

**PUNJAB STATE ROAD SECTOR PROJECT
LOAN # 4843-IN**

**Consultancy Services and Project Preparatory
Studies for Package II (Phase II)
Inception Report**



8-00719.00
#1/2007/PKG – II/Phase II/PSRSP

Punjab State Road Sector Project Consultancy Services and Project Preparatory Studies for Package II (Phase II) IBRD Loan # 4843 IN

Inception Report

Prepared by

Name Robert F. Fergstrom
Title Team Leader

Opus International (M) BHD
No 79, Sector 16-A
Chandigarh, UT, India
Tel: +9172 6573251
Cel +917 9779222679

Reviewed By

Name Tony M. Porter
Title Technical Director

Opus International Consultants Limited
International Office
Level 9, Majestic Centre, 100 Willis Street
PO Box 12343, Wellington 6144
New Zealand

Released By

Name Robert F Fergstrom
Title Team Leader

Tel: +9172 6573251
E-mail: robert.fergerstrom@Opusbhd.uemnet.com

Date: 9th September 2008
Reference: OPRC 03-08 CFMS: 8-00719.00
Status: Final

Contents

1	Executive Summary	1
1.1	Project Background and Objectives.....	1
1.2	Technical Approach and Methodology.....	1
2	Project Background and Objectives	3
2.1	Roads and Bridges Development Board (PRBDB)	3
2.2	Project Network	4
2.3	Consultant Services.....	6
3	Technical Approach and Methodology	14
3.1	Part A Contract Strategy.....	15
3.2	Part B Review of Existing Information and Selection of the Pilot Area	18
3.3	Part C Conceptual Design	19
3.4	Part D Support for Procurement	21
4	Appendices	23
4.1	Technical Approach to the Assignment.....	23
4.2	Detailed Programme.....	24
4.3	Draft Study Tour Agenda.....	25

1 Executive Summary

1.1 Project Background and Objectives

Government of Punjab (GOP) working through the Punjab Roads & Bridges Development Board (PRBDB) has contracted with the Opus International Consultants Limited, Opus International (M) BHD JV (Opus) to devise a strategy for future implementation of output and performance based contracting (OPRC) for the ongoing management, rehabilitation and maintenance of its state road network.

The initial project network consists of 652 kilometres of roads located in Bathinda, Mansa and Sangrur Districts located in the Southern portion of Punjab state. Network roads are classified as State Highways (SH), Major District Roads (MDR), Other District Roads (ODR) and Link Roads also referred to as Village Roads (VR). The findings of an initial survey of project roads are shown in Table 2.2.1.

PRBDB has contracted for consultant services to prepare contracts for upgradation, rehabilitation and maintenance of a pilot road network of approximately 600 km based on Output Performance Based Road Contracts. More specifically, the services cover:

- Confirmation of a pilot established around the roads set out in Table 2.1
- Services for Parts A – D, namely:
 - A: Development of Contract Strategy
 - B: Review of the Adequacy of Current Information and Collection of Additional Data
 - C: Preparation of Conceptual Designs, Bidding Documents, Financing Models and Price Estimates
 - D: Support to the Procurement Process

A Project Team with in-depth experience on OPRC-oriented highways rehabilitation/maintenance projects in diverse environments has been mobilized to perform the services. An organizational chart for the team highlighting principal areas of responsibility is shown in Figure 2.3.

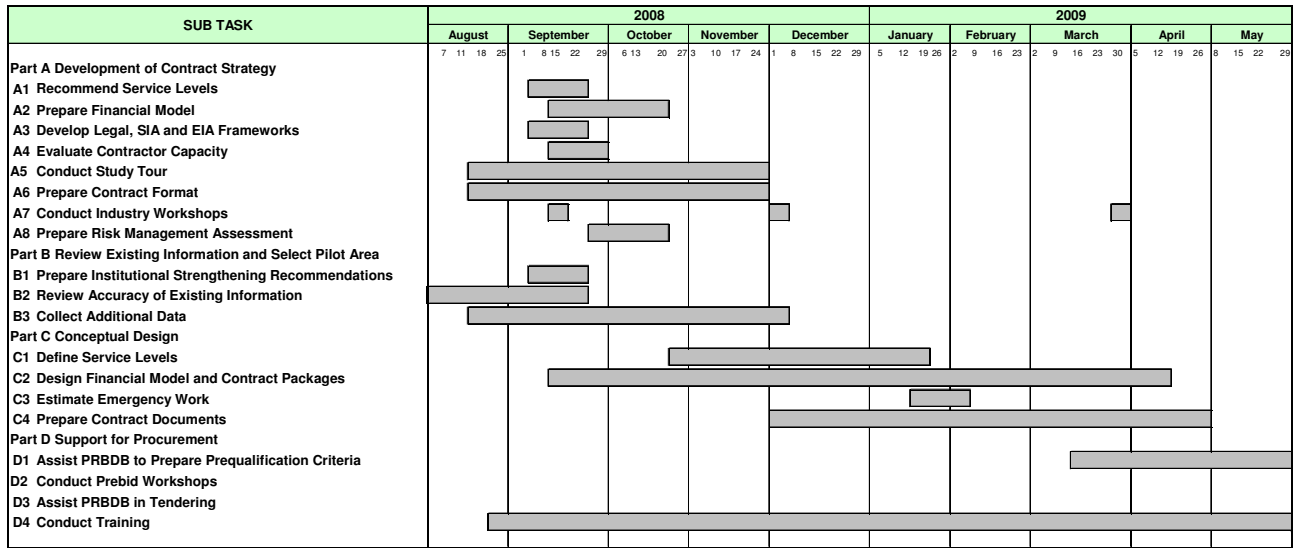
Opus has prepared a Project Quality Assurance Plan (PQAP) based around the Opus ISO9001-certified Quality Manual that is fully compliant with World Bank and PRBDB standards and defines our obligations to PRBDB. Key deliverables, and reporting requirements are shown in Table 2.2 and subtask responsibility is shown in Figure 2.5.

1.2 Technical Approach and Methodology

The Technical Approach and Methodology section summarizes activities already accomplished and contains a brief description of each of the nineteen work plan sub tasks planned for successful completion of parts A through D of the services. Figure 1.1 is a bar chart schedule of the work plan. Appendix 4.1 is an updated detailed description of the technical approach and methodology for the project based on discussions held during negotiations.

Inception Report for Preparation of Design and Pilot Contracts for Output and Performance Based Contracts (OPRC) for Approximately 600 km of Roads in Punjab State

Figure 1.1: Project Sub Task Schedule



2 Project Background and Objectives

The Government of Punjab (GOP) working through the Punjab Roads & Bridges Development Board (PRBDB) has contracted with the Opus International Consultants Limited. Opus International (M) BHD JV (Opus) to devise a strategy for future implementation of output and performance based contracting (OPRC) for the ongoing management, rehabilitation and maintenance of its state road network. As a first step in this process, OPUS has been charged with implementing a pilot project covering approximately 600 kilometres of roads located in Bathinda, Mansa and Sangrur Districts. The network comprises primarily bituminous surfaced pavements, The contract(s) for all the works within the pilot project shall be based on the World Bank's Sample Bidding Document "Procurement of Works and Services under Output and Performance Based Road Contracts, 2005"

The principal objective of the project is to assist the PWD/PRBDB in all aspects of project preparation and the procurement process by conducting:

- (i). Generic technical studies;
- (ii). Network specific technical studies;
- (iii). Preparation of bidding documents for Output- and Performance-based Road Contracts (OPRC);
- (iv). Support to the procurement process; and
- (v). Training of PRBDB/PWD personnel regarding preparation and implementation of OPRC.

2.1 Roads and Bridges Development Board (PRBDB)

The PRBDB was formed by the Punjab State Government in 1998 to spearhead the state's efforts to improve its road infrastructure. It serves as a nodal agency for planning and monitoring road improvement works throughout the state. Its primary responsibilities include:

- (i). Planning Construction and Maintenance of the State Road Network
- (ii). Serving as the nodal agency for implementing the Prime Ministers Rural Road Programme in the State (PMGSY);
- (iii). Serving as the nodal agency for implementing the World Bank aided Punjab State Road Sector Project.

The Public Works Department in its support role for Punjab State Road Sector Project assists with technical support to consultants that are engaged by PRBDB to plan and execute road projects. Figure 2.1 is a partial organizational structure for PRBDB and PWD highlighting project related activities and linkages with Opus.

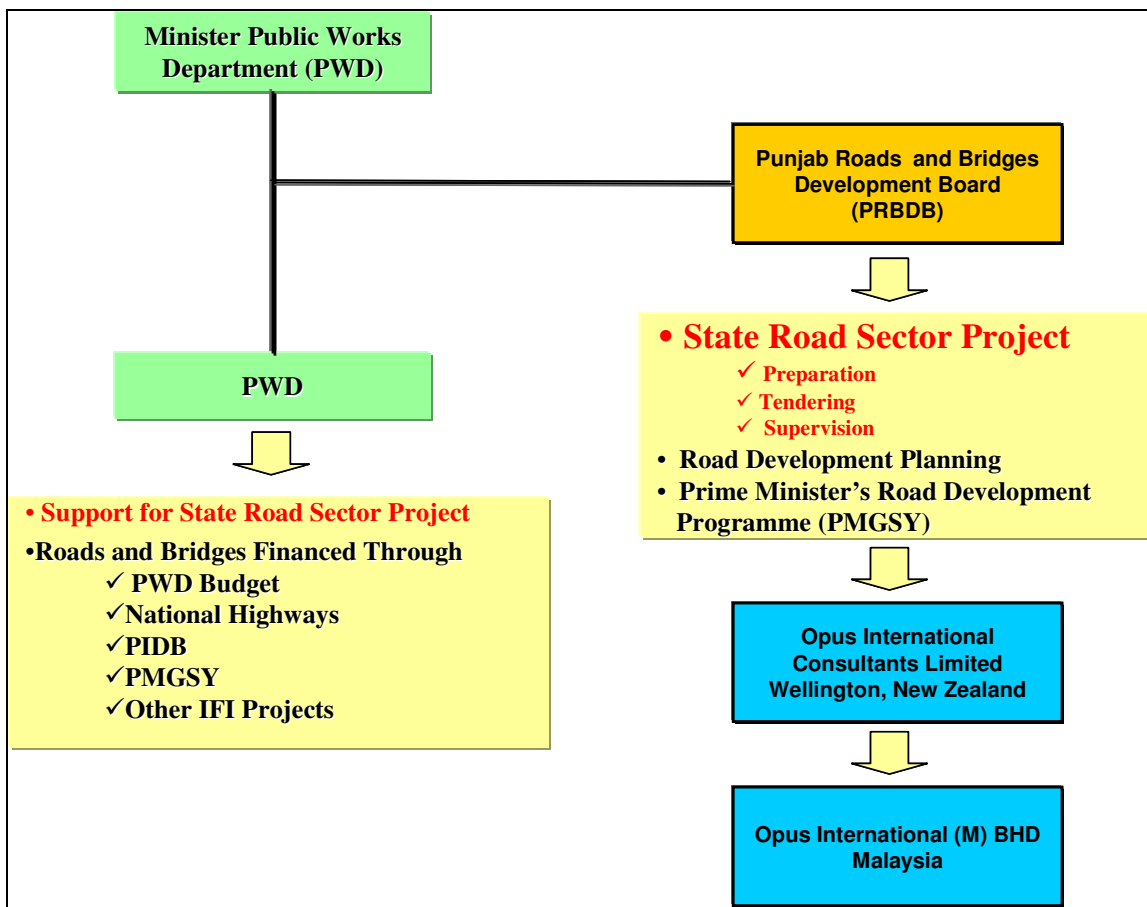


Figure 2.1: Organisational Structure for Implementing the State Road Sector Project

2.2 Project Network

The initial project network consists of 652 kilometres of roads located in Bathinda, Mansa and Sangrur Districts located in the Southern portion of Punjab state. Network roads are classified as State Highways (SH), Major District Roads (MDR), Other District Roads (ODR) and Link Roads also referred to as Village Roads (VR). As called for in the Terms of Reference (TOR) Opus will review this list and may recommend adjustments to the network in order to create a more contiguous and consistent road network.

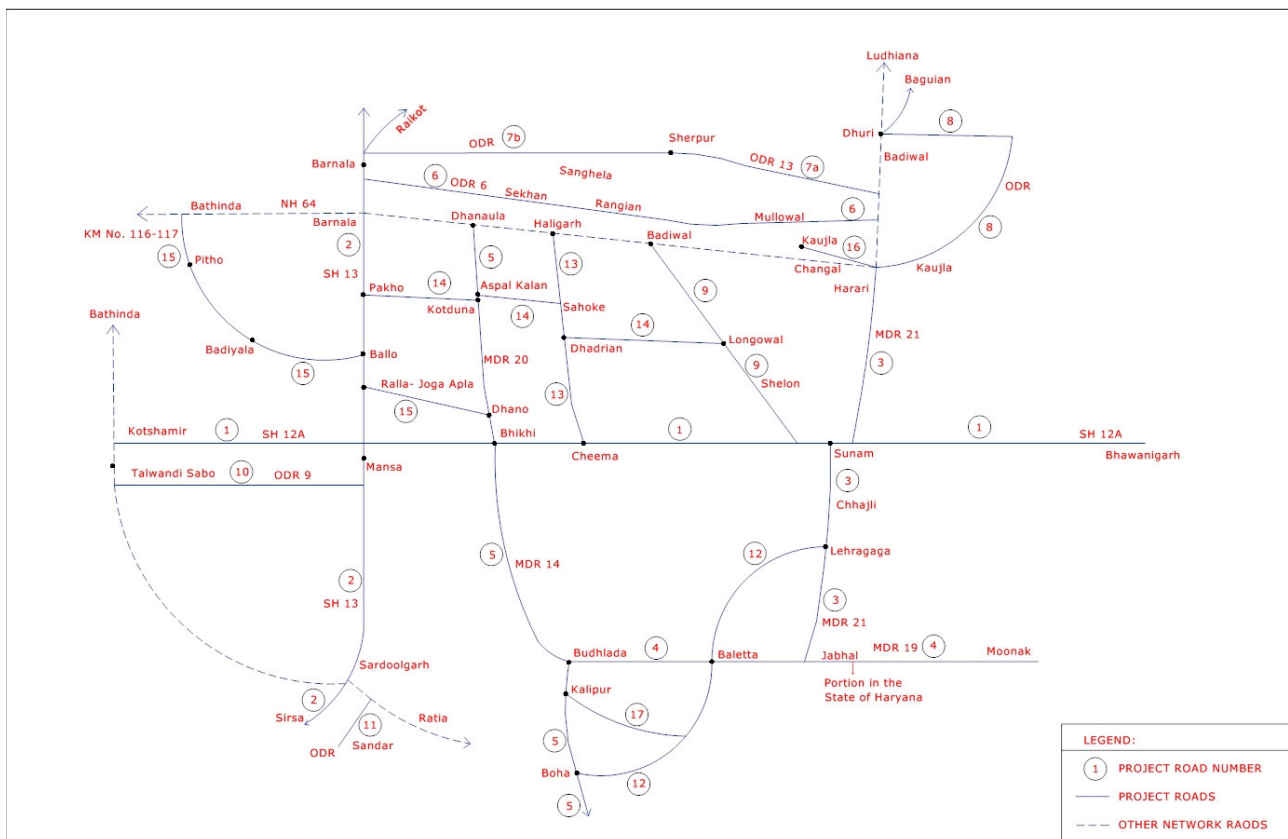


Figure 2.2: Schematic View of Project Roads

A visual survey of network roads was conducted in August 2008. Although this initial survey cannot be considered 100% accurate it revealed that almost half of the project roads are in good condition and should not require upgradation or major maintenance during the initial phase of the project. MDR's have benefited from an ongoing upgradation program and most MDR's included in the listing of project roads have received either periodic maintenance or upgradation in the last two years.

The remainder of the network roads range from very poor to fair and these roads would require an initial investment to bring them to a desired level in terms of condition and/or width. The percentage of roads in poor or very poor condition by road designation follows:

- State highways - 24%
- Major District Roads - 1%
- Other District Roads - 28%, and
- Link Roads - 58%.

Because several of the project roads either have received periodic maintenance or upgradation works, including some of the roads slated for upgradation in the TOR, the average condition of project roads has improved since OPUS inspected them prior to proposal preparation. Access to

the Quality Assurance records for this work will be necessary to understand the risks over the duration of the OPRC. The findings of this initial survey are shown in Table 2.1.

Table 2.1: Condition of Project Roads

Number	Designation	Name	Length (Rounded to Nearest Kilometer)				
			Good	Fair	Poor	Very Poor	Total
1	SH 12A	Bhawanigarh Sunam Bhikhi Kotshamir Road	5	73	24	5	107
2	SH 13	Barnala Handiaya Hari-Singhwala Mansa-Sardulgarh Sirsa Road (Up to State Boundary)	45	28	17	4	94
3	MDR 21	Sangrur Sunam Lehra Jakhhal road (Up to State Boundary)	49	0	0	0	49
4	MDR 19	Moonak Budhlada Jakhhal Road	38	0	0	0	38
5	MDR 14 & 20	Dhanaula Bhikhi Rattia Road (Up to State Boundary)	50	8	0	1	60
6	ODR 6	Dhuri- Barnala Road Via Moolowal Sekha Rangian	18	0	0	12	30
7A	ODR 13	Dhuri-Sherpur	20	0	0	0	20
7B	ODR/VR	Sanghera-Sherpur Including Bypass Barnala			18	4	22
8	ODR 7 & 10	Dhuri- Bhalwan – Sangrur Road	8	10	2	3	23
9	ODR 3 & 5	Barbar Longowal Sunam Road	18				18
10	ODR 9	Mansa to Talwandi Sabo Road	28				28
11	ODR 22 B	Sardulgarh Ratia Road to Sangha up to Haryana Boarder		11	2	3	16
12	Link	Lehragagal Ladel Kishengarh Baretta Kulerian Sher Hanwala Boha Road				43	43
13	Link	Harigarh to Cheema	25				25
14	Link	Longowal Pakho			10	12	22
15	Link	NH-64 to Ballo Bhikhi	10		19	2	31
16	Link	Sangrur Harari Changaal Kanjla.				9	9
17	Link	Budhlada Ratia to Baretta-Kulerian Road				19	19
Total			314	130	91	117	652
Percent by Condition			48%	20%	14%	18%	100%
State Roads			25%	50%	20%	4%	100%
MDR			94%	6%	0%	1%	100%
ODR			59%	13%	14%	14%	100%
Link			23%	0%	19%	58%	100%

While the PWD is pursuing a robust upgradation and rehabilitation programme, routine maintenance of the network has been neglected. Open potholes were observed on most project roads, even some on which an asphaltic concrete overlay was completed in recent years. Programmes for removal of vegetation, routine maintenance of drainage structures and unpaved shoulders do not appear to exist. Standing water was observed at several locations, signs were obstructed by overgrown vegetation. Although replacement of earth shoulders was observed on SH and MDR's, on some ODR's and link roads the absence of shoulder material caused extensive pavement edge failure.

2.3 Consultant Services

The objective of the OPRC project is to prepare contracts for upgradation, rehabilitation and maintenance of a pilot road network of approximately 600 km based on Output Performance Based Road Contracts. More specifically, the services cover:

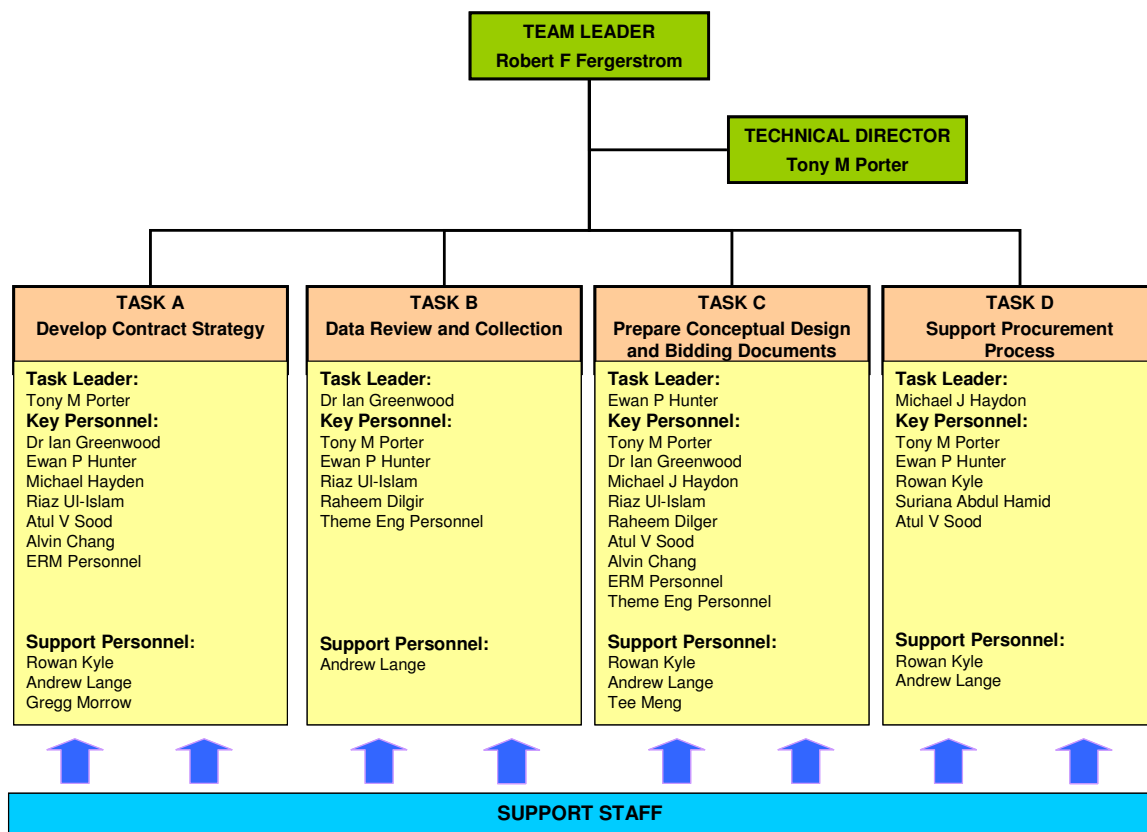
- Confirmation of a pilot established around the roads set out in Table 2.1
- Services for Parts A – D, namely:

- A: Development of Contract Strategy
- B: Review of the Adequacy of Current Information and Collection of Additional Data
- C: Preparation of Conceptual Designs, Bidding Documents, Financing Models and Price Estimates
- D: Support to the Procurement Process
- A requirement to build on the prior feasibility study work

2.3.1 Project Team

A Project Team with in-depth experience on OPRC-oriented highways rehabilitation/maintenance projects in diverse environments has been mobilized to perform the services. An organizational chart for the team highlighting principal areas of responsibility is shown in Figure 2.3.

Figure 2.3: Project Team Organization



Mobilization of the project team began with the arrival of the Team Leader on August 14, 2008. Other Team members currently mobilized are:

- Network Management Specialist – Dr Ian Greenwood
- Procurement Specialist – Ewan Hunter
- Senior Engineer – Andrew Lange

Inception Report for Preparation of Design and Pilot Contracts for Output and Performance Based Contracts (OPRC) for Approximately 600 km of Roads in Punjab State

Remaining staff members will be mobilized in accordance with the schedule in Figure 2.4 below. Major reports are highlighted in this Figure.

Figure 2.4: Staffing Schedule

NAME AND POSITION	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Weeks				
	1	2	3	4	5	6	7	8	9	10	Punjab	Away	TOTAL		
Key Personnel															
1 Robert Fergerstrom Team Leader	■			■		■			■		■	32		32	
2 Dr Ian Greenwood Network Management Specialist		■		■			■		■	■	4	5	9		
3 Tony M Porter Highway Specialist		■		■			■		■	■	5	4	9		
4 Ewan Hunter Procurement Specialist		■			■				■	■	5	3	8		
5 Michael Hayden Pavement Management Specialist				■		■		■	■		6	2	8		
6 Raiz Ul-Islam HDM4 Specialist		■		■			■		■		2	10	12		
7 Raheem Dilger Road Safety Specialist				■		■		■			2	5	7		
8 Atul Sood Legal Advisor			■	■		■					4		4		
9 Alvin Chang Financial Specialist						■	■					3	3		
											59	31	90		
Support Specialists															
10 Rowan Kyle Procurement Specialist	■	■		■	■		■	■	■	■	12	6	18		
11 Andrew Lange/Greg Morrow Senior Engineer		■			■		■	■	■		14	2	16		
											26	8	34		
											85	39	124		
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">● ★ 1</div> <div style="text-align: center;">● ★ 2</div> <div style="text-align: center;">● 3</div> <div style="text-align: center;">★ ● 4</div> <div style="text-align: center;">● 5</div> </div>															
Major Deliverables															
1 Inception Report	4 Draft Final Report														
2 Interim Report 1	5 Final Report														
3 Interim Report 2	★ Consultation Workshop Reports														

2.3.2 Equipment and Software

As part of the Opus contract for the Project a provisional sum was included for the supply of high speed data collection equipment. In August Opus submitted a High Speed Data Collection Report recommending purchase of a laser profilometer that explicitly collects roughness (and video) data as outlined in the RFP. Additionally the equipment that was recommended, addresses the need for collection of rutting data required for monitoring long term asset management performance measures. The ROMDAS system, as produced and sold by Data Collection Limited (DCL), was nominated within the Opus submission as being a suitable instrument with which to meet the above contractual requirements. This report examined the ROMDAS solution in terms of:

- Ability to meet the RFP requirements;
- Support within India;
- Track record;
- Flexibility and Ongoing Development; and
- Affordability.

Aligned with the potential application of the ROMDAS Profilometer system, provision is made to supply the Highway Information Management System (HIMS) software to store the collected data. The HIMS¹ is a powerful and flexible road asset information database management and analytical tool designed to meet the needs of road agencies and consultants. HIMS is capable of storing and analysing data (e.g. dimensions, condition data, etc) on any type of asset including pavements, bridges, culverts, stream crossings, seawalls, buildings and traffic data.

Because the levels of customisation possible, HIMS can be set-up to be as simple or as sophisticated as the user may require. HIMS is built around the concept of varying “user levels”, each level having different functional requirements and numbers of users. Given that it incorporates the ability to view video files, and includes an integrated GIS component, it is more than adequate to meet the needs of this Project. HIMS has been installed in numerous countries around the world, including India where the Bangalore University and the State of Karnataka purchased ROMDAS equipment for condition measurement.

The setting-up of HIMS will involve the following steps:

- Procurement and commissioning of the necessary hardware to support the HIMS software as soon as possible following contract award;
- Configuring HIMS to the specific needs of this Project, in turn accounting for:
 - applying Opus’ experience to scope it out,
 - incorporating input from PRBDB/GOP in the form and content of the system and its databases;
- Demonstrating the Opus held pilot version of HIMS to PRBDB/GOP and receiving feedback;
- Fine-tuning HIMS;
- Conducting initial training for PRBDB Project personnel in the use of HIMS. We will explore the advantage of loading historic data useful to the OPRC tenderers into HIMS as a means of ready dissemination;
- Hand over the system and complete database to the PRBDB at the completion of the project.

2.3.3 Quality Assurance Plan (QAP)

A Project QAP based around the Opus ISO9001-certified Quality Manual that is fully compliant with World Bank and PRBDB standards that defines our obligations to PRBDB has been prepared and is currently under review by senior management. The Opus Quality

¹ Refer URL <http://www.hdm-ims.com/index.htm> for details

Manual sets out the following components of our overall approach to Quality Assurance for this project:

- General content and format of the PQAP
- Contract-specific issues to be dealt with,
- Mandatory project requirements e.g.:
 - contract organisation chart (including details of roles/responsibilities),
 - contract work programmes,
 - provisions to prepare specific documentation,
- reporting requirements and frequency,
- data formats and data flow,
- allied measures (e.g. data validation, procedures, documentation, standards, approvals).

The OPRC PQAP was developed to ensure that project deliverables address all of the requirements of the TOR. These deliverables and timeframe for their preparation are shown in Table 2.2.

Table 2.2: Deliverable List

TASK/PART	Sub-Task	Deliverables List	Reporting
A. Development of Strategy	A1: Definition of Service Levels	Recommended OPRC Service Levels (for each road)	Interim Report 1 (+ 3 Months)
	A2: Financial Model to be Used for Payment	The development of at least 3 alternative cost recovery models and the recommendation of the most optimised method for contractor payment	Interim Report 1 (+ 3 Months)
	A3: Legal Framework, EIA and SIA Frameworks	Report on the legal framework required for the implementation of the OPRC concept and integration of all necessary social and environmental requirements into the conceptual designs and contract documents.	Interim Report 1 (+ 3 Months)
	A4: Confirmation of Contracting Capacity to Undertake and Manage the Works	Report on existing capacity of the contracting industry to deliver on the OPRC contracts and recommendations to improve capability and capacity	Interim Report 1 (+ 3 Months)
	A5: Overseas Study Tour	Study tour itinerary & briefing notes and study tour report	Interim Report 1 (+ 3 Months)
	A6: Development of Contract Format	Report recommending OPRC contract format	Interim Report 1 (+ 3 Months)
	A7: Industry Consultation Workshop	Workshop held (& debrief notes)	Interim Report 2 (+ 5 Months)
	A8: Development of a Comprehensive Approach to Allocation of Risk	Report on risk allocation and management	Interim Report 2 (+ 5 Months)

Inception Report for Preparation of Design and Pilot Contracts for Output and Performance Based Contracts (OPRC) for Approximately 600 km of Roads in Punjab State

TASK/PART	Sub-Task	Deliverables List	Reporting
B: Review Adequacy of Current Information & Collection of Additional Condition Data	B1: Checking Suitability and Selection of the Proposed Road Sections to be Included in OPRC	Report recommending roads for piloting OPRC	Interim Report 1 (+ 3 Months)
	B2: Review of Adequacy of Current Information	Technical Report recommending the need for supplementary data collection programme	Interim Report 1 (+ 3 Months)
	B3: Collection of Additional Roughness, Rutting and Video of Network	Report on the Selection*, Purchase of, and training with, a Portable Profilometer equipment and collection of the additional data Validated data lodged in the HIMS system. Collection of additional survey, SI and other related design information.	Interim Report 1 (+ 3 Months); Interim Report 2 (+ 5 Months)
C: Preparation of Conceptual Designs and Bidding Documents	C1: Definition of Service Levels for Each Road Included in the Pilot Study	Confirmation of Service Levels for each Road Hierarchy	Interim Report 2 (+ 5 Months)
	C2: Contract Packaging, Conceptual Designs, Financial Model and Confidential Price Estimate for Each Contract	Recommended Financial Model, Conceptual designs for-gradation, Rehabilitation and Maintenance Forward Work Programme under OPRC including previously identified road safety improvement designs, schedules, specifications and confidential price estimate.	Interim Report 2 (+ 5 Months); Draft Final Report (+ 8 Months)
	C3: Estimate and Pricing for Emergency Works	Basis & price estimate for emergency works	Draft Final Report (+ 8 Months)
	C4: Preparation of Contract Documentation	Contract documents for pilot OPRC contracts, and draft TOR for Future Technical Assistance to the GOP under Part E	Draft Final Report (+ 8 Months)
D: Support to the Procurement Process	D1: Prequalification of Contractors	Proposed contractor prequalification scoring system Prequalification documents, including questionnaire forms Prequalification evaluation report (for each road package)	Draft Final Report (+ 8 Months); Pre qualification Evaluation Report
	D2: Pre-Bid Workshops	Workshop held (& debrief notes)	Draft Final Report (+ 8 Months); Tender Evaluation Report
	D3: Tender Process and Evaluation of Tenders	Assist with Tendering Workshops, Address Tender Queries, Tender evaluation and reports	
	D4: Training	Prepare training plan and report at the conclusion of all training and workshops	Training and Workshop Reports

* This report was submitted in August and authorisation has been received to purchase the ROMDAS system

The PQAP is founded on three basic principles:

- Detailed Planning,
- Clearly defined assignment of responsibility,
- A comprehensive review process.

The planning process utilizes Microsoft Project Software to track tasks, sub tasks, activities within each subtask and key deliverables. For each activity or deliverable the plan identifies:



- beginning and ending date,
- person or persons responsible ,
- planned level of effort

The current version of the detailed Microsoft Project Work Plan is included in Appendix 4.2 of this report. The Work Plan identifies each of the four major tasks and the 19 subtasks that are identified in the TOR as well as activities associated with each sub task. It identifies the team member or members that are assigned to each task along with the planned level of effort for each.

Responsibility for project deliverables begins with the sub task leader shown in Figure 2.5. The sub task leader reports to the Task Leader (see Figure 2.3) who reports to the Team Leader through the Technical Director.

Figure 2.5: Staff Responsibility Matrix

Key Staff Member	Sub task												
	A1 Service Levels	A2 Financial Model	A3 Legal, SIA, EIA Frameworks	A4 Contractor Capacity	A5 Overseas Study Tour	A6 Contract Format	A8 Industry Workshops	B1 Risk Management	B2 Pilot Area	B3 Adequacy of Current Data	C1 Collection of Additional Data	C2 Define Service Levels	C3 Design, Financial Model and Contract Packages
Robert F Fergerstrom Team Leader	√	√	√	√	√	√	√	√	√	√	√	√	√
Dr Ian Greenwood Network Management Specialist	√		√		√		√	√	√				√
Tony M Porter Highway Specialist	√		√	√	√		√			√			√
Ewan Hunter Procurement Specialist		√		√		√				√	√	√	
Michael Hayden Pavement Management Specialist					√					√	√		
Raiz Ul-Islam HDM4 Specialist		√						√	√	√			
Raheem Dilger Road Safety Specialist							√	√	√				
Atul Sood Legal Advisor		√		√						√			
Alvin Chang Financial Specialist		√											√
Environmental Resources Management		√								√			
Theme Engineering Services								√	√				
Support Specialist													
Rowan Kyle Procurement Specialist		√	√	√						√	√	√	
Andrew Lange/Greg Morrow Senior Engineer	√	√	√	√	√	√	√	√	√	√	√	√	√

 Team Member Responsible for One or More Subtasks
 Sub-task Leader

Review Process: Each deliverable produced by the project team is reviewed by the project Technical Director (see Figure 2.3) as well as the Team Leader for accuracy of content and consistency with other project deliverables before it is submitted to PRBDB. Each major report or Task Report will list the name of the preparer and the reviewer. The Team Leader is responsible for final review prior to submittal.

3 Technical Approach and Methodology

Ahead of setting-out the detailed task-by-task methodology (Appendix 4.1), the Opus Team has undertaken the necessary preparatory work to ensure that our Technical Approach and Methodology accurately reflects the specific needs of the Project. In particular, attention was paid to the following:

- An understanding of the Project, covering both the work already completed and the consulting services that will be required to complete the remainder of the services specified in the TOR;
- Familiarity with key background issues obtained through field visits and conversations with PRBDB surrounding:
 - the highways sector in India generally and in the State of Punjab
 - OPRC precedents and practice and issues with its intended application under this Project, albeit on a pilot basis
- Identifying the key areas where the lessons from the Opus Team's wide-ranging experience across the Asia/Pacific region throughout the highways sector that can be brought-to-bear to "add-value" on the Project
- Establishing the resources and skills that will be required to execute the services within the specified time-frame

In researching the specific requirements of the consultancy needs for this Project, the Opus Team augmented its already wide-ranging knowledge with consultations involving:

- Field visits to each of the project roads and consultation with PRBDB conducted after mobilization of team members that began in August 2008,
- Attendance by senior Opus personnel at the pre-proposal conference in Chandigarh on the 10th of January 2008
- Review of available Feasibility Study Reports covering the highways that are the subject of this Project
- Earlier site visits over the period 8th – 12th November 2006 and the 13th -14th of September 2007 by Opus personnel to the majority of the nominated road sections covered under the Project
- Recent implementation experience in India with highway upgrading by traditional approaches and the corresponding weaknesses (including the perspectives of contractors)
- Clarification on the National/State perspectives on the non-engineering components of the project, covering environmental, social, land acquisition, etc
- Opus' role at the forefront of developing and implementing the OPRC concept in both developed and developing countries, including the OPRC Consultancy TOR for Thailand and the re-write of the World Bank sample bidding documents.

Additionally, Opus brings to this Project its international experience on performance based contracts of one form or another covering India, New Zealand, Australia, North America and the United Kingdom. This includes roles as client advisors to road agencies in North America and Australia, through to taking on the lead contractor role for a predominantly rural road network in New Zealand. The OPUS Team Leader has extensive experience in India in preparing projects for ADB financing under the PMGSY programme including introducing enhancements to the five-year

performance based contracting model employed by NRRDA for roads upgraded through PMGSY. It is this “hands-on” experience in the “doing” of asset management that we will bring to bear in implementing OPRC in Punjab state.

The following paragraphs contain a brief description of the methodology that the Opus Team will employ for the preparation of contracts for the upgradation, rehabilitation and maintenance of approximately 652 km of road based on Output Performance based Road Contracts. More specifically, the services cover:

- A pilot established around the roads set out in Table 2.1
- Services for Parts A – D, namely:
 - A: Development of Contract Strategy
 - B: Review of the Adequacy of Current Information and Collection of Additional Data
 - C: Preparation of Conceptual Designs, Bidding Documents
 - D: Support to the Procurement Process

This section summarizes key activities already accomplished or underway in parts A through D. Appendix 4.1 is a detailed description of the technical approach and methodology for the project updated based on discussions held during negotiations. The sections that follow summarise activities to be performed under each sub task and highlights accomplishments to date.

3.1 Part A Contract Strategy

Task A1 Service Levels: The crucial first-step in developing the OPRC contract strategy involves establishing the appropriate generic OPRC service levels (or performance criteria). This step has been initiated and draft preliminary recommendations on OPRC service levels have been prepared. These recommendations are currently in the process of being reviewed by the Technical Director and the Part A Task Leader. The report will be submitted to PRBDB shortly. After submittal of the Draft Service Level Document the project team will take additional steps to complete this activity including preparing the following documents:

- Summary report on the outcomes of the consultation with contractors and other stakeholders on proposed service levels;
- Report on the recommended systems for capturing and reporting on service level compliance and how failure to comply will influence the contractor’s payments.
- Report on defined methods and systems to be utilised by the public and road users to inform the authorities on road condition.

Task A2 Financial Model: Once the proposed service levels have been defined, we will review cost implications and estimate the impact of completing the scheduled upgradation and rehabilitation work. We will utilise the HDM-4 model to examine the implications of the service levels defined in Task A1 on the overall cost of maintaining the network. While developing the financial model for payment OPUS will consider costs and parameters such as:

- affordability of road user comfort measures,
- periodic maintenance,
- required upgradation,

- enforcement measures,
- availability and cost of required funding.

Once we have researched these aspects we will use them to develop a model to examine a minimum of three alternative financial outcomes and an optimised method for contractor payment including consideration of asset condition at time of handing back to the Client.

Task A3 Legal, SIA and EIA Frameworks: We will investigate legal, social and environmental impacts of implementing the proposed interventions and prepare a summary report on the applicability of the existing legal frameworks for the adoption of the OPRC concept within Punjab State and actions required to modify the World Bank model to make it compatible to existing legislation and PBRDB needs. We will also brief the Theme engineers on the critical issues relating to the integration of necessary environmental and social issues into these improvement works.

Task A4 Contractor Capacity: In order for the concept to meet its potential we will brief contractors on such issues as learning curve requirements, approaches to risk management, and how small/local contractors may get involved. The aim of the exercise is to ensure that there is sufficient capacity and not necessarily to ascertain what the total capacity is. For a successful competitive contract round, we consider that at least three capable consortiums willing to tender would be desirable. The result of this task will be a Report on the capacity of the contracting industry to deliver OPRC Contracts including:

- availability of potential bidders;
- pre-qualification criteria;
- issues of risk which will require mitigation when developing the contract documents;
- the contract size that best fits available capacity, which in turn will dictate whether the network should be tendered as one or more contract packages; and
- recommendations on prioritised actions to improve capability and capacity.

Task A5 Study Tour: A proposed agenda containing locations and agencies in New Zealand and Australia to visit on the study tour has been discussed with PRBDB and target date of the second half of October 2008 has been agreed upon. OPUS is now taking steps to determine availability of key staff at targeted institutions. The study tour agenda is included in Appendix 4.3 of this report. The purpose of the study tour is to increase the awareness of the participants, especially in the following areas:

- Building an appreciation of the practicalities of OPRC from the viewpoints of the client and the consultant;
- Highlighting key technical issues directly relevant to this project;
- Identifying implementation and administrative issues, including:
 - resourcing, training, up-skilling and system needs;
 - risk analysis and management; and
 - achieving the necessary cultural exchange.

Upon completion of the study tour, participants will prepare a report on lessons learned and actions required by consultants, contractors and PRBDB to enhance the effectiveness of OPRC in Punjab State.

Task A6 Contract Format: A recommended performance contract framework will be developed that is:

- relevant to the contractors that can be attracted to work in Punjab and does not overstretch their capabilities,
- reflects a mix of input, output and outcome components, reflective of project roads,
- maximises the potential for success while providing flexibility to allow the contract to evolve over time.

We recommend the following staged approach to jointly manage issues related to the most appropriate level of risk transfer to the contractor while managing the end of contract pavement condition.

- Step 1. Prepare a preliminary report outlining the format of the various performance based models in operation in both New Zealand and Australia,
- Step 2. Seek feedback from the contracting industry and PRBDB,
- Step 3. Seek the views of the PRBDB following the overseas tour.
- Step 4. Opus would then prepare an additional section to Interim Report No. 1 clearly outlining the most appropriate method of achieving the expectations of the PRBDB.

Step 1 is completed with submittal of the Preliminary Report on Contract Format for Output and Performance Based Contracts for Roads in August 2008. This report generated productive discussions between OPUS and PRBDB staff resulting in general agreement on the method for identifying interim performance requirements while encouraging innovation by the Contractor. The first project workshop that will take place on September 19 is expected to provide a forum for initiating discussion under Step 2. After the workshop follow up meetings will be held with contractors to further pursue this subject.

The end product of this activity will be a Draft Report on OPRC Contract Format for discussion with PRBD and the construction industry incorporating:

- Our recommendation on the final OPRC contract format (including analysis of options) and the recommendations from a legal review
- The impact of the OPRC on the residual asset value and proposed management strategy
- Our recommended method for managing non-completion of work
- Our recommendation on the compliance framework to be applied including payment reduction and possible contract termination mechanisms.
- Our recommendation on tender evaluation options and the recommended mechanism for selection.

Task A7 Industry Workshops: Attention to awareness-raising is pivotal to the successful introduction of an OPRC regime. Three consultation and awareness-raising workshops for key Government officials, staff assigned to PRBDB, PWD and other government agencies associated with the road sector, contractors and other private sector stakeholder personnel are planned. The

initial workshop will be held on 19 September, after submittal of the Inception Report. This will be followed by a workshop shortly after the first Interim Report and a third workshop shortly before submittal of the Draft Final Report. In the first workshop participants will be briefed on the scope of the project as well as the model for implementing OPRC and they will be encouraged to provide feedback. The first Consultation Workshop is scheduled to be held at the CII Convention Centre in Sector 31, Chandigarh. Invitations have been sent out and approximately 60 interested stakeholders are expected to attend.

Task A8 Risk Management: Opus will use its experience with OPRC contracting to mitigate risks identified in the TOR and additional risks that were shown to be critical in other OPRC contracts in which we have been involved. These risks are discussed in detail in Appendix 4.1 and they are listed below for reference:

- Inflation,
- Traffic Growth,
- Overloading,
- Quality of Previous Construction/Maintenance Works,
- Emergencies and Natural Hazards,
- Initial and Future Potential Improvement Work,
- Change in Law,
- Political Force Majeure,
- Delays in Forestry Clearances and Land Acquisition,
- Service level “creep” (i.e. setting standards too far above common practice)
- Accepting an OPRC contract price that is too low
- Over-reliance on the use of averaged values to quantify performance against service levels

Recommendations for risk management will be included in the 2nd Interim Report.

3.2 Part B Review of Existing Information and Selection of the Pilot Area

Task B1: Check Suitability of Pre- Selected Roads: Table 2.2.1 lists the roads that have been selected for review and possible incorporation into the pilot area in which OPRC will be implemented. A preliminary inspection was completed and a second, more detailed review is scheduled to begin on 10 September. Under this task, attention will be devoted to confirming the entire selection or reducing the number of roads to be incorporated, based on both the findings under the foregoing tasks and the following:

- The need to have a contiguous and consistent network and other logistics issues;
- The capacity of the local contracting industry;
- Availability of funding to perform required upgradation;
- Data that is available or supplementary data that can be collected in a timely and cost-effective manner;
- Level of risk; and

- The degree to which these roads represent the conditions and resource demands of the entire network.

Task B2: Review Accuracy of Existing Information: The Opus Team has completed the review of information supplied by PRBDB. Based on this review, a draft report on the adequacy of the existing data relating to the project roads and the need for and means of collecting additional data required for the concept designs, HDM4 analysis, and forecasting pavement life, has been completed. This report notes that for most of the network, no data of significance is currently available. For roads 1,2,3 and part of 5 (the state highways and some MDRs) some data has been collected, but it is three years out of date. The report is currently being reviewed by the project Technical Director and is expected to be submitted prior to the first consultation workshop.

Task B3: Collect Additional Data: As previously noted in Section 2.3.2 the Road Measurement Data Acquisition System (ROMDAS) system has been purchased and is expected to be delivered by the end of October. This is a low-cost generic system designed to collect road and pavement data using project vehicles. Upon receipt of the equipment OPUS personnel, with assistance of the local supplier of ROMDAS will:

- Take delivery, install and test the unit;
- Train PRBDB staff in the use of the equipment;
- Develop a set of documented guidelines and procedures on the operation and calibration of the equipment, including validation and quality control measures;
- Establish a data collection schedule that ties into the planning and payment milestones under the OPRC contract(s);
- Log data into the HIMS database system;
- Identify any data manipulation required to meet condition reporting or predictive modelling requirements;
- Establish the format and timing of contractual reporting requirements; and
- Complete all necessary training of GOP staff in the operation and maintenance of the vehicle and equipment.

As noted in Task B2 no data of significance is currently available for most of the network and collection of this data may require a greater level of effort than was originally assumed. We expect to rely heavily on ROMDAS, a detailed visual survey and some pavement testing (deflection and some pits) for the data that is required to support the OPRC contract. Data for conceptual designs and preparation of the EIA and SIA will be arranged through Theme Engineering, ERM, project staff or PWD. This situation will be closely monitored and recommendations for additional levels of effort, if required, will be provided in the First Interim Report.

3.3 Part C Conceptual Design

Task C1: Define Service Levels: Once required data have been collected the long term asset condition implications and the affordability of adopting the service levels proposed under Task A1 will be reviewed and confirmed with the PRBDB. We will identify the need for additional traffic counting and undertake a series of sample surveys to confirm the existing mix of traffic and the

rates of growth that were identified in previous surveys. Following final agreement with the PRBDB, these service levels will be incorporated into the contract documents along with their associated measures and compliance regimes.

Outputs of this task will include a Report on confirmed service levels and financial implications and a monitoring and evaluation programme to measure the impacts of the improvement works

Task C2: Design Financial Model and Contract Packages: In performing this task we will bring together all of the activities performed under previous sub tasks and prepare a comprehensive plan for implementing OPRC. To accomplish this we will develop:

- A long term forward work program that defines upgradation, rehabilitation and routine maintenance works for the life of the contract in order to ensure that selected project roads will all exhibit a residual life that meets or exceeds design life standards at the completion of the project;
- Conceptual designs for upgradation and rehabilitation that meet approved design standards for each road classification (State Highways Major District Roads, Other District Roads and Link Roads) and principal condition parameters for each project road type.
- Recommendations regarding the number of contract packages taking into consideration the types of contractors likely to tender for the contract, the need to promote the local contracting industry and the need for sufficient efficiency to keep overall cost of upgradation, rehabilitation and maintenance within the contract budget.
- A confidential price estimate for completing the works,
- At least three cost recovery models that consider routine maintenance, rehabilitation and upgradation needs from which an optimal model can be selected.

Task C3 Emergency Work: Under this task, consideration will be devoted to reviewing the basis for the pricing of emergency works (i.e. fixed or unit prices from bidding). In so doing, we will take account of both works that have been executed in the past and currently endorsed specifications for remedial works. The cost estimate will be prepared based on existing market rates and the estimated quantum of works for use in the evaluation and/or negotiation of tenders.

Task C4 Contract Documents: The OPRC contract documentation will be aligned with framework provided by World Bank Sample Bidding Documents (but recognising the need for these documents to also incorporate local variances identified through the findings from the lead-up work and industry workshops) and they will comprise at least the following:

- Bidding Procedures that set the context of the contracts, in terms of:
 - the criteria upon which contractors will be assessed for pre-qualification,
 - what actions are required from bidding contractors,
 - how the tenders will be evaluated,
 - the forms required to be filled out by the contractor;
- Works Requirements that define the specifications, drawings and supplementary information that will apply to the contracted works - these specifications are particular to the OPRC contract form and will include the performance criteria and threshold values that apply;
- Conditions of Contract and Contract Forms: The general and particular conditions that will apply under the contract (e.g. World Bank Sample Bidding Documents and FIDIC), as well as

the forms that will be completed when the contract is awarded (the original Invitation to Bid document will also be incorporated).

- Legal Review: To ensure consistency and agreement with standard contract conditions and the legal requirements pertaining to contract law in India.

3.4 Part D Support for Procurement

Task D1 Contractor Prequalification: The PRBDB/GOP will implement a “prequalification” process to select contractors who will be invited to submit tenders under Task D3. We will assist the PRBDB applying the findings from Tasks A4 and A7 to form the basis of the prequalification standards. Ideally a minimum of three contractors would be prequalified for each contract to ensure an adequate level of competition is achieved. Typical tasks that we would perform include:

- preparing the prequalification document,
- assisting with advertising, responding to queries, seeking clarification from contractors as required, evaluating and ranking contractor responses and notifying respondents after selection by PRBDB/GOP selection.

Task D2 Prebid Workshops: The emphasis in the prebid workshops will be placed on the following:

- Explaining the final OPRC contract format and the bidding process;
- Showing video footage of “typical” sections of the roads and issues arising in respect to how OPRC will treat them;
- Taking contractors through a “case study” of how a typical OPRC-based project will be implemented;
- Detailing how the performance assessment and payment processes are carried-out under the OPRC form of contract;
- Responding to questions;
- Conducting a site visit to the contract areas to explain key aspects of the contract in terms of illustrating acceptable and unacceptable items and identifying some of the challenges in terms of the upgradation and rehabilitation works.

Any relevant feedback arising from the workshop will be documented and consideration given to any minor amendments to the contract documentation. Such amendments, if any, would be issued as notices to renderers.

Task D3 Tendering: We will assist PRBDB/GOP with implementing OPRC process by:

- Assisting with Tendering;
- Assisting with bid evaluation;
- Preparing a Tender Evaluation Report (if required)
- Responding to queries and requests for clarification (and if necessary issuing “addenda” to the tender documents)

Task D4 Training Plan The Opus Team will provide support/training of up to five GOP/PRBDB Engineers attached to the Consultant along with other senior PWD and PRBDB staff. The principle

the aim of this training is to facilitate the smooth implementation of the contracts and capacity building of the skills needed to undertake OPRC contracts in-house in the future. This aside, it should be noted that the support and training process will commence on day one of the overall contract, with the client staff welcome to join the Opus team on any activities at any stage of the process and not just upon the commencement of Part D. Training can be split into these categories as follows:

- **Training with Client (PRBDB)** - Client support and training will cover the likes of the following, but will be targeted toward facets that are identified as needing reinforcing as the contracts proceed:
 - Interpretation of OPRC contract clauses;
 - Measurement of condition data and applying it to both the service level criteria and the payment basis;
 - Dealing with potential disputes with the contractor;
 - Troubleshooting problems;
 - Redefining measures and negotiations – both contractor and client-led;
 - The application of advanced asset management principles; and
 - Pavement deterioration modelling using HDM-4 possibly working along side experienced modellers based in Malaysia.
- **Overseas Study Tour** – The overseas study tour will provide opportunities for key management personnel to take advantages of lessons learned by other highway agencies that are successfully implementing OPRC contracts in their respective countries. Industry representatives will be encouraged to participate in the study tour however they will be expected to bear all costs related to their participation.
- **Wider Industry Training** - There is no formal training component to this project relating to the industry. However the following scheduled activities will provide opportunities for knowledge transfer from the consulting team to the local industry.
 - Workshops (as noted within the work plan) both during the development phase of the OPRC and during the tender phase; and
 - Training to support the successful contractor post-award.

Neither the Client nor Industry training will be formally assessed in terms of the breadth or depth of understanding achieved.

4 Appendices

4.1 Technical Approach to the Assignment

The detailed methodology that was included in the proposal has been updated to incorporate clarification sought and agreements reached during negotiations. It is attached as a reference.

3.4 Detailed Methodology

3.4.1 Project Inception

Summary: Establish, working closely with PRBDB, soundly-based arrangements for the organisation and execution of the Project services by the Opus Team

a) Inception Task 1 - Mobilisation and Initial Site Visit

In recognition of the urgency required to deliver this project on time it will be our intention to notify all team members of the need to plan for their mobilisation as soon as we are informed of our acceptance to enter the negotiation phase. While no financial commitments will be entered into until after the formal contract award, we are well aware of the inevitable lead in time required for team members to organise their work schedules and travel arrangements (including visa's for which letters of support from the PRBDB will be requested), and the intention is to ensure that this critical phase is completed as soon as possible.

Once the project is underway, we will arrange for an initial visit to the network by the project team thereby ensuring they are all familiar with the area that it services, and its characteristics.

b) Inception Task 2 - Project Organisation and Procedures

The first task involves setting-up the Project organisation, to provide a sound foundation for the work to follow. Key activities will cover:

- Confirming details of the Consultants engagement with the PRBDB, and the engagement of our proposed sub-consultants for design (Theme) and environmental impact (ERM).
- Initiating mobilisation of the Consultant's Project Team personnel (i.e. according to the Staffing Schedule – Tech-7)
- Finalising the organisational structure, including the establishment of:
 - legal requirements
 - roles and responsibilities
 - levels of authority
 - job descriptions
 - lines of communications
 - project protocols (including confidentiality provisions)
- Establishing Project procedures, with corresponding obligations to be set in the Project Management and Quality Assurance Plan (PMQAP)
- Agreeing and initiating knowledge-transfer/up-skilling on OPRC with the PRBDB
- Undertake a presentation to, and establishing our relationship with, the Project Review Committee

In accordance with TOR Clause #59, a Project Review Committee is to be established to review the progress of the work and reports submitted by the Consultant. The Consultant's scope of work under this task will cover

- Initial presentation and meeting with the Project Review Committee to establish the basis of the working arrangement (eg agree protocols, lines of communication, reports to be reviewed and their timings, etc)
- Submission of reports to the Committee (with cover notes on significant issues)
- Receipt and actioning of comments on reports
- Attending meetings with the Committee (as/when warranted)
- Resolving the following aspects with PRBDB:
 - receive briefings on the status of each of the contract packages
 - agree levels of delegated authority between Consultant and PRBDB
 - receive briefings on issues to be afforded top priority
 - agree the training programme for senior GOP staff on the principles of OPRC.

Outputs:

1. Documentation on Project organisation (e.g. charts, responsibilities, job descriptions, etc) along with systems and software to be used
2. Training Programme for Senior GOP personnel

c) Inception Task 3 – QA Plans

Based around the Opus ISO9001-certified Quality Manual, the Consultant will prepare the PMQAP which, will be fully compliant with World Bank and PRBDB standards, and will define the Consultant's obligations to PRBDB. The PMQAP will set out the following components of our overall approach to Quality Assurance for this project:

- General content and format of the PQAP
- Contract-specific issues to be dealt with
- Mandatory project requirements e.g.:
 - contract organisation chart (including details of roles/responsibilities)
 - contract work programmes
 - technical standards/codes
 - provisions to prepare specific documentation (eg construction and as-built drawings, etc)
 - reporting requirements and frequency
 - data formats and data flow
 - allied measures (e.g. data validation, procedures, documentation standards, approvals)

The PMQAP will be submitted to PRBDB in draft form initially for review before being finalised.

Outputs:

1. Project Management QA Plan

d) Inception Task 4 – HIMS Database System

Aligned with the potential application of the ROMDAS Profilometer system (refer Section 2.2 and Task B3), provision has been made to also supply the HIMS software (separately if necessary) to store the collected data. The HDM Information Management System (HIMS¹) is a powerful and flexible road asset information database management and analytical tool designed to meet the needs of road agencies and consultants. HIMS is capable of storing and analysing data (e.g. dimensions, condition data, etc) on any type of asset including pavements, bridges, culverts, fords, seawalls, buildings and traffic data.

Because the levels of customisation possible cater for almost any situation, HIMS can be set-up to be as simple or as sophisticated as the user may require. HIMS is built around the concept of varying "user levels", each level having different functional requirements and numbers of users. Given that it incorporates the ability to view video files, and includes an integrated GIS component, it is more than adequate to meet the needs of this Project. HIMS has been installed in numerous countries around the world, including India where the Bangalore University and the State of Karnataka have purchase ROMDAS equipment for condition measurement. Further information is available via the ROMDAS website www.romdas.com.

The setting-up of HIMS will involve the following steps:

- Procurement and commissioning of the necessary hardware and HIMS software as soon as possible following contract award.
- Configuring HIMS to the specific needs of this Project, in turn accounting for:
 - applying Opus' experience to scope-out what is considered appropriate for this application
 - getting PRBDB/GOP input on the planned form and content of the system/databases
- Demonstrating the Opus held pilot version of HIMS to PRBDB/GOP and receiving feedback
- Fine-tuning of HIMS
- Initial training of the PRBDB Project personnel in the use of HIMS. We would also explore the advantage of loading historic data useful to the OPRC tenderers into HIMS as a means of ready dissemination.
- Hand over the system and complete database to the PRBDB at the completion of the project.

Outputs:

1. HIMS Data Management System Supplied and Configured for the Project

e) Inception Task 5 – Delivery of the Inception Report

Outputs:

¹ Refer URL <http://www.hdm-ims.com/index.htm> for details

1. *Delivery of the Inception report at **Four Weeks** from Project Start that includes the outputs from Inception Tasks 1, 2, 3 and 4.*

3.4.2 Part A Services - Development of Strategy

Summary: *Undertake the pre-planning needed to establish a sound basis for OPRC*

i) Task A1 - Definition of Service Level Classification

The crucial first-step in the work involves establishing the appropriate generic OPRC service levels (or performance criteria). This will be based on the following:

- Review the applicability of the condition measures listed in the World Bank's Sample Bidding Document "*Procurement of Works and Services under Output and Performance Based Road Contracts 2005*" (i.e. as co-authored by Tony Porter), within the context of the Punjab road sector and its Hierarchy classification.
- Establish Baseline Condition Information: Review the readily available data held by the PRBDB and if necessary the PWD to determine as many current baseline conditions as possible. This process will precede a more extensive evaluation of the existing data required under Task B2 and the subsequent Definition of Service Levels under Task C1. (Note: It is our experience from prior projects elsewhere in the world, that when examined with the "OPRC spotlight", much historical data does not stand up to detailed scrutiny - furthermore, the feasibility reports and our initial observations suggest the current condition of the project roads ranged from typically "good" to "fair" but interspersed with "poor" to "very poor" sections", suggesting that the current condition may be below the targets to be set).
- Analyses of typical road uses and road user needs for each road including formal consultations and informal discussions with an agreed stakeholder focus group that will have an understanding of the concept and the need to balance the service levels with the cost of delivery. Following discussion with the PRBDB over the most appropriate stakeholders to approach, we would develop a consultation strategy specific to the Punjab network for PRBDB approval before proceeding to establish the value and importance of the proposed service levels from the road user's point of view and in the context of the available funding stream. However some early consideration would be given to the impact of these service levels on the Total Transportation Costs and the level of affordability which are appropriate for this network.
- Identify and define methods and systems for informing on road condition: There are likely to be a number of key Operational Performance Measures (OPM's) that will be influenced by reported or audit defects. These OPM's will be identified as early as possible and systems for capturing the information and reporting these then recommended.

As noted in Section 3.2.3, the setting of "fit-for-purpose" service levels is pivotal to the whole OPRC exercise. In summary, the selected levels should:

- follow the lessons from applicable global and national precedents, refined to match the Punjab situation, to avoid implementation problems
- be neither too many/complex or too few/simple (i.e. for the reasons given in Section 3.2.1)
- be quantifiable, based on readily collectable/verifiable condition data, and correspondingly permit an equitable OPRC payment regime.

Outputs:

1. *Recommendation on preliminary OPRC Service Levels*
2. *Summary report on the outcomes of the consultation process.*
3. *Report on the recommended systems for capturing and reporting on service level compliance that will influence the contractor's performance.*
4. *Report on defined methods and systems to be utilised by the public and road users to inform the authorities on road condition.*

ii) Task A2 - Financial Model to be used for Payment.

- Identification of Service Level Compliance Costs: Once the proposed service levels have been established, we will undertake a global review of the cost implications of providing these along with the possible impact upon the contractor of completing the scheduled up-gradation and rehabilitation work. Subject to sufficient existing data we will also utilise the HDM-4 model to examine the implications of the service levels defined in Task A1 on the overall costs of maintaining the pilot network. This initial model run will need to incorporate those sections of pavement that have been improved, rehabilitated or renewed since the last surveys were completed in 2005. The model will also have to reflect

the unique nature of this network (subgrade conditions, seasonal effects etc) as well as the effects of the expected routine maintenance activities that will be applied throughout the duration of the OPRC contract

- Affordability, or the availability of sustainable funding levels: It is common to find that, when moving to a long term maintenance contract, there is potential for significant "service creep", wherein the expectations for the roads within the contract are well above the historical condition (Note: while this is not a problem if funding has been set aside to cover this differential, it can cause issues wherein historically low maintenance costs are expected to deliver high quality results)
- The development of an appropriate payment regime: It will be essential that the contractor allocates the appropriate resources to the maintenance activities and meets the OPM targets, thereby avoiding the risk of the maintenance activities being ignored in favour of the contractor's preferred (customary or core) work activities such as laying asphalt for example. One option to address timeliness in completion of the physical works is to include liquidated damages provisions in the contract documents.
- Utilising the information available from the network, the service level requirements, the conceptual designs for the upgradation/ rehabilitation work and the contractors activities required to deliver these, a minimum of 3 alternative financial models will be developed to provide the PRBDB the choice to select the preferred model, possibly one reflecting a balance between the most optimised model in terms of project cash flow and one that fairly reflects the needs of the contractor in terms of sustainability over the duration of the contract. The identification of this will be critical given the scale and possible timing of the upgradation improvements and rehabilitation works to be completed in conjunction with the routine maintenance activities. The development of these models will involve an analysis of how the risks are best allocated and will therefore be a precursor to broader allocation of risks required under Task A8.

From Clarification 22052008

When developing the financial model for payment Opus will examine a number of issues, viz:

1. **The cost of meeting the Road User and Comfort Measures.** Much of this work is regarded as "Routine maintenance" and is undertaken in response to identified faults [pot holes, edge break, local shear failures etc] as they occur. Routine work is typically paid for at a fixed monthly rate in a PBC. Opus will estimate the cost of meeting the service levels under consideration and factor these costs into the recommended intervention levels. We will also consider the likely impact of the new regime of regular Periodic Maintenance on the extent of work that will be required along with the impact of the upgradation works to assess the likely monthly payment required to cover the contractor's costs. The cost of the periodic maintenance driven by these requirements is addressed in sub-item 2 below.
2. **The ongoing cost of periodic maintenance required** to meet the long term durability measures and the remaining Road User and Comfort measures [service levels]. Opus will model the network in HDM 4 to gauge the amount of work that will be required to meet the proposed service levels and access their affordability along with the economic benefits to road users [reduction in road user costs]. Opus will base its cost estimates for this work on a number of conceptual designs prepared for the purpose by our pavement specialist. While we have yet to model the network, it is common for the length of resurfacing and rehabilitation required to deliver consistent service levels to be reasonably uniform on a year to year basis once any backlog issues have been addressed. Thus it lends itself to payment by a uniform monthly rate once the target service levels are being met. Opus will consider the extent of the backlog and year on year variation in the needs of network in the development of our payment model. Careful consideration will be given to appropriate timeframe for addressing the backlog in the development of our financial model.
3. **The cost of implementing the proposed upgradation works.** If, as is being currently proposed, these works are undertaken within the first two years they will comprise a significant proportion of the total contract cost. If these works are paid via a fixed monthly payment over the duration of the contract the contractor will incur significant funding charges as his costs would be recovered over the term of the contract [e.g. 10 years] Opus will estimate the cost of undertaking the upgradation works and research the practicality of the proposed time frame in discussion with the PRBRB and the contracting industry.
4. **The cost of meeting the management performance measures.** We expect that this will be a relatively small proportion of the cost and will lend itself to payment through a uniform monthly payment.
5. **The "Enforcement Measurers"** we will build into the contract to ensure compliance. These would include Liquidated Damages and Performance Bonds that would impact on the financial model along with delaying payment for inadequate or uncompleted works and payment deductions linked to Key Performance Measure non-compliance.

6. **The cost of money.** Opus will research the appropriate financing costs faced by the Indian Construction industry as this is the rate that Tenderers are likely to apply to any funding they are required to provide.

7. **The availability of bonds to the Indian maintenance contracting industry.** While performance bonds are well established for construction, our assumption is that where these can also be linked to at least the improvement works undertaken within the OPRC, then this is likely to be more acceptable to the industry than the application of payment retentions. For example, based upon experience in NZ this is a much cheaper option for established contractors than withholding payment to ensure performance.

Once we have researched these aspects we will use them to develop a model to examine a minimum of three alternative financial outcomes. In particular the model would examine the merits of paying varying proportions of the upgradation works along with the backlog of rehab and surfacing works and the impact this would have on the financing costs the contractor will have to carry. A range of percentages will be considered to determine the most appropriate payment mechanism. It is vitally important that we ensure the contractor remains motivated to meet all the performance measures through out the full term of the contract but that at the same time we do not burden the project with any unnecessary high tender prices required to cover financing costs. A summary report explaining our recommendation model will be prepared for consideration by the PRBDB.

Outputs:

1. *Development of at least 3 financial models and the identification of the most optimised method for contractor payment including consideration of asset condition at time of handing back to the Client.*

iii) Task A3 – Legal Framework and EIA and SIA Frameworks

- Identification of any legal intricacies: As the introduction of the OPRC concept is new to the Punjab state with a primary objective of asset preservation, we have nominated within the team a Legal Advisor with intimate knowledge of the Indian legislation relating to the ownership and management of the state road network. In addition this work will also encompass the application of the existing laws relating civil construction contracts and whether there are any risks associated with the application of these to the OPRC Contracts. Any significant concerns that are identified will be communicated to the PRBDB as soon as possible.
- We understand that there are a number of policies and plans that have been developed relating to the management of both Environmental issues as well as Resettlement and Rehabilitation policies within the Punjab State (TOR Clause # 41). We will utilise a specialist environmental consultant (ERM) to review these policies and procedures within the context of the findings and recommendations from the earlier Phase I study reports. ERM will undertake a reconnaissance visit across the network to establish whether all of the key issues have been identified. They will then summarise the critical outcomes from these studies in the form of a briefing paper which will be used to ensure that both the conceptual (and subsequent) detailed designs integrate these into all of the upgradation and rehabilitation works. From our understanding of the network, we expect that a greater level of input will be required within the more heavily congested urban sections than the more sparsely populated rural areas. ERM will also be available to support the Opus team with any presentations required to the GOP/PRBDB/World Bank as necessary.

The above outcomes would be supplemented with the following information:

- The data being collected as part of Task B3
- The projected traffic growth and loading changes that can be determined from existing and additional traffic count data collected along with an assessment of the effects of the capital investment programme on the roads to be upgraded.
- The outputs from any initial HDM-4 modelling that can be completed (from Task A2), i.e. we expect that there would be some initial iteration of availability verse affordability as soon as the preliminary modelling is underway and the influence of the service levels on the operation of this network begins to be understood.

Outputs:

1. *Summary report on the applicability of the existing legal frameworks for the adoption of the OPRC concept within the Punjab State*
2. *The formal briefing of the upgradation and rehabilitation work designers on all critical issues relating to the integration of all necessary Environmental and Social issues into these improvement works.*

iv) Task A4 - Confirmation of Contracting Capacity to Undertake and Manage the Works

In order for the concept to meet its potential, contractors must be brought-up-to-speed on OPRC. As well as awareness-raising, there will be a need to address the factors listed in Section 3.2.3 (i.e. the learning curve issues, the approach to risk management, the ability of small/local contractors to get involved, etc). It is important to note that the aim of the exercise is to ensure that there is sufficient capacity and not to ascertain what the total capacity is. For a successful competitive contract round, we consider that at least three capable consortiums willing to tender would be desirable.

Under this task, based on the prior feasibility work and addressing the specific issues set out in the TOR, a more detailed assessment will be made of the contracting industry's technical (specifically, design and long term maintenance planning capability), financial and managerial capacity. This will be undertaken by methods comparable to those which Opus applied in its recent study into the introduction of OPRC into Indonesia (refer Section 3.2.3), and through the following specific activities:

- An open invitation to the contracting industry to attend an initial workshop where the concepts of the OPRC would be explained, along with what is expected of the contractor, consultant and associated government agencies. This would be sufficient to enable for a meaningful dialogue to occur subsequently when individual interviews with the industry take place. (Note that PRBRD input would be applied to develop an appropriate invitee list, including a good geographic coverage of suppliers and relevant contracting and consulting associations). Workshop attendee's would be left with a brief outline of the concepts and contact numbers for future reference or feedback/follow as necessary
- Holding up to at least 10 individual meetings with those contractors who have shown interest to discuss the concept in more detail and to flesh out the issues that may stand in the way of successful implementation (Note: this would utilise a modified version of the questionnaire developed for the OPRC Indonesian project). Particular attention would be given to identifying areas where the responses show that contractors are lacking in their knowledge of OPRC (i.e. to be built on in scoping the Task A6 work)
- Consolidating findings from the interview to identify common threads
- Holding a ½ day workshop specifically with the GOP/PRBDB to discuss the feedback received and issues that have been raised
- Preparing a report on the capacity of the contracting industry to deliver OPRC Contracts
- The preparation of a series of informative newsletters to the industry and other stakeholders summarising the relevant outcomes from subsequent project Tasks spanning the time between these workshops and those to be held under Task D2 – Pre-Bid Workshops.

It is our intention to run these workshops at a suitable venue (one with adequate size and with the necessary facilities) in Chandigarh in effort to minimise the logistical problems associated with arranging more remote venues.

Whereas the TOR specifically talks of the industry capacity, Opus' experience shows that it is also necessary to carefully outline the concepts within the relevant government departments such as the following in order to ascertain their capability to run an OPRC:

- PWD and PRBDB in relation to attitude to the OPRC and their knowledge of a changing role from implementer to governor of the assets
- Police / traffic enforcement in regard to overloading controls
- Finance in terms of long term project financing and escalation

Outputs:

1. *Report on the capacity of the contracting industry to deliver OPRC Contracts including:*
 - i. The existence of a sufficient number of potential bidders
 - ii. A basis for pre-qualification of bidders
 - iii. Specific issues of risk which will require mitigation when developing the contract documents and
 - iv. The value of the contract that will best fit local capacity.
2. *Recommendations on prioritised actions to improve capability and capacity*

v) Task A5 - Overseas Study Tour

Opus' experience in introducing OPRC in developing countries strongly supports the value of overseas study tours (e.g. refer example in Section 3.2.3). The composition of the tour party will be as set out in the TOR. In scoping the tour, it is important to note that there is a full spectrum of performance based contracts available, from those such as described in the TOR through to shorter term "hybrid" contracts (the term hybrid has been used in this context to describe road maintenance contracts that have transferred the risk for planning and implementation and maintenance of the road assets to the

contractor under a lump sum model). It is evident that the study tour will gain most by visiting a diverse range of contract forms, such that the full benefits and restrictions of each can be realised. At each site both a client representative and an Opus representative will be present to discuss their views on the contract.

An indicative draft itinerary for the overseas study tour, for discussion with PRBDB, is set out in Table 3.4, designed to maximise the learning experience. It concentrates mainly on countries where OPRC is well established. Ahead of the tour a full annotated itinerary would be issued (i.e. spelling out the activities, with website references, etc) and a pre-tour briefing held. In addition a draft contract format will have been completed, and this will be provided to the tour party so that they can gauge the applicability and outcomes of the other models with that proposed for the Punjab network. Similarly, a de-briefing session would be held to reinforce the critical aspects relating to each model type.

Table 0.4 - Indicative Draft Itinerary for Overseas Study Tour

Visit	Location	Activity	Comment
1	Auckland, New Zealand	Overview of performance-based maintenance contracts for Transit New Zealand. Visit to the Auckland Harbour Bridge which is being managed by a consortium including Opus under a 10yr OPRC.	Because performance-based maintenance contracts have been in-place for some time in New Zealand, the delegation will benefit from the practical aspects from these contracts, particularly in the area of data management and predictive modelling
2	Western Bay of Plenty (Tauranga), New Zealand	A combined local road network and state highway network 10 yr contract, with focussed levels of service for different portions of the network	A predominantly rural OPRC, with a diverse range of traffic demands and predominantly agricultural roadside activities.
3	Hamilton, New Zealand	Review of a "hybrid" style contract	Under the hybrid approach, the contractor has both output and outcome based components of work. This is similar to the scope of many pilot trials of OPRC.
4	Sydney, Australia	Review of the long-term performance specified maintenance (OPRC) contract for the North Sydney road network	The 10-year, North Sydney OPRC (the first in the world) has just been concluded and delegates will have the opportunity to discuss with representatives of the client organisation the details, benefits and weaknesses of the contract. In addition Opus has been recently commissioned by the RTA to draft the replacement contract document and the outcomes from this will also be available for discussion.
5	Bunbury/Perth, Western Australia	Overview of term network contract development and implementation for the State road network and the move from full in-house maintenance to full outsourcing in a short timeframe.	These WA term maintenance contracts vary from the contracts in New Zealand in that the regions covered are highly diverse in terms of the environment and the availability of resources to meet the needs of the contracts (Note: How the contract forms were developed will be relevant to the Punjab Project)
<i>Optional sites not included in the Opus Team's bid scope but for which arrangements could be made:</i>			
6	Victoria, Canada	Review of maintenance performance measures adopted in recent Public Private Partnership projects in British Columbia	The performance parameters and their application to recently initiated PPP projects represent latest best practice in long-term maintenance management.

Note: At each site both a client representative and an Opus representative will be present to discuss their views on the contract.

The tour would be designed to increase the awareness of the participants, especially in the following areas (i.e. as found from Opus' study tour precedents):

- Building an appreciation of the practicalities of OPRC generally (i.e. from the viewpoints of the client, the consultant and the client)
- Highlighting key technical issues directly relevant to this project
- Identifying implementation and administrative issues, including:
 - resourcing, training/up-skilling and systems needs
 - risk analysis and management
 - achieving the necessary cultural exchange

We have tentatively programmed the overseas study tour to follow the completion of the draft reports on Tasks A1 "Service Levels", A6 "Contract Format" and A8 "Risk Management" and the second industry workshop, so the study team can review what others are doing in the light of our recommendations. While not essential, we believe this would maximise the benefit of the tour. However, the consequence of this is that our first interim report would be delayed by approximately one month.

Outputs:

2. Study tour itinerary, draft contract format and briefing notes (and later debriefing notes)

vi) Task A6 - Development of Contract Format

Under this task, a recommended OPRC performance contract framework is to be developed. It is noteworthy that, as the industry's understanding of the contract model matures, some elements including some mutually agreed Key Performance Measure's within the contract are likely to change to reflect the ability of the industry to both predict the type and quantum of works, and to better manage risks. Therefore, ideally the contract format should lend itself to grow as the experience grows, rather than require a complete revision. As a pilot trial of OPRC, it is essential that the contract format:

- Recognises the current state of the maintenance contracting industry in Punjab and does not overstretch their capabilities
- Provides an appropriate mix of input, output and outcome components, reflective of the road lengths under consideration
- Maximises the potential for success, without making the project so easy that no real learning takes place
- Provides as much flexibility as possible to allow the contract to evolve over time, even to the extent of increasing or reducing the overall size of the contract network length.

Opus has pioneered the development of OPRC-based contracts, including the provision of specialist input to World Bank's "Sample Bidding Documents"². In addition, Opus has had roles in the supervision and execution of many forms of term maintenance contract, which has given our key personnel significant insight into approaches that meet agency expectations but are also highly deliverable in a practical sense. This makes Opus uniquely qualified to produce documents that fully reflect the requirements in the Punjab situation. Consideration would also be given to the requirement for joint PRBDB/Contractor management structures (e.g. performance boards) in the OPRC document(s) that would provide a governance role and potentially enable a speedy resolution to any disputes, along with the role of external advisors that may add value over the duration of the contract.

As required by the TOR, aspects to be covered include:

- Signage, delineation, lighting, vegetation, rest areas, slopes, retaining structures, drainage works, bridges, road right of way
- Risk profile issues
- Boundary between policing/enforcement and operational requirements
- Proposed performance criteria (refer also Task A1)
- Long-term asset performance measures
- Operational performance measures
- Management performance measures

In addressing these issues, the Opus Team will pay special attention to the following aspects:

- The scope of infrastructure assets that will fall under the OPRC umbrella; selecting the assets to be managed under a performance-based regime will be a function of:

² Co-authored by Tony Porter of Opus in 2005

- the potential benefits of the OPRC approach to the GOP and PRBDB (i.e. as compared with the resources required to administer such a contract)
- the industry capacity to maintain the assets
- what is practically viable in terms of both the OPRC and the remaining network
- Balancing the level of contractual risk embodied in the contract form at a level that meets the performance expectations of the PRBDB, whilst acknowledging the learning curve of the contractor
- Ensuring that, if more than one contract area is established under this OPRC pilot, that no more than one contract can be held by any one contractor (which would negate the benefits of splitting the contract area)
- Incorporating enough flexibility within the contract to allow incremental improvement of the performance measures and the monitoring/payment framework as consultant/contractor knowledge and capability builds

From Opus' prior experience, issues of overloading and historical pavement construction quality are likely to dominate the concerns of the contracting industry, although it is not necessary to eliminate all overloading in order to apportion the risks. With the proposed extent of up-gradation and rehabilitation likely over the duration of the contract, issues of historical maintenance quality are expected to diminish as these initial improvement works are completed.

There will need to be careful consideration given to the development of the performance criteria. While there is an initial tendency to want to examine the current condition of the network to determine the appropriate standards, this approach will not suffice for a network that is being significantly rebuilt within the term of the contract. Correspondingly, for the long-term asset performance measures, consideration will be given to:

- The expected performance of a well built and maintained asset
- The cost of collecting and managing data items in comparison to the benefit of the extra indicator(s)
- The repeatability of the equipment used versus the expected change in condition
- The cost of undertaking the work.

With respect to the long-term asset performance measures relating to road user comfort and safety the above approach may see the application of surrogate measures and material standards to ensure that an appropriate standard of asset is supplied to the road user. Operational performance measures (OPM's) that are used to define the way the contractor has to deliver the required services (e.g. frequency of inspections, response times/conditions for maintenance intervention, reporting requirements etc) will need to be comprehensive in scope, as the contractors will no doubt look to these to understand their work priorities as they come to terms with the OPRC contract requirements.

End of Contract Residual Road Condition: We recognise the importance of ensuring that there is no asset consumption over the duration of the maintenance contract and that the network is returned without the need for any major periodic maintenance immediately following the end of the contract. Our approach to achieving this will involve both modelling the impacts of the proposed long term Forward Works Programme and Financial Models combined with the practical understanding of the networks needs over the next 10 years within the context of planned improvement and maintenance works to be completed. Our experience with these contracts has indicated that relying on condition indicators alone to encourage contractors to carry out sufficient structural (pavement) investment is unlikely to be successful, and we would seek to identify minimum "underpinned" quantities of both pavement rehabilitation and surfacing renewal to be completed each year to ensure any risk of asset consumption is eliminated.

End of Contract Inspections: To complement the management of the asset condition and in recognition of the drivers for the contractor to also reduce inputs near the end of the contractual cycle, we will prepare a comprehensive inspection programme that will identify any defects and ensure their correction by the contractor before the end of the maintenance defects period. In preference to relying solely on inspections near to the end of the contract, we would also include in this programme a series of internal reviews of the contractor's own quality assurance systems throughout the duration of the contract to ensure they have set up and are effectively operating a defects management system.

Contract Financial Management and Compliance Framework: There are a number of contractual mechanisms available to manage the risk to the PRBDB of either non-completion of the work or non-compliance with the required OPM's and Key Performance Measures (KPM's) (measurable asset condition parameters that will be used to define the required service level targets the contractor must achieve) that will be explored as the contract format is established. The option of applying of a variable level of payment retention will need to be carefully examined given the long duration of the contract and the risk that this may unfairly penalise the contractor. An

alternative that may avoid this difficulty is to require the contractor to have a performance bond in place throughout the duration of the contract. Minor breaches in KPM or OPM targets will usually attract an agreed level of payment reduction that is aligned with the reduction in road user comfort and/or safety that has resulted. As an example, major non-conformance with any of the performance targets could place an increasing onus on the contractor to demonstrate how his systems will be modified to prevent any re-occurrence, along with the risk that the contract may be terminated if the number of major non-compliances exceeds a stipulated threshold within a pre-determined time frame.

Should two contract areas be agreed upon, we would also explore the option of having a mechanism to transfer some work from one contract to the other in the event of inadequate performance by one of the suppliers. From our experience this would not only reduce the risk to the PRBDB of poor or non performance but would also further encourage the contractors to strive for a good level of achievement and quality.

We would also use the team's Legal Adviser to undertake a legal review of the contract format during this phase to ensure that there were no significant problems likely to be encountered further on.

Tender Evaluation Procedures: The success of any contract is ultimately reliant upon the selection of the "best" contractor that will provide the greatest value for money outcome. We are well aware of the importance of achieving this outcome and will utilise our experience in evaluation systems and procedures to provide the GOP and PRBDB with options to enable the value of the contractors non price (quality attributes) to be determined in a transparent way. This approach will enable the GOP and the PRBDB to establish, in a quantifiable way, how much they are prepared to pay to secure the highest quality contractor over above the supplier with the next highest attributes.

From Clarification 22052008

In accordance with the requirements of Task A2, Opus will pursue an approach that will allow the contracting industry the freedom to embrace the concept of Performance Based Road Contracts. We will appropriately reconcile with the Client on the manner the incorporation of the optimised and agreed single payment method from the financial model output into the contract documents for the tenderers reference.

As this approach will still require discussion over the most appropriate level of risk transfer to the contractor as well as managing the end of contract pavement condition we recommend the following staged approach to jointly manage these issues.

Step 1. Prepare a preliminary report as soon as possible after contract award outlining the format of the various performance based models in operation in both New Zealand and Australia

Step 2. Seek feedback from the contracting industry.

Step 3. Review the outcome of Task B2.

Step 4. Seek the views of the PRBDB following the overseas tour.

Step 5. Opus would then prepare an additional section to Interim Report No. 1 clearly outlining the most appropriate method of achieving the expectations of the PRBDB.

We believe that this approach is very much aligned to the expectations of Task A6.

Outputs:

1. Draft report on OPRC Contract Format for discussion with industry, incorporating:

- Our recommendation on the final OPRC contract format (including analysis of options) and the recommendations from a legal review
- The impact of the OPRC on the residual asset value and proposed management strategy
- Our recommended method for managing non-completion of work
- Our recommendation on the compliance framework to be applied including payment reduction and possible contract termination mechanisms.

- v. *Our recommendation on tender evaluation options and the recommended mechanism for tenderer selection.*

vii) Task A7 - Industry Consultation Workshops

As acknowledged in Task A4, attention to awareness-raising is pivotal to the successful introduction of an OPRC regime. Key PRBDB personnel will have undergone awareness-raising before and during the study tour (Task A5), and these workshops are further opportunity to extend this to the contracting sector and receive feedback on the proposals in the Task A6 reports prior to finalisation.

Critical objectives to be achieved through the organising and running of a series of three workshops are:

- firstly, raising awareness
- secondly outlining the draft contract format
- thirdly, just prior to short listing, to discuss, in detail the OPRC requirements.

We would also hold a seminar with the PRBDB, other Government departments and road user groups directly after the first industry workshop to discuss issues relating to asset ownership and any implications relating to the implementation of the OPRC concept. These workshops will also be held in Chandigarh and will focus on the following aspects:

- Attendees: early attention to be given to developing an invitation list (with PRBDB, referring also to the contractors consulted under Task A4)
- Suggested workshop format developed for each phase as the concepts and the contract documentation become more refined (question times and group inputs to be added-in):
 - Opening address (PRBDB)
 - The status of the current project (to let participants understand where they fit in, how feedback may influence decisions etc.) (PRBDB)
 - Introduction/Update on progress with OPRC development (including its evolution, the framework, lessons from overseas, etc)
 - Approaches to road maintenance planning (including life-cycle costing, predictive modelling, etc)
 - OPRC case studies/applications to the Punjab network
 - Key issues with introducing OPRC (eg data, criteria, payment, etc)
 - OPRC from a contractors viewpoint
 - Proposed OPRC framework for this Project (including updates on the options considered)
 - Workshopping on issues raised and feedback from the Contractors.
 - Next steps
 - Closing summary
- Presentation approaches (noting the need to target the content at the appropriate level and avoid undue technical complexity):
 - PowerPoint presentations, with copies available in both hardcopy and electronic format which will include relevant contact numbers for follow-up or feedback.
 - Identification of suitable reference material
 - Links to existing websites
 - Available videos

Outputs:

1. *Workshops held (and debrief notes/outcomes applied to contract format / documentation)*

viii) Task A8 - Development of a Comprehensive Approach to Allocation of Risk

The TOR (Clause #31) identifies and comments on a series of risks under the OPRC regime. Further comment on these and how Opus proposes to use its experience in this sector are listed below:

- Inflation:
 - this is a risk that the road controlling agency has to take, because it is something that the contractor cannot control

- an appropriate rise-and-fall clause in the contract form manages risk by presenting the framework for determining market influences on the cost of the works. Our approach will be to utilise and if necessary modify existing frameworks applicable to the Indian economy and will only pursue the development of a new framework if the existing options are considered to be unsuitable.
- Traffic Growth:
 - traffic growth can have a significant impact on the cost of maintaining the road to a set level of service – it will be necessary to establish a forecast traffic growth profile that is appropriate to the road link(s) under the contract (in turn recognising that a rehabilitated/upgraded road will inevitably attract additional traffic), and agree the rates to be capped under this project. Our approach will be to use the existing traffic data information and supplement this with additional survey information from selected network sections to re-confirm the validity of the existing traffic model.
- Traffic Overloading:
 - whereas the risk of overloading can be managed through an increased enforcement regime, this runs the risk of shifting the problem to other parts of the network. A more practical and achievable approach however, may be to take the level of overloading into account when designing and planning improvement/maintenance works activities. The issue to consider is the cost of determining the level of overloading, such that the risk can be fairly apportioned, against the cost of increased policing to remove the overloading from occurring.
- Quality of Previous Construction/Maintenance Works:
 - for those portions of the network which are not identified for improvement works (either initially or during the duration of the contract), consideration of how to manage risks around prior workmanship or material qualities will need to be determined.
- Emergencies and Natural Hazards:
 - because the application of a uniform rate for the restoration of damage due to emergencies or natural hazards (i.e. due to their widely varying nature and scale) is difficult, the only equitable approach to these situations is for them to be assessed and priced individually
 - mandating an unrealistic rate for emergency/natural hazard remediation may impact on the contractor's viability, with a corresponding impact on local industry capacity
- Initial and Future Potential Improvement Work:
 - to protect the interests of all parties under the contract, it is essential to establish the baseline status of the network – particularly in terms of current and future improvement works prior to commencement of construction (e.g. major bridge structures, the management of claims for variations etc)
- Change in Law
 - There is a reasonably high probability that there will be legislative changes within the selected contract duration that may impact upon the contractor's activities and those of the PRBDB. By setting in place a mechanism to manage this and mitigate the potential impact on the outcomes will assist both parties through greater certainty and reduction in the value of this risk that might otherwise be factored into the contractor's price.
- Political Force Majeure
 - The longer contract tenure provided for under the OPRC model provides a greater level of certainty to the contracting industry about investment, training of personnel, and ultimately the price paid by the road controlling authority. It is therefore essential that these desirable outcomes are not compromised by the contractor perceiving an unnecessarily high risk of early contract termination, other than that based on (inadequate) contract performance which also serves to protect the interests of the client.
- Delays in Forestry Clearances and Land Acquisition.
 - We are well aware of the risks associated with having to clear established trees and/or acquire land as a pre-requisite to the upgradation works. In part these risks can be managed through early planning and the application of the principles outlined in the EMP and RAP frameworks. To adequately manage any unforeseen issues that may still arise, mechanisms will be written into the contract that will protect the PRBDB against the risk of time becoming at large and costs then being incurred as a result.

From Opus' experience, other risks worthy of consideration in this context include:

- Service level "creep" (i.e. setting standards too far above common practice)
- Accepting an OPRC contract price that is too low
- Over-reliance on the use of averaged values to quantify performance against service levels

A fuller list of risks will be developed following the consultation with industry and government players, with the report from this task incorporating the full spectrum of risks and how each one is best managed. We will apply accepted risk management principles to this task such as those outlined in the Australian and New Zealand Standard AS/NZS 4360 on Risk Management.

From Clarification 22052008

AS/NZS 4360 will form the framework and be a guideline for developing an appropriate allocation of risks through our interactions with Stakeholders and the PRBDB is illustrated below.

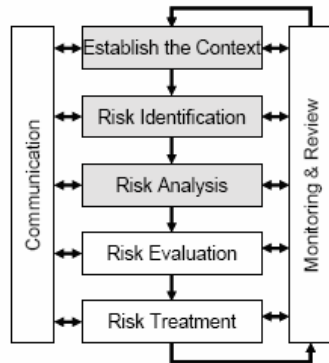


Figure 1: Risk Management Process

In addition to the risks identified in the RFP we have also identified a further three risks that need management in the preparation of the contract documents. They are not risks that can be allocated to the contractor as they are issues defined by the contract documents. In each case recognising the potential consequences is the first and most significant step in mitigation. These have been briefly outlined:

1. Service Level Creep. Early Performance Based Contracts (PBC's) tended to over specify service levels such that what "usually happens" became "what always must happen". Opus recognises this issue and our methodology for setting service levels is designed to minimise the risk of service level creep.
2. Accepting a contract price that is too low. In our experience an appropriate tender price has proved to be a major factor in the success of PBCs internationally. Our procurement strategy will be designed to mitigate this risk. In particular;
 - A sound short listing process based on Track Record, Relevant experience, Available Resources, Technical Skills and Financial Strength should ensure contractors capable of the undertaking the work and an interest in the success of the pilot tender for the work.
 - Appropriate "incentives" that ensure contractors are committed to meeting the specified service levels (refer to Financial Model –Item 5).
 - A programme of stakeholder education to ensure tenderers and those they will interact with understand PBC concepts and contractual requirements.
 - A quality/risk/price mechanism for evaluating tenders that gives tenderers confidence that lowest price will not necessarily win.
3. Over reliance on averaged values to quantify performance against service levels. Opus' experience is that Contractors should not be allowed to play the "numbers" to show compliance with service levels, as cheaper interventions will inevitably take preference over more costly ones. In our experience awareness of the issue

is again the key to mitigating this risk, and in particular avoiding the temptation of specifying overly complex measurement criteria (e.g. PCI) which may provide an opportunity for the contractor(s) to manipulate one or more the variables to their advantage. Our methodology for setting and measuring service levels aims to minimising this risk.

Outputs:

1. Report on recommended risk allocation and management

3.4.3 Part B Services - Review of Adequacy of Current Information and Collection of Additional Condition Data

Summary: Establish the suitability of sites and data for applying OPRC to the selected roads

i) Task B1 - Checking Suitability of Pre-Selected Road Sections

The road sections to be reviewed for OPRC implementation are listed in Table 3.1. Under this task, attention will be devoted to confirming or modifying this selection, based on both the findings under the foregoing tasks and the following:

- The need to have a contiguous and consistent network
- The capacity of the local contracting industry
- Availability of data to apply OPRC (and ability to collect supplementary data in a timely and cost-effective manner)
- Level of risk (e.g. it would be unwise to pilot OPRC on sections of roads where the levels of risk/uncertainty are unusually high)
- Logistics issues (e.g. accounting for the difficulties if road sections are widely separated)
- As these sections are meant to pilot the OPRC form for the Punjab network, there is a need for them to be representative of the conditions and resource demands of the entire network
- Physical works that may have occurred on the network between the time of the Feasibility Study fieldwork and the present
- Overlaying the financial resource restrictions that may be applicable

It is noteworthy that Opus' Indonesian OPRC study involved selecting roads upon which to trial OPRC, based on a carefully chosen set of criteria (refer Section 1.5). Correspondingly, the lessons learned from this experience will be put to valuable use in executing this task.

Outputs:

1. Report recommending roads for piloting OPRC

ii) Task B2 - Review of Adequacy of Current Information

The first step under this task involves reviewing the available data from all of the listed sources, including the PRBDB website, and ascertaining its applicability for determining the following:

- Service levels to be set under Task A1 and the pilot OPRC network under Task B1.
- Upgradation standards and pavement design
- Contract performance measures
- EIA and SIA requirements to be considered and implemented
- Network safety strategies and improvements to known blackspots
- The impact of existing utilities in the corridor and their impact upon upgradation and pavement rehabilitation
- Risk identification and allocation mechanisms
- Financial model development

It is our intention to complete as much of this task as early as we can, and where possible, before the network inspections proceed. In this context, it is noted that whilst data may well be available and appropriate for its current

use, the greater scrutiny and robustness required within the OPRC contract can often pose a challenge to historical information in terms of accuracy and completeness.

The following general comments relate to the expected application of the available data including the data collected from the network surveys completed in July-Sept of 2005:

- Roughness survey data (as acquired via response-type roughness meters): Whilst providing a general indication of ride quality, it is likely that the repeatability would not be suitable for the ongoing measurement of contractor performance; (particularly if payment deductions were involved); further, transitioning from one technology to another can often result in step changes in reported condition
- Deflection surveys (as acquired via Benkelman Beam): Based on the spacing of 250m, these should be sufficient to identify the level of variability in the pavement performance and provide a good general indication in load carrying capacity
- Traffic volumes and composition: Besides the overloading issue, there is also a need to understand how traffic volumes (and composition) vary within the various towns/cities and also the loading pattern across the cross-section (i.e. are the trucks driving on the shoulders, or is there a directional bias on the loading patterns?)
- Inventory: It is noted that the signs and markings are not currently recorded and whilst markings are normally not critical in the pricing of a contract, it is essential to have a record of what is present (for which the video may be adequate)
- Preliminary /base designs for rehabilitation and upgradation from earlier studies (these will be used as a basis for the development of the conceptual designs)
- Environmental Screening and Social Screening Report detail and recommendations: The application of the recommendations from these reports, especially on the improvement works required within the more congested urban zones may have significant impacts on the design and construction requirements for these sections. Use will be made of the information relating to the baseline data of air quality, noise level, water quality and tree counting in ensuring both these and the national legislation requirements are included in the conceptual designs
- EIA scoping matrix requirements within the prioritised corridors, Socio-economic surveys of the settlements within the pilot area, Relocation and Resettlement policy requirements, and Generic environmental plan requirements will be used to ensure that policy requirements are reflected in the development of the conceptual designs and implementation of the OPRC concept
- Strip map information will be used to assist in the identification of boundaries, encroachments and utilities and their impact on upgradation and rehabilitation works
- Road Safety Reports will be used to identify specific safety improvements to be implemented in conjunction with the planned upgradation and rehabilitation works, as well as the approach to network wide safety to be pursued under the OPRC format
- Visual pavement condition: Whereas this is likely to be sufficient for the development of the long-term works programmes, such techniques can be unsuitable to the monitoring of the OPRC itself owing to the inherent variation between different rating staff. Emphasis will be applied to implementing a comprehensive Quality Assurance programme to provide consistency and repeatability with all visual rating activity.

The methodology for assessing the data will cover the following steps:

- Compile the data into the HIMS system, including any necessary data translation or manipulation (refer Inception Task 4 and Task B3)
- Analyse/validate the data in respect to applying it to quantify performance against the service levels
- Review alignment of technology used to collect existing data with that likely to be adopted under the pilot studies
- Identify gaps/anomalies in the data and investigate rectification options or assign a confidence rating to the data set
- Develop the supplementary data collection programme (i.e. for carrying-out under Tasks B3 – refer to those task descriptions for further comment), noting that the programme will be "optimised" accounting for:
 - alternative technologies/equipment
 - logistics issues
 - costs
 - timelines to complete

Outputs:

1. *Technical Report recommending the need for a supplementary data collection programme, the adequacy of the existing data relating to the initial improvement works, and the implementation of the OPRC model.*

iii) Task B3 - Collection of Additional Data, Roughness, Rutting and Video of Network

Subject to approval from the PRBDB and the World Bank to use the US\$0.10 Million Provisional Sum item for additional data collection, we will arrange for this to be collected inline with the recommendation made under the Task B2 report. This may include additional travel times over critical network sections, visually collected inspection data ((cracking, shoving, ravelling, edge-break, edge-drop, drainage deficiencies, vegetation issues, etc), additional topographical survey data, hydrological data (for bridge widening and storm water design) pavement loading and pavement design investigation data as necessary.

Following approval to proceed with the collection of the high speed data under this task, a laser Profilometer with video recording facility will be purchased and delivered to acquire the required roughness data. Opus has in-depth knowledge of the technology and the attributes of the various makes/models available, and has already identified a preferred supplier.

Prior to this phase Opus will prepare a report on the options open to the PRBDB covering available equipment that may be suitable. For the purpose of our planning and programming, one of these options is could be the purchase of a "ROMDAS" Laser Profilometer (2 lasers) with video and transverse profiler. The Road Measurement Data Acquisition System (ROMDAS³) system has been developed as a low-cost generic system designed to collect road and pavement data using any vehicle. While other more advanced and expensive systems will be evaluated, this option may provide a better fit with the limitations of the Provisional Sum budget and immediate needs of the PRBDB for this network.

With over 150 units in use in over 50 different countries, ROMDAS has a level of refinement not found in any competing systems. The system was developed to be both robust and easy to use, yet provides data that is of a high level of accuracy. Moreover, it can be mounted on a range of vehicles, thereby increasing the portability of the equipment and reducing the financial burden of having a dedicated data collection vehicle. As with other profilometers, ROMDAS utilises a combination of lasers and inertial sensors to develop a profile of the road, from which real-time processing generates the road condition indices of roughness and rutting. The video system is digitally recorded with the location referencing superimposed.

ROMDAS is modular in nature and can be configured (if supporting hardware is purchased) for the following surveys:

- Roughness surveys
- Travel time and congestion surveys
- Condition rating surveys
- Inventory surveys
- Moving traffic surveys
- Transverse profile/rutting surveys
- Video log surveys
- Recording the location of digital photographs
- Creating voice records which are associated with road attributes
- Collecting global positioning system (GPS) data
- Collecting skid resistance data using the Findlay Irvine GripTester

Therefore the provision of the basic building block of ROMDAS under this contract provides the GOP with the ability to "grow" the features as the need arises.

The steps in executing the work under this task will cover:

- Taking delivery, installing and testing the unit (by the ROMDAS suppliers, Data Collection, New Zealand)
- Training PRBDB staff in the use of the equipment (by the ROMDAS suppliers, Data Collection, New Zealand)
- Developing a set of documented guidelines and procedures on the operation and calibration of the equipment, including validation and quality control measures

³ Refer URL www.romdas.com for details

- Establishment of a schedule of data collection that ties into the planning and payment milestones under the OPRC contract(s)
- Logging data into the HIMS database system (refer Section 3.4.1(d) for details)
- Identifying any data manipulation required to meet condition reporting or predictive modelling requirements
- Establishing the format and timing of contractual reporting requirements.
- Completion of all necessary training of GOP staff in the operation and maintenance of the vehicle and equipment.

It is noteworthy that, under an OPRC contract format, greater emphasis is likely to be placed on the quality of the data than at present owing to it being used to judge the performance of the contractor. In this way, robust quality procedures are needed that adequately deal with the range of circumstances that can reasonably be assumed to occur while collecting data.

A key aspect of data collection involves establishing quality procedures for the ongoing collection and reporting of data. These quality procedures, to be incorporated in the QA procedures to be developed under Inception Task 2, will build upon the user manuals for the ROMDAS system in terms of the automated data collection, plus cover the quality procedures involved in the collection of manual data.

Wrapping-up Part B will involve finalising the data from Tasks B2 and B3 and compiling a summary report. Given all of the compilation, validation and database recording undertaken under Task B3, the contents of the report would likely comprise the following, with a focus on the application of the data to the pilot OPRC regime:

- Executive summary
- Introduction (i.e. explaining the context, etc)
- Data requirements for OPRC (and its application in respect to the service level criteria)
- Pre-existing data (list of data and commentary, for each dataset)
- Data collected under this Project (as above, but including the methodology)
- Data processing and validation
- Commentary on OPRC issues arising
- Conclusions
- Recommendations
- Appendices (including explanation of the data formats in the HIMS system)

Additionally, the report will provide instructions on how to access the HIMS database where the data is stored.

Outputs:

1. Validated data lodged in the HIMS system
2. The supply of a vehicle mounted fully calibrated high speed survey system (e.g. ROMDAS portable laser Profilometer) including all necessary training.
3. Additional data for improvement works collected and passed to the designers and summarised for inclusion into the contract documents
4. Summary data collection report including collection procedures and recommendations on calibration procedures to ensure consistency in survey results between years.
5. Completion of GOP training in the use and maintenance of the high speed survey equipment.

From Clarification 22052008

Relevant TOR Clauses # 34, 35, 36, Task B2 – Review of Adequacy of Current Information; Task B3 – Collection of additional data, roughness, rutting and Video of network.

Further to item 6 above and the summary provided on page 58 of our submission we have taken due consideration of the TOR's comment on the availability of extensive information summarised under Clause # 34. While a final recommendation will be subject to the outcome of the detailed review to be undertaken under Task B2, the following comments have been made in anticipation of what this review is likely to identify. We have also been cognisant of the time that has elapsed between the last survey (July-Sept 2005) and the potential impact that this may have on the validity and usefulness of the existing data

Because much of this information is considered to be a pre-requisite to Tasks C1 and C2 and that these tasks lie on the critical path, we have scheduled the review of the adequacy of the existing data and the recommendation on the collection of the additional data to occur as early as possible within the overall programme.

1. **Network Roughness, Deflection and Topographical Survey** – Requirements and approach already outlined under Item 6 above and Task B3.
2. **Traffic Volumes and Mix:** Our experience is that significant changes in historical trends can occur over relatively short time periods in response to regional development, network realignment/improvement, the impact of fuel prices and general economic development. Consequently it is probable that a need for series of additional traffic count surveys will be identified for critical sections of the network to confirm the extent of the change that has occurred since the last survey and to increase the accuracy of the modelling predictions and pavement design parameters (both conceptual and detailed). The identification of the number and location of these surveys would pay specific attention to any existing PRBDB traffic count programme and align itself with this as far as practicable in an effort to maximise the efficiency and usefulness of the data collection exercise.
3. **Other Inventory:** Our assumption is that the existing inventory data is most likely complete and will not require any significant data collection to be undertaken. At the outset of the project the completeness of the pavement and surfacing data in particular will have the biggest influence on the accuracy and validity of the modelling outcomes and the ability to predict the future condition of the network. Once the review of the existing data has been undertaken we would then make recommendations over the how the balance of any necessary inventory data should then be collected and over what time scale (e.g. from the contractor(s) directly or from independent data collection / verification activities).
4. **Preliminary Base Designs:** An assessment of the work undertaken previously is expected to assist with the development of the conceptual designs and accepted standards of construction. It is intention to utilise as much of this existing information as possible along with discussion with the PRBDB on required construction standards and specifications to minimise the risk of unnecessary design re-work. We would also seek to use any historical Soil Investigation (SI) information results to assist with pavement designs in preference to requesting additional SI under the PS allocation.
5. **Visual Pavement Condition:** Subject to the coverage and the parameters captured from the earlier visual survey's of pavement condition within the network, the need for further condition survey work is likely to be identified specifically to record defects that will not be evident from either the high speed survey or video (e.g.. pavement cracking) that will assist in identifying the potential need for pavement rehabilitation.
6. **Existing Underground Utilities:** Although it is desirable to shift the risk of managing the relocation of existing underground utilities within the sections identified for upgradation and rehabilitation to the contractor, the risk of this still delaying the construction works and then being used as a basis for a variation would be further mitigated if this information was available at the time the contract estimates are being developed and was also available to the contractor(s) at the time of tender. Assistance would be sought from the PRBDB in facilitating the supply of this information from the agencies responsible for the management of these utilities across the network.

3.4.4Part C Services - Preparation of Conceptual Designs and Bidding Documents

Summary: Confirm Service Levels, Long Term Forward Works Programme, Conceptual Improvement Work Designs, Price Estimates, Emergency Works and Contract Documentation

i) Task C1 – Definition of Service Levels for Each Road Included in the Pilot Study

Utilising the information from:

- The existing PRBDB and PWD data
- Previous feasibility study reports
- Information from our field visits
- Road user needs and consultation discussions
- Results from the baseline survey (including traffic volumes and transportation costs) and a re-run of the HDM Model now using the updated condition survey and inventory data,

the implications of adopting the service levels proposed under Tasks A1 and A2 in terms of long term asset condition and affordability will be reviewed and confirmed with the PRBDB. We will identify the need for additional traffic counting and undertaken a series of sample surveys to confirm the existing mix of traffic and the rates of growth from that identified in previous surveys. Following final agreement with the PRBDB, these service levels will then be incorporated into the contract documents along with their associated measures and compliance regimes.

Impact of the Identified Improvement Works: With the large percentage of the network that will be potentially upgraded during the term of the OPRC pilot and the need to evaluate the benefits from both the perspective of agency and road user cost savings, we will prepare a programme to measure and evaluate these benefits post construction. This will require the calibration of the Road User Effects sub-model in advance of this work proceeding.

The modelling phase will have two distinct levels, one strategic and one tactical. The strategic level would show network condition forecasts under at least two options, an unconstrained and a constrained budget, through which we would examine the affordability issues. At the tactical level, we would validate the model's predictions as part of the field drive over, which would utilise such outputs as pavement condition, traffic, predicted treatments and treatment drivers etc. Typical outputs that can be expected from the model that are then transferred onto sheets taken into the field to support the decisions made on the Forward Work Programme (FWP) of future maintenance requirements has been enclosed under Appendix B. Please note that this example is based upon a typical New Zealand State Highway network. While the data underpinning is likely to exceed that initially available for this network, we expect that a similar level of information and modelling output alignment with the FWP (at a project level) will be achievable in time.

Outputs:

1. *Report on confirmed service levels and financial implications*
2. *Preparation and delivery of a monitoring and evaluation programme to measure the impacts of the improvement works.*

ii) Task C2 – Contract Packaging, Conceptual Designs, Financial Model and Confidential Price Estimate for Each Contract

Long Term Forward Work Programme: The development of a long term forward works programme is required to enable a confidential price to be completed and to assist in developing appropriate performance measures and levels of service for the contract.

Based on Opus' experience, it is proposed to apply a two-pronged approach that will be a balance of the (local) practical approach to pavement management and the science of good asset management involving:

- A traditional field based works programme based on observed condition, covering all assets in the road corridor, involving:
 - the field team (including locally experienced staff) travelling by vehicle, stopping routinely, to develop a robust "practitioners" works programme and incorporating the outcome from the first HDM model run⁴
 - compiling outputs in a spreadsheet style table (a matrix) with years along the top and location down the side, with the table containing the generic nature of works estimated to be required
- The application of the HDM-4 (second run) model to the road pavements and surfacings, noting that:
 - calibration of a system such as HDM-4 will improve as the quantity of available data increases
 - calibration of the HDM-4 model to a Level 1 standard as per the Guidelines to the Calibration and Application of HDM-4 will be undertaken (refer Section 2.2(h)), making use of the field based programme to review the reasonableness of the sub-project proposals arising out of the HDM-4.

Preliminary work will be required in terms of the following:

- Gathering of relevant network condition, routine maintenance and improvement work completed since the 2005 survey and traffic loading data (this will have occurred with the prior tasks)
- Development of appropriate treatments and treatment strategies, based on an analysis of options

⁴ It is noted that the Feasibility Study reports make reference to an existing HDM-4 model, which is assumed to be made available to this Project

- Establishment of treatment units rates that will apply
- Development of and agreement on, future traffic growth scenarios

Conceptual Designs: The proposed methodology for this task is based on the delivery of a "conceptual" design (which, unless significantly modified during the final design phase by the contractor, would define all of the requirements for final design, environmental and social specifications (i.e. as per TOR Clauses 20). However equally importantly, the methodology has been developed to provide both a mechanism and scope for the contractor to innovate and take ownership of the design, construction and maintenance of the road network.

While the TOR makes note of only designing those roads due for up-gradation and rehabilitation improvement work in the first five years of the contract period, our approach would look to develop a balanced programme spread over the 10 year contract period. This approach may enable a more manageable contractor's programme and cash flow to be developed thereby encouraging a more realistic pricing by the industry. In addition, this balanced work load will lessen the risk of the contractors seeking to front load their pricing (and profit taking) on the improvement works to the detriment of the long term maintenance outcomes expected under the OPRC concept.

With regard to the level of detail specified in the TOR under Task C-2, the methodology will encompass the following:

Upgradation: For the sections identified for up-gradation within the OPRC pilot the conceptual design for these will be based upon the following approach:

- The identification of sufficiently homogenous rural sections within each road section that will then be surveyed and designed and used to develop a sample conceptual design representative for each section
- The identification of any major intersections or areas of known safety improvement (or known black spots) that require specific design for pricing
- All significant villages or townships within the identified upgradation (or rehabilitation) lengths will be surveyed in detail and the concept designs for pavement and drainage improvements undertaken in recognition of the higher risks (but also increased benefits) associated with the upgradation works within these road network sections.

The conceptual design detail will be sufficient to permit the OPRC contractor to price this work as a unit rate (e.g. per km or per intersection), while also minimising the risk of variations being claimed following the completion of the detailed design stage. So long as the sample designs are reasonably representative of the upgradation required, then we expect that the overall variance in quantities throughout the road section will be sufficiently small to allow the unit rate price to be held secure. In other words the contractor would have to clearly demonstrate (with evidence) why any subsequent increase in the quantities, priced within the unit rate, have been significant enough (and above the level of risk that will be defined) along the entire road section being upgraded to warrant a variation to be considered.

The impact of the planned upgradation on any major bridge structures (and possibly railway crossings) will be initially assessed visually during network inspections undertaken during the development of the long term forward work programme. The outcome from this, along with the recommendations from the Phase I studies previously undertaken within the network, will be used to develop a summary of all of the major structures (bridges and culverts) that will need to be widened to match into the adjacent sections of upgradation. We will then select a common example of a single span and a multiple span bridge to be widened as the basis for preparing a set of standard designs for each two examples for the tenderers to price, possibly on a rate per lineal metre. We would seek a copy of any existing structural drawings and construction details of the bridges identified for widening to assist with process.

Rehabilitation: For sections identified in the Forward Works Programme for rehabilitation within the OPRC pilot the conceptual design will be based upon the following approach:

- The development of a series of standard pavement and resurfacing designs with associated standard cross sections, longitudinal profile and drainage layout from which unit rates (per km) can again be derived and applied to the recommended under pinned quantity to be completed each year within the OPRC pilot

Our general approach would then be:

- Complete all conceptual up-gradation and rehabilitation designs, specifications and unit rate schedule of quantities ready for inclusion into the contract documents and price estimates

- Ensure all environmental and social impacts have been recognised and incorporated into the conceptual designs and contract documents
- Complete an independent (from the designers) “value engineering” review on all up-gradation and rehabilitation works to ensure that the works are appropriate for the future needs of the network but are not over engineered in terms of risk and cost.
- Present the tendering contractors with conceptual designs that have recognised and incorporated the requirements from the previously completed base environmental and social investigations
- Provide a framework within the OPRC documents to enable the contractor to resolve any detailed design aspects related to his construction methodologies along with a clear requirement for the contractor to prepare a final design report prior to any construction commencing
- Complete a safety audit on all designed sections with specific attention applied to major intersections, urban zones, bridges and railway crossings.

Our sub-consultants Theme will be responsible for undertaking the up-gradation design activities including:

- The required topographical survey on the identified conceptual design sections using the latest electronic survey techniques
- Geometric and pavement designs plus associated adjustments to minor structures and drainage facilities as required
- Confirmation that all required safety improvements have been included
- Quantity estimates suitable for pricing the conceptual designs on a unit rate basis
- Development of standard construction specifications which are applicable for the use of locally available materials and construction capabilities of the local industry

The “conceptual” designs will have, as a starting point, the work documented in the previously completed feasibility studies. All of the designs will be reviewed by the Team’s Pavement Management specialist prior to be incorporated into the draft contract documents.

Outputs from this Task work will include the following (note that, in preparing the schedules, discussions will be held with PRBDB/GOP on how these may impact on the potential risk transfer):

- Conceptual design drawings covering sample lengths within the rural sections identified for upgradation as well as major intersections, townships and villages, detailing typical cross sections, long sections, pavement construction, drainage facilities, minor structures and intersection details enabling the contractor to price on a unit rate basis:
- The sections identified for rehabilitation and surfacing renewal will have conceptual pavement and surfacing designs prepared to sufficient detail to allow the contractor to price these on a unit rate (per km) basis. While an indicative annual quantity to be undertaken each year will be shown on the Forward Works Programme, it is more likely that the OPRC contract will require the contractor to price on a completing a fixed underpinned quantity per year
- The results of pavement testing and associated preliminary pavement design, including the associated long-term maintenance programme
- The loading of the available traffic loading data into the HIMS database, (refer Task B3)
- Associated drainage designs
- Strip maps showing the location of known existing utilities, and which of these are likely to need relocating as part of the proposed works
- Identified safety improvement works identified from Phase I black spot studies along with those initiatives identified through our liaison with the NGO appointed by the PRBDB to raise awareness over the need for improvements in overall network safety and the current crash rates.
- Specifications for works in an OPRC format
- General specifications
- Specifications for the emergency works (from Task C3)
- Environmental and Social specifications inline with the requirements set put under Task A3
- A mechanism to ensure the contractor(s) supply as built information and quantities for all activities that add to or alter the existing road asset inventory and need to be recorded.

All data collected and/or collated for the project areas will be loaded into the HIMS database (refer Task B3). From this, the data will be presented to the contracting parties to enable for them to check or revise the proposed

designs accordingly. In addition to any pavement testing results, this would also include the traffic loading data/assumptions and the historical condition data (where available). Additionally, all completed social and environmental studies would be supplied to the tenderers’ to help guide them in their development of any alternative methods and designs.

Specifications in relation to the maintenance standards for the works will be developed through discussion with both the PRBDB and the contractors to ensure that they are workable and applicable for both the network and the capability of the local industry within the OPRC format.

From Clarification 22052008

During the Concept Design phase of the project, the team will draw together all of the various facets of this project and compile the improvement works and OPRC components into the development of the concept design. Prior to this however, the various steps has to be taken to ensure that the Concept Design reflects the requirements of the Project:

1. To review the pre-selected road sections and identify road section for the OPRC implementation.
2. To review the adequacy of available data on network condition from all available resources, i.e. data on roughness survey, deflection survey, traffic volumes and composition, inventory, routine maintenance, improvement works, earlier studies for preliminary designs for rehabilitation and upgradation, EIA & socio economic surveys, pavement condition surveys and road safety reports and to recommend the necessity for additional and supplementary data.
3. To collect additional data, i.e. visually collected inspection data, additional topographical survey data, hydrological data (for bridge widening and storm water design), pavement loading and pavement design investigation data, high speed survey data, roughness data and video of the network and to produce a summary report necessary for the design.
4. To develop appropriate treatments and treatment strategies, based on an analysis of options
5. To establish treatment unit rates that will apply
6. To develop and agree on future traffic growth scenarios
7. To brief and mobilise the resources and skills that will be required to execute the design within the specified time-frame

Using the information gathered, the Team will study and confirm the service levels appropriate for the OPRC in terms of long term asset condition and affordability. The Team will identify the need for additional traffic counting and undertaken a series of sample surveys to confirm the existing mix of traffic and the rates of growth from that identified in previous surveys. Following final agreement with the PRBDB, these service levels will then be incorporated into the contract documents along with their associated measures and compliance regimes.

Concept design for Upgradation (Rural and Urban)

The Team will

- identify sufficiently homogenous rural sections typical of those identified for upgradation that will then be surveyed and a sample concept design representative for each section developed
- identify any major intersections or areas of known safety improvement (or known black spots) that require specific design for pricing
- carry out topographical survey of identified townships within the upgradation lengths and to incorporate concept designs for pavement and drainage improvements undertaken in recognition of the higher risks (but also increased benefits) associated with the upgradation works within these road network sections.

The Team has identified the following where concept design will be carried out for the following Roads:

Rural roads - a maximum of 14 discrete sections

Urban roads - a maximum of 11 townships (including major intersections & junctions)

Pavement design - sufficient to determine the price in the contract estimate and inclusion in the cost recovery models

Structures - Standard culvert extension details

The concept design detail for upgradation work will be sufficient to permit the OPRC contractor to price this work as a unit rate (e.g. per km or per intersection), while also minimising the risk of variations being claimed following the completion of the detailed design stage.

In areas where there are bridge or very large culvert structures (and possibly railway crossings), the Team will not include these structures as part of the upgradation concept design. It is proposed that any necessary upgradation of these major works will be undertaken via a separate contract package. A summary of the entire major structures (bridges and culverts) that will need to be widened to match into the adjacent sections of upgradation will be compiled for PRBDB to initiate upgradation works under this separate contract.

Concept design for Rehabilitation (Rural and Urban)

The Team will develop a series of standard pavement and resurfacing designs sufficient to determine the price for this work to be included in the contract estimate, and within the recommended cost recovery model.

Deliverables for the Upgradation concept design for the selected road sections.

- Typical geometric cross sections of the roads
- Typical drainage and culvert information
- Typical pavement investigation information
- Safety Improvements for Identified Black Spots
- Environmental and Social Impact specifications

Confirmation of the Number of Contract Areas: Based upon all of the information compiled, including liaison with the contracting industry, the outcomes from the financial modelling and risk identification tasks, we will make a final recommendation as to the number of contract areas and contracts to be established.

Confidential Price Estimate: As required under TOR Clause #44, this task will develop the confidential price estimates for the roads under the OPRC contracts/packages, covering:

- Maintenance services
- Identified rehabilitation works
- Planned up-gradation works
- Emergency works (refer Task C3)
- Other services/actions required to complete the contract

These estimates will be compiled with consideration given to the following data/sources:

- The scale of the works and potential for "packaging" numerous work items, as defined in the works programming task
- Unit costs from conventional contracting rates in India/Punjab, with appropriate indexation applied. We anticipate the need to build up some of the unit rates for routine maintenance activities from first principles and will seek input from the local PRBDB staff with contract experience in this process
- Preliminary data from prior OPRC contracts (refer Section 3.2.3)
- The HDM-4 modelling and field based long term work programmes
- The levels of service and performance measures

- Estimates of applicable risk premiums

It is envisaged that separate estimates will be required for each of the contract packages that will eventually be used as a benchmark against which tender prices will be evaluated. For this reason, we will need to be cognisant of the contractor's perceived view of the risks, rather than the view formed from years of maintaining road networks⁵. To achieve this, use will be made of the feedback from the consultation with industry under Tasks A4 and A7 when determining their capacity. Where appropriate any remaining uncertainties associated with both the quantities and rates will be quantified and reflected in the way the estimate accuracy is communicated.

Cost Recovery Models: The timing of the planned improvement works, while still ensuring an appropriate focus on routine maintenance is achieved, will significantly influence the cash flow to the contractor as well as the timing of the benefits recouped through reduced agency and road user costs. To examine this aspect, at least 3 alternative programmes for all planned up-gradation, rehabilitation and surfacing renewal will be prepared, and these combined with the routine maintenance activities, will be used to produce the three financial models. From these three models the most optimal solution will be identified that will ensure road user and agency costs are minimised while also providing a balanced and sustainable cash flow to the contractor.

Outputs:

1. Contract document(s) inclusive of all up-gradation works, planned rehabilitation conceptual sample designs, and all routine maintenance specifications required to be completed under the OPRC concept.
2. Confidential price estimate for each contract
3. Three alternative cost recovery models which analyse and identify the most optimum method of paying the contractor.

iii) Task C3 - Estimate and Pricing for Emergency Works

Under this task, consideration will be devoted to reviewing the basis for the pricing of emergency works (i.e. fixed or unit prices from bidding). In so doing, we will take account of both works that have been executed in the past and currently endorsed specifications for remedial works. The cost estimate will be prepared based on existing market rates and the estimated quantum of works for use in the evaluation and/or negotiation of tenders.

From the foregoing, with the basis established for dealing with emergency works, costs will be estimated (i.e. broadly as for Task C2), with special attention to:

- The likelihood of particular emergency or natural hazard events within each of the contract areas
- The historic scale and cost of remediation of these events
- The most appropriate treatments to remediate damage caused by emergencies or natural hazards, in terms of cost and reducing disruption to road users
- The proposed risk allocation between the PRBDB/GOP and the contractor (Task A8)

The World Bank Sample specifications, for example, permit the quantum of emergency works to be supplied as a provisional sum within the contract, and that the contractors should then bid within the tender process. In this way the contractor is again taking the risk for the efficiency and quality of their works, but not the quantity of these emergency works. Because provisional sums are normally excluded from the cost estimate, the tendered rates would form the basis for negotiation with the preferred contractor.

It should be noted that, for some specific emergency works, the best contractor for the works may not be the OPRC contractor. For instance, whereas clearing away silt/debris following a major flooding event will fall within the capability of the OPRC contractor, it is not always appropriate to also have the contractor responsible for the repair or rebuilding bridges. It is therefore possible that, as part of the negotiation process above, some emergency work may not be included within the OPRC contract. Once the estimate of the likely cost of the emergency works is prepared, a workshop would be held with the GOP and the PRBDB to discuss the proposed recommendations and agree the most appropriate policy.

Outputs:

1. Basis and price estimate for emergency works

⁵ For instance, from Opus' Indonesian work (refer Section 3.2.3(b)) there was a lot of concern around the risk of the overloaded vehicles, even when it was explained that the contractors risk would be clearly limited to a reasonable level

iv) Task C4 - Preparation of Contract Documents

The contract documentation for each of the pilot contracts areas will be prepared taking into account the following issues:

- The contracts are to be aligned with framework provided by World Bank Sample Bidding Documents (but recognising the need for these documents to also incorporate local variances identified through the findings from the lead-up work and industry workshops)
- Building on the Task C2 work, scope and develop model documents⁶ for review with PRBDB/GOP, paying close attention to:
 - ensuring threshold values for the nominated performance criteria are "fit-for-purpose"
 - a payment/penalty regime that is appropriate to an immature contract form and industry
- Tailor the above to the needs of each specific contract area (if more than one) with respect to:
 - how the nature and layout of the network will impact on the efficiency of inspection and maintenance activities
 - the volume and make-up of the traffic
 - the strategic importance of individual links
 - the potential of these links to improve equity of access
- Incorporate baseline condition data and OPRC service levels

We expect that the OPRC contract documentation will comprise the following:

- Bidding Procedures: Sets the context of the contracts, in terms of:
 - the criteria upon which contractors will be assessed for pre-qualification
 - what actions are required from bidding contractors
 - how the tenders will be evaluated
 - the forms required to be filled out by the contractor
- Works Requirements: Defines the specifications, drawings and supplementary information that will apply to the contracted works - these specifications are particular to the OPRC contract form and will include the performance criteria and threshold values that will apply
- Conditions of Contract and Contract Forms: The general and particular conditions that will apply under the contract (e.g. World Bank Sample Bidding Documents and FIDIC), as well as the forms that will be completed when the contract is awarded (the original Invitation to Bid document is also incorporated).
- Legal Review: To ensure consistency and agreement with standard contract conditions and the legal requirements pertaining to contract law in India, it is our intention to have the draft contract documents reviewed by the team's Legal Advisor prior to submission to the PRBDB.

Under this task attention will be devoted to the following facets:

- The identification of the most appropriate network sections that, if grouped together, would best suit the contracting industry, to ensure resources and equipment are utilised efficiently and thereby providing opportunities for cost savings without impinging on quality (Note: there is potential to group the roads in the network into at least two contract areas that may be advantageous from the point of view of the long term maintenance as well as the delivery of the planned up-gradation works).
- Reflecting, as far as is warranted, the feedback from the contracting industry obtained from the Task A4 and A7 workshops
- Applying performance criteria that are appropriate to the strategic importance of the links and the needs of the local community
- Treatment of risk and emergency issues (i.e. from Tasks A8 and C3)

Specific issues to be addressed in the documentation include (refer also Tasks A4, A6 and C1):

- How to encourage innovation from the contractor, without the GOP taking on undue risk
- How to ensure that there is a real incentive to undertake the maintenance component, especially given the dominating value that the improvement works will have on the overall value of the contract
- The cost of managing the contracts on the part of the GOP

⁶ Based on the World Bank "Sample Bidding Documents"

TOR for Part E: Critical to the long term success of these contracts will be the on-going need to monitor compliance outcomes and if necessary adjust the measurement mechanisms in response. We see the opportunity for Opus to continue to work closely with the GOP and the PRBDB throughout the duration of the contract as significant and beneficial to the long term relationship between these organisations. To this end we will prepare a programme for this that will focus on the critical aspects of contract monitoring and data analysis along with our recommendations on the timing of these reviews.

We recognise that over the duration of the contract there will be a significant volume of correspondence and transfer of written/electronic information between the various parties. Consequently the recording and tracking of this documentation through a user friendly, robust and accessible (by all parties) system is considered critical to the success of the project.

Opus will develop a Project Document Control system that has the capability to record and track the generation, receipt and circulation of project documents such as correspondence (letters, minutes, notes etc), reports (progress, financial, engineering etc) and drawings (preliminary, tender, construction and as built).

The system is capable of indexing and identifying all documents, both in digital and hardcopies, based on serial numbers, work packages, subject and other metadata. The system will have the capability to digitise all project related documents and store these in a central project database. A web interface, based on Microsoft Internet Explorer, is used to manage and retrieve these from a central location, via local area and internet networking. Search capabilities based on keywords, dates, serial numbers and other information is built into the user interface. Work flows will be built into the system whereby revisions to documents, including engineering audit comments to drawings are tracked and monitored for compliances to standard work processes. Work processes related to documents such as required responses, actions, approvals and resolutions to issues are monitored and tracked for compliance with quality management systems.

Outputs:

1. Contract documents for pilot contracts
2. Annotated version of (1) explaining the rationale applied
3. Draft TOR for Part E services providing for technical assistance to the GOP for on-going compliance monitoring and OPRC management.
4. Propose a framework for a project document control system

3.4.5Part D: Support to the Procurement Process

Summary: Develop and Implement Contractor Prequalification Process, Prepare and Run Pre-bid Workshops, Prepare and Run Tender Workshops, Support PRBDB during Tender Process, Provide Training to Nominated PWD/PRBDB/GoP Staff

i) Task D1 - Prequalification of Contractors

The TOR indicates that PRBDB/GOP will implement a "prequalification" process to select contractors who will be invited to submit tenders under Task D3. The findings from Tasks A4 and A7 will form the basis of the prequalification standards. Ideally a minimum of three contractors would be prequalified for each contract to ensure an adequate level of competition is achieved.

Subject to PRBDB/GOP's agreement, prequalification will proceed as follows (note that the Opus Team's role is to assist/guide PRBDB/GOP on this work):

a) Preparation of Prequalification Document (tentative coverage as below):

Description of the contract package covering:

- locations and route maps
- description of the works to be undertaken (backed by approximate statistics defining the magnitude of the works)
- the proposed upgradation/rehabilitation programmes

Explanation of the planned OPRC bidding and execution arrangements covering:

- contractual arrangements

- tender documents (including particular conditions that may influence contractors interest in seeking prequalification)
- roles of key parties, including that of the PRBDB/GOP and the Consultant
- the tendering and evaluation basis

The questionnaire-form documentation to be provided by the contractor in response to the tender evaluation (and the "scoring system", which will be applied to rank submitters, agreed in advance with PRBDB/GOP); are expected to include the following, covering both the contractor and their related parties:

- statutory details
- financial details (e.g. profit and loss accounts and balance sheets for last 3 years)
- list of current projects or those awaiting tender outcomes (including corresponding financial and resource/equipment commitments)
- inventory of resources
- summary of experience on comparable projects
- which contracts they are interested in (noting that some contractors may be interested in all areas, while others may only be interested in their local area)

Approval by PRBDB/GOP of the prequalification document for issue

b) Steps to Finalisation of the List of Pre-Qualified Contractors:

- Advertising the invitation to register interest in becoming a pre-qualified contractor (note: to be timed to meet the overall Project programme)
- Issuing the prequalification documents to registrants
- Responding to queries during the submission period
- Collating the responses and, if necessary, making contact with the registrants to receive clarifications
- Evaluating the responses according to the agreed scoring system
- Reporting the findings to PRBDB/GOP, including a recommended list of appropriately qualified contractors for approval
- Upon approval from the GOP, notifying all respondents of the outcome

In this exercise, it may be necessary to consider how many contracts (if more than one) a party can be prequalified for, in order to ensure some form of equitable distribution of works and to not end up with the creation of a single entity holding all of the OPRC experience. Furthermore, because it is common for many of the smaller contractors to want to offer their services to those who are trying to pre-qualify, it will be necessary to develop a policy on how to pass this information on to those who are pre-qualifying. This aspect would be raised during the workshops under Tasks A4 and A7, thereby encouraging potential consortia to get their groupings together well in advance of the actual pre-qualification invitation.

Outputs:

1. *Proposed contractor prequalification scoring system (for approval by PRBDB/GOP)*
2. *Prequalification documents, including questionnaire forms*
3. *Prequalification evaluation report (for each road package)*

ii) Task D2 - Pre-Bid Workshops

The pre-bid workshop is an important component of implementing the OPRC regime on a pilot basis in the Punjab, especially given the newness of the OPRC approach and the potential for contractors to misunderstand aspects of it. These workshops will follow on from the three industry consultation workshops completed under Task A7.

Because this workshop will involve only the pre-qualified contractors (refer Task D1), the emphasis will be placed on the following aspects:

- Explaining the final OPRC contract format (having previously addressed the draft contract format under Task A7) and the bidding process
- Showing video footage of "typical" sections of the roads and issues arising in respect to how OPRC will treat it
- Taking contractors through a "case study" of how a typical OPRC-based project will be implemented (i.e. into the longer-term)

- Detailing how the performance assessment and payment processes are carried-out under the OPRC form of contract
- Responding to questions
- Conducting a half day site visit to the contract areas to explain key aspects of the contract in terms of:
 - illustrating acceptable and unacceptable items
 - identifying some of the challenges in terms of the upgradation and rehabilitation works

Any relevant feedback arising from the workshop will be documented and consideration given to any minor amendments to the contract documentation. Such amendments, if any, would be issued as notices to tenderers.

In addition to the above workshops, we would identify the need for further focussed workshops on specific issues. The need for such workshops will depend on the outcome of Task A7, but may include the likes of:

- Training on HIMS and/or the data contained within it
- Efficient maintenance practices
- Risk appreciation and management

Such training would be scheduled to coincide with our potential involvement under Part E activities (and identified in the TOR) as part of the ongoing support of the project and scheduled visits by the team members.

Outputs:

1. *Workshop held (and debrief notes submitted)*

iii) Task D3: Tender Process and Evaluation of Tenders

Subject to confirmation with PRBDB/GOP, the Consultant's services during the tendering are set to cover the following (albeit that these aspects will be led by PRBDB/GOP):

a) Tender Process:

Issuance of tender documents to pre-qualified contractors

Attendance at site visits

Participation in up to 3 half day tender workshops, anticipated to cover the following issues:

- Workshop #1 (1 week after document release): discuss the tender documents, what other information may be available, etc
- Workshop #2 (about 2 - 3 weeks after #1): risk issues and their management
- Workshop #3 (2 weeks after #2): questions from tenderers

Responding to tenderer's queries and request for clarifications (and if necessary issuing "addenda" to the tender documents)

b) Tender Evaluation:

- Documenting the tender evaluation procedures to be used
- Completing the "Basic Data Sheet"
- Completing the "Record of Tender Opening"
- Compiling the "Table of Tender Prices" and revenue projections, and supporting funding requirements
- Evaluating the technical abilities of the tenderers
- Compiling a short-list of the substantially conforming tenders and proceed to undertake detailed technical and financial evaluations
- Confirming the accuracy of the tender prices (e.g. by checking for arithmetical correctness or the implications of minor technical non-compliance etc)
- Seeking clarification(s) from tenderers (albeit generally on matters directly influencing the "preferred tenderer's" submission)
- Hold a 1-day workshop with GOP and the World Bank, at which the Project Team would present their findings and recommendations ahead of starting the contract negotiations - this will ensure all processes have been followed and clear justification for the conclusions have been made

c) Contract Negotiation (if required):

On the basis of this work, the Consultant will prepare the formal "Tender Evaluation Report" recommending the preferred tenderer to PRBDB/GOP (including compilations of the information described above).

Outputs:

1. *Tender evaluation reports (for each package)*

iv) Task D4: Training

In line with the training programme submitted with the Inception Report, the Opus Team will provide support/training of up to five GOP/PRBDB Engineers attached to the Consultant along with other senior PWD and PRBDB staff. The principle aim of this training is to facilitate the smooth implementation of the contracts and capacity building of the skills needed to undertake OPRC contracts in-house in the future. This aside, it should be noted that the support and training process will commence on day one of the overall contract, with the client staff welcome to join the Opus team on any activities at any stage of the process and not just upon the commencement of Part D.

Client support and training will cover the likes of the following, but will be targeted toward facets that are identified as needing reinforcing as the contracts proceed:

- Interpretation of OPRC contract clauses
- Measurement of condition data and applying it to both the service level criteria and the payment basis
- Dealing with potential disputes with the contractor
- Troubleshooting problems
- Redefining measures and negotiations – both contractor and client-led
- The application of advanced asset management principles
- Pavement deterioration modelling using HDM-4 (possibly working along side experienced Opus modellers)
- Payment certification / approval process

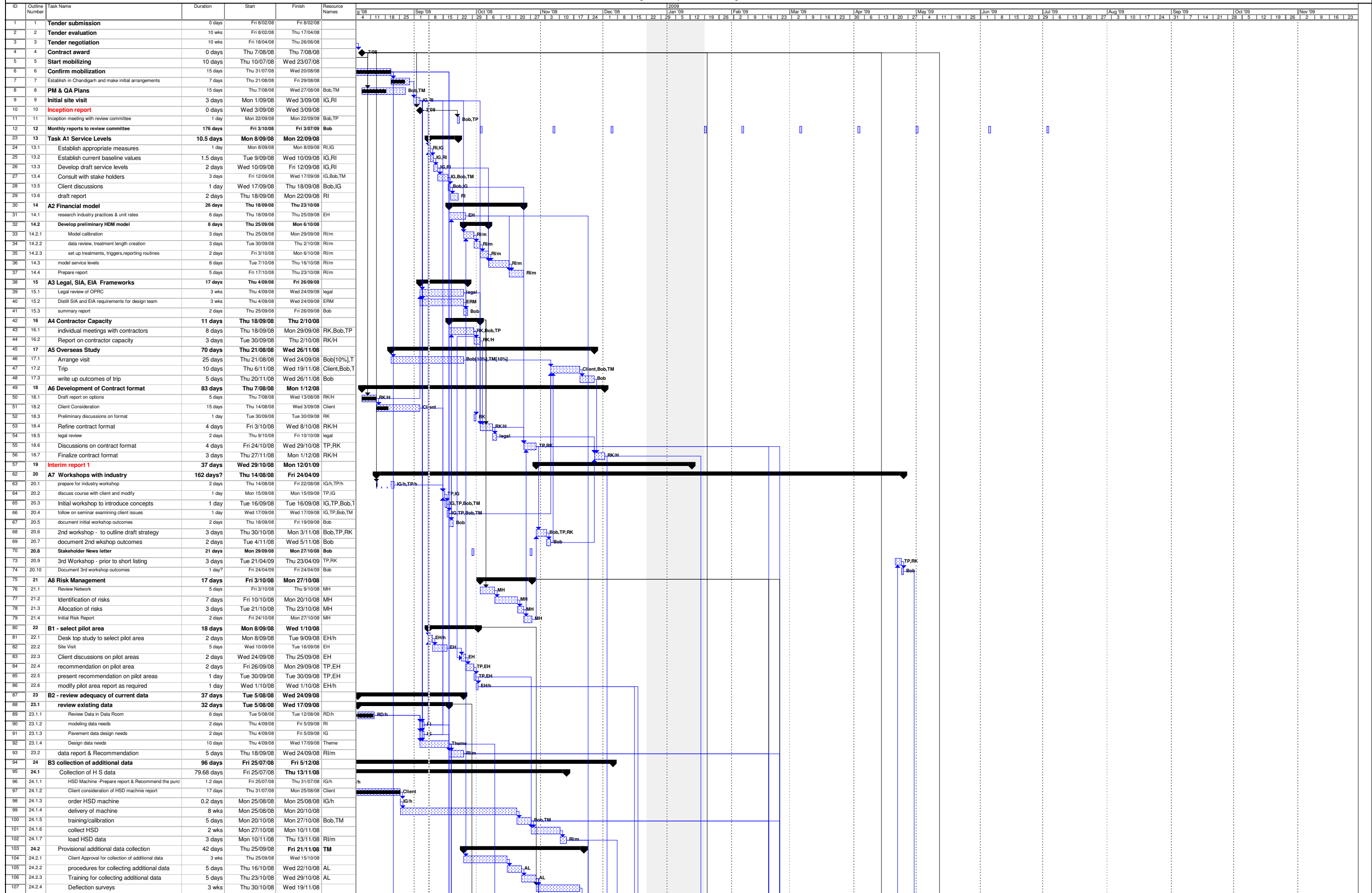
The training will be provided in the form of supervised experience gained during the day-to-day execution of this project along with presentations on issues identified from the series of dedicated industry workshops. We would also arrange a half day workshop for all of the staff at the start and end of each major Task to review our approach and the subsequent outcomes.

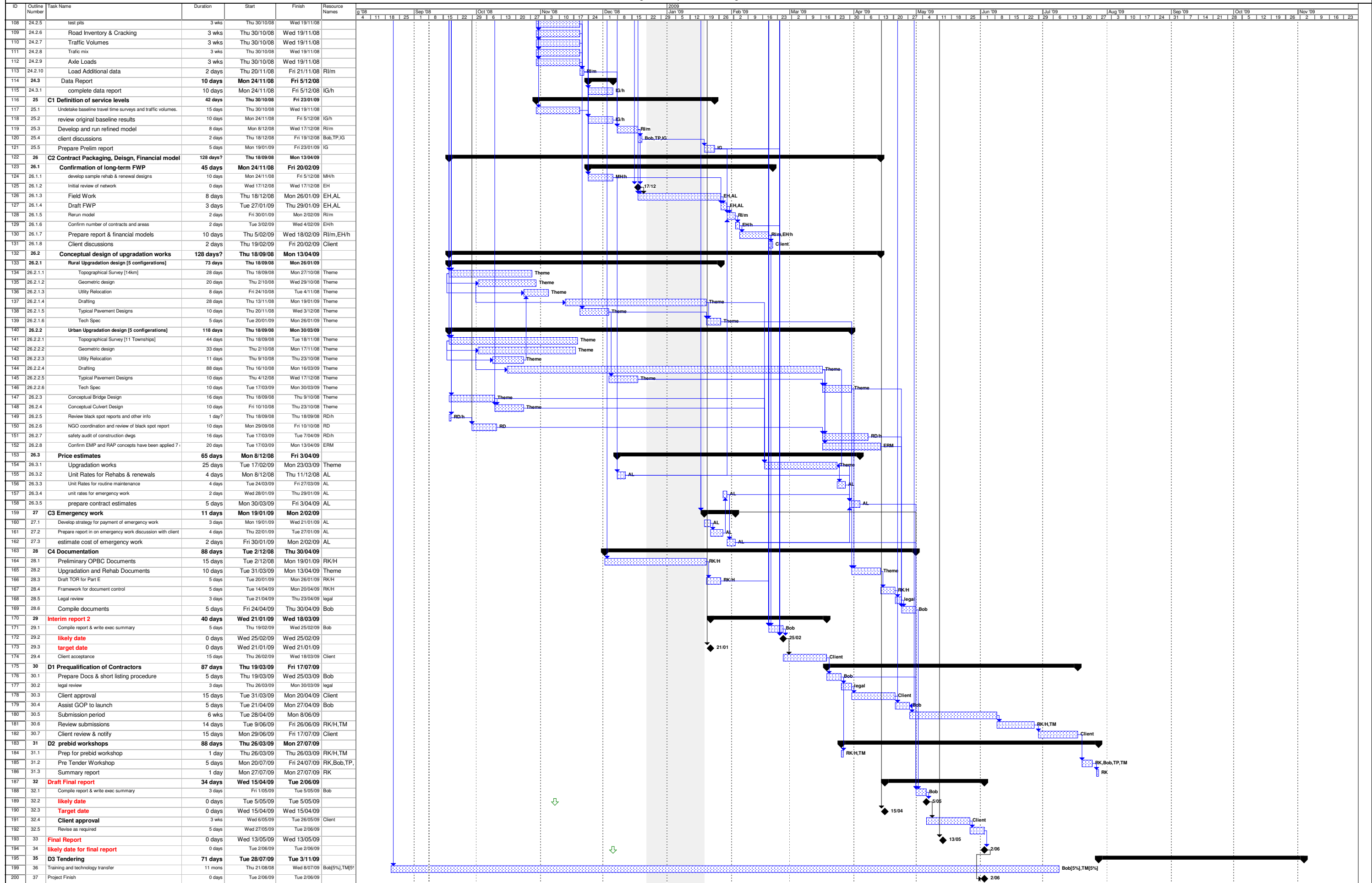
Under this task, a core team of up to 5 GOP and PRBDB staff will be identified who will in the future be expected to provide the critical management functions necessary to administer the OPRC contractors, and who will be expected to disseminate the OPRC knowledge throughout the GOP. These team members will be critical to the building of institutional capability in the development and execution of these forms of contract and in that context will be vital to the ongoing sustainability of the road network.

Outputs:

1. *As required.*

4.2 Detailed Programme





4.3 Draft Study Tour Agenda

Table 4.4 - Indicative Draft Itinerary for Overseas Study Tour

Visit	Location	Activity	Comment
1	Auckland, New Zealand	Overview of performance-based maintenance contracts for Transit New Zealand. Visit to the Auckland Harbour Bridge which is being managed by a consortium including Opus under a 10yr OPRC.	Because performance-based maintenance contracts have been in-place for some time in New Zealand, the delegation will benefit from the practical aspects from these contracts, particularly in the area of data management and predictive modelling
2	Western Bay of Plenty (Tauranga), New Zealand	A combined local road network and state highway network 10 yr contract, with focussed levels of service for different portions of the network	A predominantly rural OPRC, with a diverse range of traffic demands and predominantly agricultural roadside activities.
3	Hamilton, New Zealand	Review of a "hybrid" style contract	Under the hybrid approach, the contractor has both output and outcome based components of work. This is similar to the scope of many pilot trials of OPRC.
4	Sydney, Australia	Review of the long-term performance specified maintenance (OPRC) contract for the North Sydney road network	The 10-year, North Sydney OPRC (the first in the world) has just been concluded and delegates will have the opportunity to discuss with representatives of the client organisation the details, benefits and weaknesses of the contract. In addition Opus has been recently commissioned by the RTA to draft the replacement contract document and the outcomes from this will also be available for discussion.
5	Bunbury/ Perth, Western Australia	Overview of term network contract development and implementation for the State road network and the move from full in-house maintenance to full outsourcing in a short timeframe.	These WA term maintenance contracts vary from the contracts in New Zealand in that the regions covered are highly diverse in terms of the environment and the availability of resources to meet the needs of the contracts (Note: How the contract forms were developed will be relevant to the Punjab Project)
<i>Optional sites not included in the Opus Team's bid scope but for which arrangements could be made:</i>			
6	Victoria, Canada	Review of maintenance performance measures adopted in recent Public Private Partnership projects in British Columbia	The performance parameters and their application to recently initiated PPP projects represent latest best practice in long-term maintenance management.

Note: At each site both a client representative and an Opus representative will be present to discuss their views on the contract.