



TRANSPORT PAPERS

TP – 42 C
March 2014

Review of Performance Based Contracting in the Road Sector

Phase 2: Review of Training Materials and Resources

Ben Gericke, Theuns Henning, and Ian Greewood



REVIEW OF PERFORMANCE
BASED CONTRACTING IN THE
ROAD SECTOR
PHASE 2: REVIEW OF TRAINING
MATERIALS AND RESOURCES

© 2014 The International Bank for Reconstruction and Development / The World Bank

1818 H Street NW
Washington, DC 20433
Telephone 202-473-1000
Internet: www.worldbank.org

This volume is a product of the staff of The World Bank. The findings, interpretations, and conclusions expressed in this volume do not necessarily reflect the views of the Executive Directors of The World Bank or the governments they represent.

The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Rights and Permissions

The material in this publication is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable law. The International Bank for Reconstruction and Development / The World Bank encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the Copyright Clearance Center Inc., 222 Rosewood Drive, Danvers, MA 01923, UNITED STATES; telephone: 978-750-8400; fax: 978-750-4470; Internet: www.copyright.com. All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2422; e-mail: pubrights@worldbank.org.

To order additional copies of this publication, please send an e-mail to the Transport Help Desk transport@worldbank.org

Transport publications are available on-line at <http://www.worldbank.org/transport/>

Cover photo: Haiti - Truittier debris management site. Photo: Romel Simon / World Bank
Photo ID: RS-HT005 World Bank

CONTENTS

EXECUTIVE SUMMARY	6
INTRODUCTION.....	7
2.1. Background to Assignment.....	7
2.2. Purpose of This Task.....	7
A REVIEW OF AVAILABLE TRAINING MATERIAL AND RESOURCES	8
3.1. Purpose of This Task.....	8
3.2. Recommended Changes to current Framework.....	8
ASSESSING THE STATUS OF CURRENT RESOURCES	11
4.1 Training Material.....	11
4.2. Documents and Other Resources.....	13
DELIVERY OPTIONS	16
5.1 Review of Delivery Options.....	16
5.2 Recommended Delivery Options	17
RECOMMENDED DEVELOPMENTS.....	19
6.1 Training Material.....	19
REFERENCES.....	21
APPENDICES.....	22
DOCUMENTATION	24

LIST OF TABLES

Table 1: Assessment of the Status for Existing PBC Training Material	12
Table 2: Assessment of the Status for Existing PBC Documents and Resources	15
Table 3: Recommended Delivery Options.....	17
Table 4: Training Material Development Needs.....	19

1 EXECUTIVE SUMMARY

The support of Performance Based Contracts (PBCs), from initial concept to final delivery, is essential if the best outcomes are to be achieved for the road users. This report, completed as part of the Opus International Consultants overall review of PBCs for the World Bank under contract 7158253, focusses on the existing training materials and resources available and provides recommendations on the updating, expansion or creation of materials to increase the chances of overall success.

The report recommends a more structured approach to the materials available, with a clearer intent on the audience and the topics addressed. Although some material would be duplicated between the audiences, it is recommended that materials be developed that focus specifically on:

- The Executive Level
 - World Bank Staff
 - Government/Road Agency Exec Management
- The Management Level
 - Road Agency “Owner” of the PBC
 - Agency Procurement Team
- The Delivery Teams
 - Road Agency contract management team
 - Consultants and
 - Contractors.

Based on the review, a modular “topics of focus” approach to the training and resource materials is recommended, with the following modules included to address the primary issues that have been observed to be hampering success:

- Introduction/Objectives of Asset Management and how PBC facilitates the paradigm shift;
- PBC Types and Case Studies;
- Structuring the PBC according to AM Strategy;
- Governance Structures (and the impact of outsourcing on the Road Agency);
- Contract Development;
- Tender Process;
- Risk Management; and
- PBC Delivery.

The review has also considered the means of delivery of the training, with a mix of face-to-face and remote training considered appropriate for various levels of training.

2 INTRODUCTION

2.1. BACKGROUND TO ASSIGNMENT

Performance Based Contracts (PBC's) are not new to the transport sector, with many variants in use in different countries for close to two decades. International lending institutions – such as the World Bank – have played a significant role in pushing PBCs into developing nations as part of loan assistance packages.

However, there has been a tendency for a “one-size-fits-all” approach to the implementation, with the result being a variation in the success of any implemented PBCs, as well as a significant proportion of the proposed PBCs not making it to the contract award stage. To address these issues, the World Bank has commissioned a Review of Performance Based Contracting in the Road Sector (contract number 7158253) led by Opus International Consultants Limited.

Outputs from the project to date include:

- Phase 1 report covering the review of previous PBCs (Opus 2011)
- A guide for the application of PBCs (Opus, 2012a)
- Points to guide Bank implementation of PBCs (Opus, 2012b)
- This review of existing training materials and resources.

2.2. PURPOSE OF THIS TASK

The purpose of this task is to review the existing training materials and resources available within the Bank for PBCs in light of the recommendations from Opus (2011, 2012a and 2012b) and provide a summary in terms of:

- What is fine to continue using
- What is no longer relevant and should be discontinued and
- What gaps exist that need new material developed.

The task incorporated feedback received from PBC implementers on the existing materials, including responses to the questionnaire (Opus, 2011) on which materials were used (and how useful were they) by the various PBC team leaders.

3 A REVIEW OF AVAILABLE TRAINING MATERIAL AND RESOURCES

3.1. PURPOSE OF THIS TASK

Feedback received from the case studies (Opus, 2011) suggested that parties involved found the resources such as the sample bidding documents useful but still felt that there were a number of areas where more assistance was needed. Often the implementations were undertaken by Bank staff, consultants and contractors, none of whom had prior experience with PBC contracts. In addition to that, many of the “failed” projects, in particular the one’s that never got off the ground, failed because there were some misunderstandings from government officials regarding the PBC process or the aims it is trying to address.

Opus (2011) highlighted that PBCs can only be successful if it is adopted within the appropriate institutional context and readiness. From the Bank resource guide (and other readily available material) there are a significant number of presentations and reports that describe the intent of a PBC, or which present case studies of specific implementations. There is very little material though, which provides guidance on how to progress a PBC from initial concept through to having a successful contract in place.

Once the decision to adopt a PBC is made (i.e. the “why” question has been answered to the satisfaction of the executive level and they have brought into the concept), the guidance on the “how to” aspects of the implementation needs to be enhanced. For example, the risk sharing principle is explained in some presentations, yet the practical implication and guidance of how to develop a risk sharing framework for a particular contract is limited. The same applies to the development of the tender document and contracts. There are certain fundamentals that are essential to procurement options and if not well understood, some impractical changes or omissions may cause downstream difficulties with the projects.

3.2. RECOMMENDED CHANGES TO CURRENT FRAMEWORK

Based on the review and the feedback from the case studies (Opus 2011), the following recommendations are made in order to increase the value form both the training presentations and resources:

- **Target Audience/Focus and Training Levels** – The training resources on PBC are extensive, yet most of it is of a general nature and does not target a specific audience. This has resulted in most of the presentations being very long.

Additionally, most of the presentations lack a clear topic of focus (e.g. risk management). It is recommended to adopt a modular training material framework that collates material for specific parties within the PBC environment, and for specific topics. This will not only allow for specific issues to be covered by the respective modules, but it will result in material to be more relevant to the target audience. Although some material would be duplicated between the audiences, it is recommended that materials be developed that focus on:

- **The Executive Level.** At this level the aim is to raise awareness of the benefits and issues of PBC implementation, the need for good AM practice and related prerequisites. The focus is to answer the question of “why should I consider PBC for my network” with the target audience being:
 - World Bank Staff
 - Government/Road Agency Exec Management
- **The Management Level.** At this level the focus moves on to the fundamental principle levels and addresses the question of “how to procure a PBC”. The audience for this level would consist of:
 - Road Agency “Owner” of the PBC
 - Agency Procurement Team
- **The Delivery Teams.** At this level there would be specific details on the issues that need to be understood from those directly involved in the PBC to enhance the chances of success. The question is “how to make it work on the ground” would be answered with a target of:
 - Road Agency contract management team
 - Consultants and
 - Contractors.
- **Modular Framework** – The existing Bank training material are split into the following categories:
 - General PBC
 - Procurement
 - Road Maintenance
 - Country/Region Specific

It is recommended to structure the material into more specific topic areas/modules. It is noted that the modules identified below would need to be aligned to each of the three levels of audience noted above. The following modules should be included to the current structure:

- Introduction/Objectives of Asset Management and how PBC facilitates the paradigm shift;
- PBC Types and Case Studies;

- Structuring the PBC according to AM Strategy;
- Governance Structures (and the impact of outsourcing on the Road Agency);
- Contract Development;
- Tender Process;
- Risk Management; and
- PBC Delivery.

Subsequent sections contain more detail discussions of these modules.

4

ASSESSING THE STATUS OF CURRENT RESOURCES

4.1 TRAINING MATERIAL

Appendix 1 contains a listing of the materials reviewed as part of this review. The assessment of the existing training material is summarized in Table 1. The table categorized the current material availability into the following categories:

- Existing material is adequate;
- Repackage existing material – this imply that the material has to be split up into the suggested sector groups and module levels. The intent is to focus presentations for a very specific topic area;
- Enhance existing material, suggesting that there are some current material could be combined with new development in order to complete the respective modules; and
- New development will largely involve full development of the modules indicated.

As can be observed from the table, there is significant material available, especially in the introduction of PBC concepts. Furthermore, there has been excellent work completed in the case study area and the wider benefits and lessons learned from PBCs. The primary areas where more and/or new development is required include:

- Introduction/Objectives of Asset Management and how PBC facilitates the paradigm shift;
- Structuring PBCs according to wider asset management objectives; and,
- Most of the implementation stages of PBC including governance, contract development, tendering and risk sharing.

TABLE 1: ASSESSMENT OF THE STATUS FOR EXISTING PBC TRAINING MATERIAL

		Modules							
		Introduction /Objectives for PBC	PBC Types and Case Studies	Structuring according to AM Strategy	Governance Structures	Contract Development	Tender Process	Risk Management	PBC Delivery
Level	Audience								
Executive Level	World Bank	R	A	-	-	-	-	E	E
	Government/Road Agency Exec Management	R	A	-	-	-	-	-	-
Management Level	Road Agency "Owner" of the PBC	R	A	N	N	-	N	N	N
	Agency Procurement Team	R	-	-	-	N	N	-	-
Delivery Team	Road Agency contract management team	R	A	N	N	R	N	N	N
	Consultants	R	A	N	N	R	N	N	N
	Contractors	R	A	N	N	-	N	N	N

Legend:

- Existing material is adequate A
- Repackage R
- Enhance existing E
- New development N
- No material needed -

4.2. DOCUMENTS AND OTHER RESOURCES

A similar review has also been completed on the supporting documentation and other resources available to support PBC implementation. The summary of this review is presented in Table 2.

It is noted that the completeness of coverage of the contents documented on PBCs significantly exceeds that of the training material (as summarized in Table 1), with most of the areas within the delivery spectrum of PBC having been documented in one form or another. It is noted that some of the materials are partly documented across a number of publications and may appear fragmented to the reader.

The vast range of publications in this area results in the reader having to undertake an intensive literature review in order to get a complete picture of specific topics, and/or to determine what is “best practice” rather than “best to avoid practice”. For this reason there are three main recommendation regarding the documentation and resources on PBCs:

- Developing a **compendium/library** for the documentation. In essence this library already exists on the Banks PBC resource website – the recommendations is to expand the headings in the modular structure that covers the full range of PBC delivery and clearly index all materials to the relevant headings;
- Some of the topic areas are adequately covered in various publications but in a fragmented manner. It is recommended to **summarize/consolidate** some of these documents into a single Road Note or guideline. An excellent example of such publications is the guideline note titled: “Structuring Output-based Aid Approaches in World Bank Group Operations” This document is focused in a very specific area that summarized the main considerations for the topic thus increasing its value to the reader;
- **Specific resources** such as contract type templates are increasing consistency and efficiency for the implementations across many countries and this approach would be promoted for all commonly needed areas. Examples of needed resources include:
 - Contract templates (sample bidding documents) for most commonly used PBC contract variations (refer to Opus 2011 and 2012a);
 - Summarizing the value of PBC for senior government officials in a road note. The first question many senior government officials will ask when considering PBC is “Give me some examples of how much money can be saved when using PBCs?” Any implementer knows the complexity of this question as PBC offers many other benefits that do not necessary include cost savings (especially short term cost savings that may be in conflict with the whole-of-life costing principles of asset management). There needs to be single document explaining the benefits with evidence/data from existing case studies that demonstrate how some of these benefits

were achieved. The Guide (Opus 2012a) covers a significant component of this, but is potentially too long to create/stimulate the initial interest;

- Standardized risk register that can be used to decide/define risk sharing concepts in tender documents and more importantly communicating the issues faced in a region.

TABLE 2: ASSESSMENT OF THE STATUS FOR EXISTING PBC DOCUMENTS AND RESOURCES

		Modules							
		Introduction /Objectives for PBC	PBC Types and Case Studies	Structuring according to AM Strategy	Governance Structures	Contract Development	Tender Process	Risk Management	PBC Delivery
Audience	Training Level								
Executive Level	World Bank	A	A	-	-	-	-	R	R
	Government/Road Agency Exec Management	A	A	-	-	-	-	-	-
Management Level	Road Agency "Owner" of the PBC	A	A	E	-	-	R	R	R
	Agency Procurement Team	A	A	E	R	E	R	-	-
Delivery Team	Road Agency contract management team	A	A	E	R	E	R	N	R
	Consultants	A	A	E	R	E	R	N	R
	Contractors	A	A	E	R	-	R	N	R

Legend:

Existing material is adequate A

Repackage R

Enhance existing E

New development N

No material needed -

5

DELIVERY OPTIONS

5.1 REVIEW OF DELIVERY OPTIONS

A key aspect of training is the means by which it is delivered. While there is little doubt that face-to-face training delivers the best outcome, there are other well established means of providing training that greatly reduces the costs associated with delivering and receiving training. On the basis of the three different levels of training required (Executive, Management and Delivery Teams), the suitability of training delivery options has been assessed.

The options under consideration are:

- **Workshops and seminars:** These are the traditional means of delivering training, and involve the trainer using prepared materials and travelling to the location of the clients' project team. Results are best when a high level of interaction occurs, which can be difficult in large groups.
- **Web-Based Training:** Various technical solutions exist ranging from largely one-way (passive audience) to two-way (active audience) solutions. While suitable to some situations, the lack of interaction could pose significant challenges when training is delivered across cultural boundaries (as is typical for PBCs).
- **Pre-Recorded Videos:** While watching videos of training sessions delivered elsewhere can in its own right be a training means, it is considered that this approach is most successful when used as a basis for guiding discussions, wherein the video is stopped regularly and a trainer in the room with the trainees then leads discussion on the topic just viewed.
- **Self-Study:** This is generally considered a good means once the fundamentals of the subject matter have been understood. It is therefore considered more as a supporting means of delivering the training, rather than a replacement for either of the above methods.

To support increasing demand for PBC's, there is likely a need to increase the number of competent trainers on PBCs. Consideration of a "train-the-trainers" course may well be a suitable means of both ensuring the quality of training delivered, as well as ensuring the quantity of trainers is available.

5.2 RECOMMENDED DELIVERY OPTIONS

Based on the training delivery options above, and the courses to be delivered, Table 3 presents the recommended delivery options.

TABLE 3: RECOMMENDED DELIVERY OPTIONS

Audience	Workshops / Seminars	Web-Based Training	Pre-Recorded Videos	Self - Training
Executive	Ideal, especially as target audience is small in numbers and it is essential that full buy-in to the PBC concepts is understood to provide leadership to the initiative.	Potentially ok if venue and IT is suitable. Executive level is likely to be more open to asking questions across a web-based delivery means.	Suitable as a refresher to enable clients to study specific topics as/when required, or to support other training. Not considered suitable as a primary means of training.	
Management	Ideal	If language/cultural challenges are not significant, then could be successful. Ideal would be for trainees to be in one venue with a coordinator who can observe the room and provide feedback/questions to the trainer.	Suitable as a refresher to enable clients to study specific topics as/when required, or to support other training. Not considered suitable as a primary means of training.	
Delivery	Ideal, but need to ensure	Generally difficult to deliver quality	Suitable as a refresher to	Owing to range of

<p>Teams</p>	<p>either small training groups, or that a larger group is regularly split into small discussions to ensure attendees feel comfortable asking questions. This is especially so in some cultures where there is a general reluctance to ask questions in large groups or in front of ones manager.</p>	<p>training on technically challenging material across a web-based training means, especially when the cultural challenges are added.</p>	<p>enable clients to study specific topics as/when required, or to support other training.</p> <p>Not considered suitable as a primary means of training.</p>	<p>topics to cover, self training is likely to be suitable only as an extension of subjects taught, and not as a primary means of training.</p>
---------------------	---	---	---	---

6 RECOMMENDED DEVELOPMENTS

6.1 TRAINING MATERIAL

The training material development needs are summarized in Table 4. Note that “repackaging” of material pertains to the task of taking existing materials and compiling a new presentation focused on a very specific topic area within the PBC delivery range.

TABLE 4: TRAINING MATERIAL DEVELOPMENT NEEDS

Module	Development Need
Introduction/Objectives for PBC	Repackage existing material in order to give relevant focus to different sector groups. For example introduction presentations with a focus such as “What PBC means to the contractor?”
PBC Types and Case Studies	Adequate presentations exist within this area. They just require clear referencing to the relevant PBC model type (DBMOT, Network Management etc., as per Opus (2012a))
Structuring according to AM Strategy	<p>New presentation materials is required that explains linking asset management objectives to both management and project owner level. For example this topic area should include aspects such as:</p> <ul style="list-style-type: none"> Understanding your current network performance - performance monitoring principles and/or benchmarking; Understanding life-cycle cost aspects on the network; Identifying inefficiencies of a network and the way it is managed; Understanding network traffic capacity and impacts of improved road conditions; and Understanding pavement loading capacity on network level and associated strategies to manage this in the contract.
Governance Structures	Material discussing appropriate contract governance structures for different contract types.

Module	Development Need
Contract Development	<p>Current training material covers this topic fairly well. Most of this is focused around fundamental PBC specific contractual aspects. The areas that needs expansion via tailored training include:</p> <p>Specific training material that explains the difference between PBC and traditional contracts. Some road agencies feel reluctant to move away from traditional contract clauses and often slow down the implementation process as a result of extensive rewriting (and subsequent approval process of changes);</p> <p>Specific training is also required in the process of developing specifications for network performance. Few network managers understand how to develop outcome based specifications that will drive the right outcomes yet provide “space” for the contractor to be efficient and effective in their work practices.</p>
Tender Process	<p>Few resources exist on the actual tendering process. In contrast to traditional contracts there are some aspects that need to be explained to implementers including:</p> <p>Methods and value of information sharing;</p> <p>Different techniques used in tender assessment;</p> <p>Utilising an interactive tendering process.</p>
Risk Management	<p>Fundamental risk sharing principles are well covered; more material must be developed to cover the practicalities and identification of specific risks for the intended contract area. This includes the use of standard definitions of risks, and risk boundaries.</p>
PBC Delivery	<p>New material has to be developed to give implementers an idea of the “how-to” aspects in running a PBC. Apart from covering the day-to day activities related to the management of a contract by outcomes (as opposed to directing via inputs or outputs), training is also required to include scenarios of the contract not going the way it is intended to.</p>

REFERENCES

Opus (2011). *Review of Performance Based Contracting in the Road Sector, Phase 1: Tasks 1-6*. World Bank Contract 7158253. Opus International Consultants Limited, New Zealand.

Opus (2012a). *A Guide to Delivering Good Asset Management in the Road Sector through Performance Based Contracting*. World Bank Contract 7158253. Opus International Consultants Limited, New Zealand.

Opus (2012b). *Letter covering suggested Bank strategy to enhance the adoption of PBCs*. World Bank Contract 7158253. Opus International Consultants Limited, New Zealand.

APPENDICES

LIST OF RESOURCES REVIEWED

Presentations/Training Resources

From World Bank Website

1. "Case Study Performance-based Management and Maintenance of Roads in the USA," César Queiroz, Transport Infrastructure Consultant, World Bank Regional Seminar on Performance-Based Management and Maintenance Contracts, Arusha, Tanzania
February 2008
Also available as PDF file.
2. "Word Bank Resource Guide and Other Information on Performance-Based Contracts," César Queiroz, Transport Infrastructure Consultant, World Bank Regional Seminar on Performance-Based Management and Maintenance Contracts, Arusha, Tanzania
February 2008
Also available as PDF file.
3. "Changes Required by Road Administrations and the Consulting and Contracting Industries," César Queiroz, Transport Infrastructure Consultant, World Bank Regional Seminar on Performance-Based Management and Maintenance Contracts, Arusha, Tanzania
February 2008
Also available as PDF file
4. "International Experience with Performance Based Maintenance Contracts," VicRoads International from Australia
Workshop organized with the Egypt Road Authority (GARBLT)
Februray 2008
Also available as PDF file.
5. "Public Private Partnerships as an Option to Speed Up Investments in Intermodal Infrastructure and Services," César Queiroz, Transport Infrastructure Consultant, World Bank
InterBaltic Final Conference: "A Future Transport Policy for the Baltic Sea Region," Klaipeda, Lithuania,
19-21 November 2007
Also available as PDF file.

Various Presentations

TITLE	AUTHOR
Performance-based Contracts in the Road Sector under World Bank funded projects	Andreas Schliessler
Performance Based Contracts In The Road Sector	unknown
The Development of WB Sample Bidding Documents for Performance-based Road Contracts	Andreas Schliessler
Performance Based Contracting in Eastern Europe. Word Bank PBC Resource Guide	César Queiroz
Output and Performance Based Road Contracts (OPRC) in Roads Asset Management	Yitzhak Kamhi
Framework for Introducing OPRC	Christopher R. Bennett
The Review of Performance-based Contracting in the road sector and the guideline for implementation	Katsuya ABE
Road Maintenance and Performance –Based Contracting	Asif Faiz
Performance Based Contracting in Estonia. Word Bank PBC Resource Guide	César Queiroz
Performance Based Contracts in the Road Sector	Eric Lancelot
Output- and Performance-based Road Contracts (OPRC)	Unknown
Implementing Output and Performance- Based Contracting	Ben Gericke
Practical Guidance to Procure Output- and Performance-Based Road Contracts (OPRC) under Bank-Financed Projects	Patricia Baquero
Use of OPRC contracts through small local enterprises using labor-based methods	Gerardo W. Flintsch
Argentina Performance-Based Road Rehabilitation And Maintenance Contracts (CREMA)	Marcela Silva

DOCUMENTATION

From World Bank Website

(http://www.esd.worldbank.org/pbc_resource_guide/resources-publications.htm#general)

1. Stankevich, N., Qureshi, N. and Queiroz, C. 2005. "Performance-based Contracting for Preservation and Improvement of Road Assets." Transport Note TN-27. Washington, D.C.: The World Bank. The publication is available in French, Russian and Spanish.
Also available at: <http://www.worldbank.org/transport>
2. Pakkala, P. 2005. "Performance-based Contracts – International Experiences". Finnish Road Administration. Presentation at the TRB Workshop on "Performance-based Contracting". April 27, 2005. Washington, D.C.
Courtesy of P.Pakkala.
3. Pakkala, P. 2002. "Innovative Project Delivery Methods for Infrastructure. International Perspective". Helsinki 2002. Finnish Road Enterprise. Courtesy of P. Pakkala.
<http://alk.tiehallinto.fi/julkaisut/pdf/pakkalae5.pdf>
4. Queiroz, C. 2005. "Options for Implementing Performance-based Contracts." Presentation for the World Bank Transport Forum 2005.
Washington, D.C.: World Bank.
Also available at: http://www.worldbank.org/transport/learning/presentations/Roads%20Tuesday/Queiroz_Performance-Based%20Contracts.ppt
5. World Bank. 2005. "Structuring Output-based Aid Approaches in World Bank Group Operations. Guidance Note for Staff."
Washington, D.C. Courtesy of GPOBA.
Also available at: <http://www.gpoba.org/documents/OBAGuidanceNoteFinalNov162005.pdf>
6. Zietlow, G. 2005. "Cutting Costs and Improving Quality through Performance-Based Road Management and Maintenance Contracts - The Latin American and OECD Experiences." Birmingham, April 24-29. University of Birmingham (UK), Senior Road Executives Programme, Restructuring Road Management.
Courtesy of G. Zietlow.
Also available at: <http://www.zietlow.com/docs/PBRMC-05.pdf>
7. Zietlow, G. 2004. "Implementing Performance-based Road Management and Maintenance Contracts in Developing Countries – An Instrument of German Technical Cooperation." November 2004. Eschborn, Germany. Courtesy of G. Zietlow.
Also available at: <http://www.zietlow.com/docs/PBMMC-GTZ.pdf>

[Back to top](#)

► Procurement

1. Bloxam, M. "Evaluation Using The Quality Price Risk Trade Off (QPRT0)." Paper for the Bay Roads Exposed Conference, Rotorua, April 27 to 29, 2003. Bloxam Burnett & Olliver. Courtesy of Bloxam Burnett & Olliver, Transit NZ and Western Bay of Plenty District Department of Main Roads, New Zealand.
Also available at: <http://www.wbopdc.govt.nz/NR/rdonlyres/1312D128-CDF1-4E99-8E95-2E9B8F3BE81C/0/MartinBloxam.pdf>

2. Porter, T. "International Trends in Procurement Models for Highway Maintenance." Opus International Consultants, Ltd. Courtesy of T. Porter.
Also available at: http://www.opus.co.nz/detail_pages/papers/inttrends.pdf
3. Porter, T. "Trends in the Procurement Models for Highway Maintenance." Opus International Consultants, Ltd.
Courtesy of Tony Porter.
Also available at: <http://www.mrutc.org/about/00950.pdf>
4. Queiroz, C. 2000. "Contractual Procedures to Involve the Private Sector in Road Maintenance and Rehabilitation". 24th International Baltic Road Conference. Riga. August 21-23. Washington, D.C.: World Bank.
Also available at: http://www.balticroads.org/pdf/09_Queiroz_USA_eng.pdf
5. Segal, G.F., Moore, A. T., and McCarthy, S. 2003. "Contracting for Road and Highway Maintenance." Los Angeles: Reason Public Policy Institute. Courtesy of Reason Public Policy Institute.
Also available at: <http://www.rppi.org/htg21.pdf>
6. VMS Inc. 2001. "Best Practices of Outsourcing Winter Maintenance Services." Richmond. Virginia. Courtesy of VMS Inc.
Also available at: <http://www.vmsom.com/news/pro-paper.asp>
7. World Bank. 2005. "Procurement of Works and Services under Output- and Performance-based Road Contracts: Sample Bidding Document." September 2005. Washington, D.C.: World Bank.
Also available at: <http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/PROCUREMENT/0,,contentMDK:20646773~menuPK:84284~pagePK:84269~piPK:60001558~theSitePK:84266,00.htm>
8. World Bank. 2004. "Procurement under IBRD Loans and IDA Credits: Guidelines." Washington, D.C.: World Bank.
Also available at:
<http://siteresources.worldbank.org/INTPROCUREMENT/Resources/Procurement-May-2004.pdf>

[Back to top](#)

► Road Maintenance

9. BC MOT (British Columbia Ministry of Transportation). 2004. "Best Management Practices for Highway Maintenance Activities." Victoria, British Columbia.
Courtesy of BC MOT.
Also available at:
http://www.th.gov.bc.ca/publications/eng_publications/environment/MoT_Hwy_Maint_BMP.pdf
10. Brodie, C. 2003. "Seal Extension Design Review." Paper for the Bay Roads Exposed Conference, Rotorua, April 27 to 29, 2003.
Courtesy of C. Brodie, Beca (Beca International Consultants Ltd.), Transit NZ and Western Bay of Plenty District Department of Main Roads, New Zealand.
Also available at: <http://www.wbopdc.govt.nz/NR/rdonlyres/4ACEF038-1BE6-4073-AAB5-5413B70A9B11/0/ColinBrodie.pdf>
The paper was prepared to present a specific case study with its own unique parameters. Accordingly, the findings and recommendations contained in the paper are applicable to the case study only.
11. Loveless, R. "Measures for Carriageway Lighting." Paper for the Bay Roads Exposed Conference, Rotorua, April 27 to 29, 2003. Odyssey Energy Ltd.
Available at: <http://www.wbopdc.govt.nz/NR/rdonlyres/0A767198-02A1-4ECA-8CEE-6C9C79C11632/0/RogerLoveless.pdf>

12. Meister, M. and Koorey, G. "Corridor Safety Performance Measures." Paper for the Bay Roads Exposed Conference, Rotorua, April 27 to 29, 2003. Opus International Consultants, Ltd., and Opus Central Labs. Courtesy of M. Meister and G. Koorey.
Also available at: <http://www.wbopdc.govt.nz/NR/rdonlyres/7286D592-7B59-4278-8EAF-B65E252B45CE/0/GlenKoorey.pdf>
13. OECD (Organisation for Economic Co-operation and Development). 2005. "**Performance-based Standards for the Road Sector.**" Transport Research Centre.
Available at: <http://www.cemt.org/pub/pubresearch.htm>
14. Ozbek, M. E. 2004. "Development of Performance Warranties for Performance Based Road Maintenance Contracts." Thesis for a Master Degree. Blacksburg, Virginia. April 23. Courtesy of M. E. Ozbek.
Also available at: <http://scholar.lib.vt.edu/theses/available/etd-04272004-002725/unrestricted/MehmetEOzbekMSThesis.pdf>
15. Parkman, C., Hallett, J., Henning, T., and Tapper, M. 2003. "Pavement Deterioration in Long-term Performance-based Contracts: How Far Does It Mitigate the Risk For Client and Contractor?" Transit New Zealand. ARRB Conference, June 2003. Cairns, Australia.
Courtesy of C. Parkman and Transit NZ.
Also available at: <http://www.rims.org.nz/NR/rdonlyres/2C6A9E57-7CEF-4946-8E45-08BE28DF858D/0/ParkmanARRBPSMCRisks.pdf>
16. PIARC (The World Road Association). 1999. "The Quality of Road Service, Evaluation, Perception and Response Behavior of Road Users." Pages 72 to 78, 108 to 118. Courtesy of PIARC.
Also available at: <http://rru.worldbank.org/Documents/Toolkits/Highways/pdf/96.pdf>

[Back to top](#)

► **Country/Region Specific**

17. Brown, M. "**The Works Infrastructure Perspective.**" Paper for the Bay Roads Exposed Conference, Rotorua, April 27 to 29, 2003. New Zealand Works Infrastructure.
Available at: <http://www.wbopdc.govt.nz/NR/rdonlyres/1E514C08-C817-4DD6-BA57-8C7DD2B8F837/0/MurrayBrown.pdf>
18. Douglas-Crane, M. 1999. "**Commercialisation of Road Management in VicRoads.**" Presentation for the World Bank. December 1999.
Available at: http://worldbank.org/transport/rdmgmnt/mdc_1.pdf
19. Engelke, T. 2003. "**An international Perspective – Long-term Performance-based Road Maintenance Contracts in Western Australia.**" Paper for the Bay Roads Exposed Conference, Rotorua, April 27 to 29, 2003. Main Roads Western Australia.
Available at: <http://www.wbopdc.govt.nz/NR/rdonlyres/F3490F6E-DF36-470E-9CB1-9417A1CFEF66/0/TomEngelke.pdf>
20. FHWA (US Federal Highway Administration). 2005. "**Scanning Tour Brings Back New Approaches to Construction Management.**" FOCUS. January/February 2005. FHWA-HRT-05-023.
Available at: <http://www.tfhrc.gov/focus/jan05/01.htm>
21. FHWA. 2004. "**DC Streets: Innovation Yields Results.**" Focus.
Available at: <http://www.tfhrc.gov/focus/dec04/02.htm>
22. FHWA. 2002. "**Pavement Preservation Compendium: "DC Streets" is a Capital Success.**"
Available at: <http://www.fhwa.dot.gov/pavement/preservation/ppc0306.cfm>

23. Frost, M., and Lithgow, C. **"Improving Quality and Cutting Costs through Performance Contracts. Australian Experience."** Paper for the World Bank Road Management Training Seminar. 1996. Available at: <http://www.zietlow.com/docs/frost.htm>
24. Gilbertson, T. 2003. "The Hybrid Performance Based Management Strategy." Opus International Consultants Ltd. REAAA/ARRB International Conference. Cairns, Queensland, Australia. Courtesy of T. Gilbertson. Also available at: http://www.opus.co.nz/detail_pages/papers/gilbertson_2.pdf
25. Hayes, B. 2003. "The Integration of Transit and WBOPDC Requirements into a Single Performance-based Contract." Paper for the Bay Roads Exposed Conference, Rotorua, April 27 to 29. Bloxam Burnett & Olliver. Courtesy of Bloxam Burnett & Olliver, Transit NZ and Western Bay of Plenty District Department of Main Roads, New Zealand. Also available at: <http://www.wbopdc.govt.nz/NR/rdonlyres/08CB2D3C-DA26-400C-96B4-48A6E4CF8D01/0/BradHayes.pdf>
26. Hardy, P. 2001. "Austroads Review of Performance Contracts: The Potential Benefits of Performance Contracts." Opus International Consultants Ltd. Courtesy of P. Hardy. Also available at: http://www.opus.co.nz/detail_pages/papers/austroadsreview.pdf
27. Hartwig, T., Mumssen, Y. and Schliessler, A. 2005. "Output-based Aid in Chad: Using Performance-based Contracts to Improve Roads." Global Partnership on Output-based Aid. Note No 06. Washington, D.C.: World Bank. Courtesy of GPOBA. Also available at: http://www.gpoba.org/documents/Chad_Roads_OBAApproaches.pdf
28. Hunter, E. and Kyle, R. "A Review of Achievable Efficiencies and Associated Issues Under Output and Performance-based Contracts." Opus International Consultants Ltd. Courtesy of E. Hunter and R. Kyle. Also available at: http://www.opus.co.nz/detail_pages/papers/achievableff.pdf
29. ISTED (Institut des Sciences et des Techniques de l'Equipeement et de l'Environnement pour le Développement). 2002. "Contracting Road Maintenance: Example of the Province of Alberta in Canada" No 26, October 2002. Courtesy of ISTED. Available at: http://www.isted.com/periodiques/lettre/lettre_pdf/lettra26.pdf
30. JLARC (Joint Legislative Audit and Review Commission of the Virginia General Assembly). 2001. "Review of VDOT's Administration of the Interstate Asset Management Contract." Courtesy of JLARC of the Virginia General Assembly. Also available at: <http://jlarc.state.va.us/reports/rpt259.pdf>
31. Lande, K. 2005. "Privatized Highway Asset Management: Performance-based Management and Maintenance of Roads: Virginia Case Study." Presentation for the World Bank Transport Forum 2005. Washington, D.C.: World Bank. Courtesy of K. Lande. Also available at: http://www.worldbank.org/transport/learning/presentations/Roads%20Tuesday/Lande_March%208,%202005.ppt
32. Liautaud, G. 2004. "Maintaining Roads: Experience with Output-based Contracts in Argentina." Washington, D.C.: World Bank. Courtesy of GPOBA. Also available at: <http://rru.worldbank.org/Documents/Other/09ch4.pdf>
33. Lund, E.A. 1996. **"Privatization of Road and Bridge Maintenance in British Columbia. Transfer of Public Employees to the Private Sector, British Columbia Experience."** Paper presented for the World Bank Road Management Training Seminar, December 18, 1996. Washington, D.C.: World Bank.

- Available at: http://siteresources.worldbank.org/INTROADSHIGHWAYS/Resources/338993-1122496826968/cn_ntk5a.pdf
34. Michael Baker Jr., Inc. 1999. "**Asset Preservation Plan for the District of Columbia National Highway System.**" Washington, D.C. Prepared for the Federal Highway Administration U.S. Department of Transportation and District of Columbia Department of Public Works. Available at: <http://www.zietlow.com/docs/washdcap.pdf>
 35. Moore A. 2004. "**Private Transportation and Competition.**" Testimony to U.S. House Subcommittee on Energy Policy, Natural Resources and Regulatory Affairs Committee on Government Reform. May 18. Available at: http://www.reason.org/commentaries/moore_20040518.shtml
 36. Newhouse, J. 2004. "2003/2004 Maintenance Contracts. Request for Proposals." Presentation. British Columbia Ministry of Transportation. Courtesy of British Columbia Ministry of Transportation. Also available at: http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Nov_15_Meeting_Full_Presentation.pdf
 37. Pavement Management Services. "Getting Ready for the First Renewal of the Sydney PSMC." Road Runner. Issue 4, 2004. Courtesy of Pavement Management Services. Also available at: http://www.pavement.com.au/downloads/roadrunner_04.pdf
 38. PIARC – Canada. 2004. "**Maintenance Delivery in Ontario.**" Prepared for PIARC, December 2004. Kananaskis, Canada. Available at: <http://www.cnc-piarc-aipcr.ca/documents/OntarioMaintenanceContractingPPP.pdf>
 39. Robinson, M. 2005. "Lessons Learned in Performance-based Maintenance Contracting." Presentation for AASHTO Maintenance Subcommittee. SAIC. McLean, VA, USA. Courtesy of M. Robinson, SAIC and FHWA.
 40. Robinson, M. and Raynault, E. 2005. "Performance-based Contracting in Road Management: Experiences and Lessons Learned in the DC Streets Project." Presentation for the World Bank. SAIC. McLean, VA, USA. Courtesy of M. Robinson and E. Raynault, SAIC.
 41. Robinson, M. et al. 2005. "The DC Streets Performance-based Asset Preservation Experiment – Current Quantitative Results and Suggestions for Future Contracts." Presentation for Transportation Research Board's 2006 Annual Meeting. Washington, D.C. Courtesy of FHWA, DDOT and SAIC.
 42. Robinson, M. et al. 2005. "The DC Streets Performance-based Asset Preservation Experiment – Current Quantitative Results and Suggestions for Future Contracts." Paper for Transportation Research Board's 2006 Annual Meeting. Washington, D.C. Courtesy of FHWA, DDOT and SAIC.
 43. TRB (Transport Research Board). 2003. "Outsourcing of State DOT Capital Program Delivery Functions." Transport Research Board. Vienna, Virginia, November 2003. Courtesy of TRB. Also available at: http://trb.org/publications/nchrp/nchrp_w59.pdf
 44. VDOT (Virginia Department of Transportation). 1995. "Public-Private Transportation Act of 1995." Also available at: <http://www.virginiadot.org/business/ppta-default.asp>
 45. Williams, G. 2005. "Assessment of PMMR Implementation Potential in Africa." Presentation for the World Bank Transport Forum 2005. BCEOM. Washington, D.C.: World Bank. Courtesy of G. Williams. Also available at: <http://www.worldbank.org/transport/learning/presentations/Roads%20Tuesday/Graham%20Williams%20Presentation.ppt>

46. Zietlow, G. 2005. "Using Micro-Enterprises to Create Local Contracting Capacity - The Latin American Experience." Birmingham, April 24-29. University of Birmingham (UK), Senior Road Executives Programme, Restructuring Road Management.
Courtesy of G. Zietlow.
Also available at: <http://www.zietlow.com/docs/Using%20Micro-Enterprises-05.pdf>
47. Zietsman, J. "Performance Measures for Performance Based Maintenance Contracts." Texas Transportation Institute.
Also available at: <http://www.trb-performancemeasurement.org/pbmctrbpost2.PDF>

From project Literature Search

Reference
<p>Title: Transacting under a <u>performance-based contract</u>: the role of negotiation and competitive tendering Personal Author: Hensher, DA (University of Sydney Institute of Transport and Logistics Studies) Name of Conference: International Conference on Competition and Ownership in Land Passenger Transport, 10th, 2007, Hamilton Island, Queensland, Australia Source: DATE: 2007-08, PAGES: 17p [<u>performance based contracts</u>], PUBLISHER: University of Sydney. Institute of Transport and Logistics Studies, T: Sydney, S: New South Wales, C: Australia</p>
<p>Title: Sample bidding document: procurement of <u>performance-based</u> management and maintenance of roads (output-based service <u>contract</u>) Corporate Author: World Bank Source: DATE: 2002-02, PAGES: 222p, PUBLISHER: World Bank, T: Washington, S: DC, C: USA</p>
<p>Highway management, the highway highlanders way Issue Title: Proceedings - 21st ARRB and 11th REAAA Conference, Transport Our Highway to a Sustainable Future Publication Date: 20031201</p>
<p>Title: Transacting under a <u>performance-based contract</u>: the role of negotiation and competitive tendering Personal Author: Hensher, DA (University of Sydney Institute of Transport and Logistics Studies); Stanley, J (Bus Association Victoria) Source: PN: Transportation Research, Part A-Policy and Practice, VOL: 42A, NO: 9, DATE: 2008-11, PAGES: 1143-51</p>
<p>Title: Future trends in <u>performance based contracting</u> - legal and technical perspectives Personal Author: Frost, MR (CSR Emoleum Road Services); Lithgow, CM (Sparke Helmore) Name of Conference: ARRB Transport Research Ltd Conference, 19th, 1998, Sydney, New South Wales, Australia Source: DATE: 1998, PAGES: 91-101 (Session D2), PUBLISHER: ARRB Transport Research Ltd, T: Vermont South, S: Victoria, C: Australia, ISSN: 0572-1431, ISBN: 0- 86910-782-8</p>
<p>Title: Risk management in new <u>performance based contracts</u> Personal Author: van der Zwan, J; van Dommelen, A; Schut, E Name of Conference: Transport Research Arena Europe, 2008, Ljubljana, Slovenia Source: DATE: 2008-04, PAGES: 8p, PUBLISHER: Road and Transportation Research Association of Slovenia, T: Ljubljana, C: Slovenia</p>
<p>Modelling R&M in <u>performance based contracts</u> - When does risk equal reward? Jacopino, Andrew Proceedings - Annual Reliability and Maintainability Symposium VOL ISSU PAGE 142-146 DATE 2007</p>
<p>Title: Risk issues in <u>performance-specified flexible paving contracts</u> Personal Author: Gallagher, PJ (Australian Asphalt Pavement Association); Mangan, DA (Australian Asphalt Pavement Association) Name of Conference: ARRB Transport Research Ltd Conference, 19th, 1998, Sydney, New South Wales, Australia Source: DATE: 1998, PAGES: 361-70 (Session A), PUBLISHER: ARRB Transport Research Ltd, T: Vermont South, S: Victoria, C: Australia, ISSN: 0572-1431, ISBN: 0- 86910-782-8</p>
<p>Risk-Based Model for Valuation of Performance-Specified Pavement Maintenance Contracts by Ivan Damjanovic, (Asst. Prof., Zachry Dept. of Civ. Engrg., Constr. Engrg. and Mgmt. Group, Texas A&M Univ., College Station, TX 77843 (corresponding author). E-mail: idamjanovic@civil.tamu.edu) and Zhanmin Zhang, (Assoc Prof., Dept. of Civ. Engrg., Transp. Engrg. Group, The Univ. of Texas at Austin, 1 University Station C1761, Austin, TX 78712. E-mail: z.zhangx@mail.utexas.edu) <i>Journal of Construction Engineering and Management</i>, Vol. 134, No. 7, July 2008, pp. 492-500,</p>

<p>Title: Implementation of level-of-service component for <u>performance-based</u> road maintenance <u>contracts</u> Personal Author: Ozbek, ME; de la Garza, JM; Pinero, JC Source: PN: Transportation Research Record, NO: 2150, DATE: 2010, PAGES: 1-9, PUBLISHER: Transportation Research Board (TRB), T: Washington, S: DC, C: USA, ISSN: 0361-1981, ISBN: 9780309142816</p>
<p>Title: Sampling procedure for <u>performance-based</u> road maintenance evaluations Personal Author: de la Garza, JM; Pinero, JC; Ozbek, ME Source: PN: Transportation Research Record, NO: 2044, DATE: 2008, PAGES: 11-8, PUBLISHER: Transportation Research Board (TRB), T: Washington, S: DC, C: USA, ISSN: 0361-1981, ISBN: 9780309113120</p>
<p>Title: Evaluating the network condition changes of transit networks managed under PSMC procurement options Personal Author: Kadar, P (MWH NZ); Henning, T (MWH NZ) Source: PN: Land Transport New Zealand Research Report, NO: 324, DATE: 2007, PAGES: 40p, PUBLISHER: Land Transport New Zealand, T: Wellington, C: New Zealand, ISSN: 1177-0600, ISBN: 0478287364</p>
<p>Title: Opportunistic behavior in road maintenance markets: exploring the consequences through gaming simulation Personal Author: Altamirano, MA; de Jong, WM Source: PN: Transportation Research Record, NO: 2108, DATE: 2009, PAGES: 13-22, PUBLISHER: Transportation Research Board (TRB), T: Washington, S: DC, C: USA, ISSN: 0361-1981, ISBN: 9780309126250</p>
<p>Title: Transacting under a <u>performance-based contract</u>: the role of negotiation and competitive tendering Personal Author: Hensher, DA (University of Sydney Institute of Transport and Logistics Studies); Stanley, J (Bus Association Victoria) Source: PN: Transportation Research, Part A-Policy and Practice, VOL: 42A, NO: 9, DATE: 2008-11, PAGES: 1143-51</p>
<p>Title: Promoting innovation in transportation infrastructure maintenance: incentives <u>contracting</u> and <u>performance-based</u> specifications Personal Author: Stenbeck, T Source: PN: TRITA-BKN, NO: 91, DATE: 2007-09, PAGES: 32p + appendices, PUBLISHER: Royal Institute of Technology (KTH). Civil and Architectural Engineering, T: Stockholm, C: Sweden, ISSN: 1103-4270</p>
<p>Title: Pavement and surfacing condition in Western Australia with ten-year maintenance <u>contracts</u> Personal Author: Kennedy, D (Main Roads Western Australia); Peters, B (Main Roads Western Australia) Name of Conference: ARRB Conference, 23rd, 2008, Adelaide, South Australia, Australia Source: DATE: 2008-07, PAGES: 16p, PUBLISHER: ARRB Group Ltd, T: Vermont South, S: Victoria, C: Australia, ISSN: 0572-1431, ISBN: 1876592540 Pagination: 16</p>
<p>Title: Evaluating the network condition changes of transit networks managed under PSMC procurement options Personal Author: Kadar, P (MWH NZ); Henning, T (MWH NZ) Source: PN: Land Transport New Zealand Research Report, NO: 324, DATE: 2007, PAGES: 40p, PUBLISHER: Land Transport New Zealand, T: Wellington, C: New Zealand, ISSN: 1177-0600, ISBN: 0478287364</p>
<p>Title: Effectiveness of <u>performance</u> indicators in managing road networks Personal Author: Kadar, P (MWH Australia); Henning, T (MWH New Zealand); Parkman, C (Transit New Zealand) Name of Conference: ARRB Conference, 22nd, 2006, Canberra, ACT, Australia Source: DATE: 2006-11, PAGES: 15p, PUBLISHER: ARRB Group Ltd, T: Vermont South, S: Victoria, C: Australia, ISSN: 0572-1431, ISBN: 1876592494</p>
<p>Title: Assessing the effectiveness of unsealed road key <u>performance</u> measures Personal Author: McDougall, D (In3roads) Name of Conference: Transit New Zealand and New Zealand Institute of Highway Technology (NZIHT) Annual Conference, 8th, 2006, Auckland, New Zealand Source: DATE: 2006-10, PAGES: 8p, PUBLISHER: New Zealand Institute of Highway Technology (NZIHT), T: Wellington, C: New Zealand</p>