

Alliance Contracting—Evolving Alternative Project Delivery

DETAILS

72 pages | 8.5 x 11 | PAPERBACK

ISBN 978-0-309-27156-1 | DOI 10.17226/22202

BUY THIS BOOK

AUTHORS

Gransberg, Douglas D.; Scheepbouwer, Eric; Michael C. Loulakis

FIND RELATED TITLES

Visit the National Academies Press at NAP.edu and login or register to get:

- Access to free PDF downloads of thousands of scientific reports
- 10% off the price of print titles
- Email or social media notifications of new titles related to your interests
- Special offers and discounts



Distribution, posting, or copying of this PDF is strictly prohibited without written permission of the National Academies Press. (Request Permission) Unless otherwise indicated, all materials in this PDF are copyrighted by the National Academy of Sciences.

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP SYNTHESIS 466

**Alliance Contracting—Evolving
Alternative Project Delivery**

A Synthesis of Highway Practice

CONSULTANTS

Douglas D. Gransberg
Iowa State University
Ames, Iowa

Eric Scheepbouwer
University of Canterbury
Christchurch, New Zealand
and

Michael C. Loulakis
Capital Project Strategies, LLC
Reston, Virginia

SUBSCRIBER CATEGORIES

Administration and Management • Construction • Highways

Research Sponsored by the American Association of State Highway and Transportation Officials
in Cooperation with the Federal Highway Administration

TRANSPORTATION RESEARCH BOARD

WASHINGTON, D.C.
2015
www.TRB.org

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Academies was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to the National Research Council is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and the Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

NOTE: The Transportation Research Board of the National Academies, the National Research Council, the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the individual states participating in the National Cooperative Highway Research Program do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

NCHRP SYNTHESIS 466

Project 20-05, Topic 45-16
ISSN 0547-5570
ISBN 978-0-309-27156-1
Library of Congress Control No. 2014954134

© 2015 National Academy of Sciences. All rights reserved.

COPYRIGHT INFORMATION

Authors herein are responsible for the authenticity of their materials and for obtaining written permissions from publishers or persons who own the copyright to any previously published or copyrighted material used herein.

Cooperative Research Programs (CRP) grants permission to reproduce material in this publication for classroom and not-for-profit purposes. Permission is given with the understanding that none of the material will be used to imply TRB, AASHTO, FAA, FHWA, FMCSA, FTA, or Transit Development Corporation endorsement of a particular product, method, or practice. It is expected that those reproducing the material in this document for educational and not-for-profit uses will give appropriate acknowledgment of the source of any reprinted or reproduced material. For other uses of the material, request permission from CRP.

NOTICE

The project that is the subject of this report was a part of the National Cooperative Highway Research Program, conducted by the Transportation Research Board with the approval of the Governing Board of the National Research Council.

The members of the technical panel selected to monitor this project and to review this report were chosen for their special competencies and with regard for appropriate balance. The report was reviewed by the technical panel and accepted for publication according to procedures established and overseen by the Transportation Research Board and approved by the Governing Board of the National Research Council.

The opinions and conclusions expressed or implied in this report are those of the researchers who performed the research and are not necessarily those of the Transportation Research Board, the National Research Council, or the program sponsors.

The Transportation Research Board of the National Academies, the National Research Council, and the sponsors of the National Cooperative Highway Research Program do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of the report.

Published reports of the

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

are available from:

Transportation Research Board
Business Office
500 Fifth Street, NW
Washington, DC 20001

and can be ordered through the Internet at:
<http://www.national-academies.org/trb/bookstore>

Printed in the United States of America

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. C. D. Mote, Jr., is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, upon its own initiative, to identify issues of medical care, research, and education. Dr. Victor J. Dzau is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. C. D. Mote, Jr., are chair and vice chair, respectively, of the National Research Council.

The **Transportation Research Board** is one of six major divisions of the National Research Council. The mission of the Transportation Research Board is to provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal. The Board's varied activities annually engage about 7,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation. **www.TRB.org**

www.national-academies.org

TOPIC PANEL 45-16

ALAN D. AUTRY, *Florida Department of Transportation, Tallahassee*
STEVEN D. DEWITT, *Parsons Brinckerhoff, Raleigh, NC*
ANN FOX, *California Department of Transportation, San Diego*
MICHAEL J. GARVIN, *Virginia Tech, Blacksburg*
FREDERICK HEJL, *Transportation Research Board*
MICHELLE PAGE, *Utah Department of Transportation, Salt Lake City*
CHRISTIAN “CHRIS” G. YOUNGS, *Michigan Department of Transportation, Lansing*
RUSSELL ZAPALAC, *Texas Department of Transportation, Austin*
G. ROB ELLIOT, JR., *Federal Highway Administration (Liaison)*
KATHERINE A. PETROS, *Federal Highway Administration (Liaison)*

SYNTHESIS STUDIES STAFF

STEPHEN R. GODWIN, *Director for Studies and Special Programs*
JON M. WILLIAMS, *Program Director, IDEA and Synthesis Studies*
JO ALLEN GAUSE, *Senior Program Officer*
GAIL R. STABA, *Senior Program Officer*
DONNA L. VLASAK, *Senior Program Officer*
TANYA M. ZWAHLEN, *Consultant*
DON TIPPMAN, *Senior Editor*
CHERYL KEITH, *Senior Program Assistant*
DEMISHA WILLIAMS, *Senior Program Assistant*
DEBBIE IRVIN, *Program Associate*

COOPERATIVE RESEARCH PROGRAMS STAFF

CHRISTOPHER W. JENKS, *Director, Cooperative Research Programs*
CHRISTOPHER HEDGES, *Manager, National Cooperative Highway Research Program*
EILEEN P. DELANEY, *Director of Publications*

NCHRP COMMITTEE FOR PROJECT 20-05

CHAIR

BRIAN A. BLANCHARD, *Florida DOT*

MEMBERS

STUART D. ANDERSON, *Texas A&M University*
SOCORRO “COCO” BRISENO, *California Department of Transportation*
CYNTHIA L. GERST, *Ohio Department of Transportation*
DAVID M. JARED, *Georgia Department of Transportation*
MALCOLM T. KERLEY, *Virginia Department of Transportation (retired)*
JOHN M. MASON, JR., *Auburn University*
CATHERINE NELSON, *Salem, Oregon*
ROGER C. OLSON, *Minnesota Department of Transportation*
BENJAMIN I. ORSBON, *South Dakota Department of Transportation*
RANDALL R. “RANDY” PARK, *Utah Department of Transportation*
ROBERT L. SACK, *New York State Department of Transportation*
JOYCE N. TAYLOR, *Maine Department of Transportation*
FRANCINE SHAW WHITSON, *Federal Highway Administration*

FHWA LIAISONS

JACK JERNIGAN
MARY LYNN TISCHER

TRB LIAISON

STEPHEN F. MAHER

FOREWORD

Highway administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to highway administrators and engineers. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire highway community, the American Association of State Highway and Transportation Officials—through the mechanism of the National Cooperative Highway Research Program—authorized the Transportation Research Board to undertake a continuing study. This study, NCHRP Project 20-5, “Synthesis of Information Related to Highway Problems,” searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an NCHRP report series, *Synthesis of Highway Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

By Jon M. Williams
Senior Program Officer
Transportation
Research Board

Alliance contracting may be defined as a project delivery model where the owner(s), contractor(s), and consultant(s) work collaboratively as an integrated team and their commercial interests are aligned with actual project outcomes. The objective of this study is to identify and synthesize current effective practices that comprise the state of the practice related to the use of alliance contracts around the world and discuss the procurement procedures that have been used to successfully implement alliance contracting on typical transportation projects.

The bulk of the information comes from a comprehensive literature review and 11 project case studies from Australia, New Zealand, the Netherlands, and the United Kingdom. The study finds that alliancing appears to be an excellent choice to deliver complex projects that require innovative solutions to the challenges presented in their scopes of work.

Douglas D. Gransberg, Iowa State University, Ames, Iowa; Eric Scheepbouwer, University of Canterbury, Christchurch, New Zealand; and Michael C. Loulakis, Capital Project Strategies, LLC, Reston, Virginia, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable with the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

1	SUMMARY
5	CHAPTER ONE INTRODUCTION
	Introduction, 5
	Synthesis Objective, 6
	Key Definitions, 7
	Study Approach, 10
	Protocol to Develop Conclusions and Suggestions for Future Research, 15
	Conclusions and Effective Practices, 15
	Organization of the Report, 15
16	CHAPTER TWO ALLIANCING CASE STUDIES
	Case 1: Northern Gateway Toll Road Alliance, New Zealand, 16
	Case 2: Stronger Christchurch Infrastructure Rebuild Team Alliance, New Zealand, 19
	Case 3: Grafton Gully, New Zealand, 23
	Case 4: Autobaan A2 Hooggelegen Alliance, the Netherlands, 24
	Case 5: The Origin Alliance, Australia, 26
	Case 6: Midlands Highway Alliance, Leicester County, England, 27
	Case 7: The Auckland Motorway Alliance, New Zealand, 28
	Case 8: Manukau Harbour Crossing, Auckland, New Zealand, 30
	Case 9: Channel Deepening Project, Victoria, Australia, 31
	Case 10: SR 519 Intermodal Access Project, Phase 2: Atlantic Corridor, Seattle, Washington, 32
	Case 11: U.S. Federal Acquisition Regulation Alliancing Contract Analysis, 34
	Case Study Analysis, 36
	Conclusions, 39
40	CHAPTER THREE ALLIANCE CONTRACTING PROCUREMENT POLICIES, PROCEDURES, AND PROGRAMS
	Introduction, 40
	Alliancing Policies, 40
	Alliancing Procedures, 45
	Alliancing Programs, 47
	Conclusions, 49
50	CHAPTER FOUR ALLIANCE CONTRACT ADMINISTRATION PROCEDURES
	Introduction, 50
	Alliance Design Administration Procedures, 50
	Alliance Construction Administration Procedures, 51
	Applying Alliancing Within Existing U.S. Agency Constraints, 53
	Conclusions, 54
55	CHAPTER FIVE ALLIANCE CONTRACTING LEGAL ISSUES
	Introduction, 55
	Unique Contract Terms and Conditions, 55

Integrated Project Delivery Contracts, 57
Challenges to Using Alliance Contracting on U.S. Public Sector
Construction Projects, 58
Conclusions, 60

61 CHAPTER SIX CONCLUSIONS, EFFECTIVE PRACTICES,
AND SUGGESTIONS FOR FUTURE RESEARCH

Introduction, 61
Conclusions, 61
Effective Practices, 62
Future Research, 62

63 GLOSSARY OF TERMS AND ACRONYMS

65 REFERENCES

68 APPENDIX A AUSTRALIAN COMMERCIAL FRAMEWORK
AND GAINSHARE/PAINSHARE EXAMPLES

Note: Photographs, figures, and tables in this report may have been converted from color to grayscale for printing. The electronic version of the report (posted on the web at www.trb.org) retains the color versions.

ALLIANCE CONTRACTING— EVOLVING ALTERNATIVE PROJECT DELIVERY

SUMMARY The terms “alliance contracting” or “alliancing” are foreign concepts to most U.S. transportation agencies and their industry partners. The proliferation of alternative project delivery methods for transportation and other infrastructure projects springs from the urgent need to improve the nation’s deteriorating infrastructure. The Australian Department of Infrastructure and Transport defines alliancing as “A delivery model where the owner(s), contractor(s), and consultant(s) work collaboratively as an integrated team and their commercial interests are aligned with actual project outcomes.” Alliancing is not the Australian term for the U.S. version of partnering; there are important differences between partnering and alliancing. Under traditional contracts, and under partnering as well, one team may make profits from a project while other partnered firms or teams actually may incur a financial loss. With alliancing, there is a joint rather than shared commitment; if one party in the alliance underperforms, then all other alliance partners are at risk of losing their rewards.

The FHWA Every Day Counts program is designed to identify and deploy innovation aimed at “shortening project delivery, enhancing the safety of our roadways, and protecting the environment . . . it’s imperative we pursue better, faster, and smarter ways of doing business.” Moving to relational contracting methods, such as alliance contracting as practiced in Australia and other nations, is one method that has proven to yield innovative solutions for complicated design and construction problems on a wide range of projects. Alliances potentially constitute

“Governments across Australia support alliance contracting, which now represents one third of the total value of public sector infrastructure projects delivered in Australia.”
(Duffield et al. 2014)

a smarter way of doing business by bringing the collective experience and creativity of all project stakeholders to bear in a highly integrated and thoroughly collaborative project delivery environment.

The objective of this synthesis is to identify and synthesize current effective practices that comprise the state of the practice related to the use of alliance contracts around the world and discuss the procurement procedures that have been used to successfully implement alliance contracting on typical transportation projects. The bulk of the information comes from a comprehensive literature review and 11 project case studies from Australia, New Zealand, the Netherlands, and the United Kingdom. In addition, an attempt by the Washington State Department of Transportation (DOT) to try alliance contracting that was converted late in the process to a design-build project and an analysis of potential alliancing use by the

Alliancing is best reserved for extremely complex, high risk projects where the sheer number of external stakeholders requires a highly integrated and highly collaborative project delivery team.

U.S. Department of Defense were included to furnish specific information on different approaches to dealing with alliance projects.

The case study projects range from an AU\$1.95 billion (~U.S. \$1.82 billion) pure alliance to upgrade a vital motorway (the Australian term for an interstate highway) in Brisbane, to a NZ\$1.6 billion (~U.S. \$1.4 billion) competitive alliance to rebuild the city of Christchurch

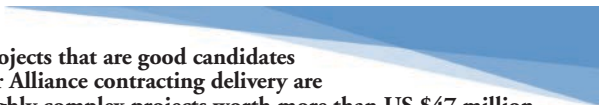
after a series of devastating earthquakes, to a €140.0 million (~U.S. \$193 million) urban freeway expansion in the Netherlands, to a NZ\$3.67 million (~U.S. \$3.14 million) alliance to furnish performance-based maintenance on an urban freeway. The projects were selected because each demonstrated a specific approach to alliance contracting that allowed an in-depth illustration of important information gleaned from the literature. There was also a screening survey of U.S. state DOT and Canadian province Ministries of Transportation to search for previously unknown North American alliancing experience (there was none found beyond the aborted Washington State DOT attempt) and to identify local barriers to implementation.

The synthesis reached one overarching conclusion with regard to this topic and that was that alliancing appears to be an excellent choice to deliver complex projects that require innovative solutions to the challenges presented in their scopes of work.

In addition, it was found that the primary motivation for implementing alliance project delivery was to leverage the interrelationships necessary to manage complex projects and benefit from the innovation produced by integration by building a highly integrated and highly collaborative project execution environment where decisions are made using “best for project” as the default decision criterion. Put another way, if the agency’s primary motivation is to compress the project schedule or minimize costs, it might best use design-build, construction manager/general contractor, public–private partnerships, or integrated project delivery. Alliancing is best reserved for complex, high-risk projects where the sheer number of external stakeholders requires a highly integrated and highly collaborative project delivery team.

Other major conclusions documented in the report are as follows:

1. There are three separate and distinct models for alliance contracting: Pure, competitive, and collaborative.
2. The Washington State DOT experiment with alliancing concluded that implementing alliance contract project delivery can be achieved in the United States under most of the current statutory constraints on procurement, and the analysis of the federal sector indicates that implementing alliance contracting will be complicated but not impossible. Like most alternative delivery methods, alliancing may require an agency to specifically seek enabling legislation.
3. Projects that are good candidates for alliance contracting delivery are highly complex projects worth AU\$50 million (~U.S. \$47 million) or more. Such projects have high-risk profiles with a “potential for a substantial change in project scope” and therefore require the flexibility to make decisions and change plans in an expeditious and agile manner. The risk profile is complicated by the large number of external stakeholders and often a high-pressure schedule.
4. Alliance contracting procurement demands that a significant emphasis be placed on the personalities of the key personnel, unlike other alternative project delivery methods where the emphasis on key personnel focuses on their experience and credentials.
5. Implementing alliance contracting will require North America agencies to shift their risk management programs away from risk shedding and risk allocating to real risk sharing to benefit from alliance delivery.
6. Alliancing does not alter post-award design or construction administration procedures in a significant manner.



Projects that are good candidates for Alliance contracting delivery are highly complex projects worth more than US \$47 million and have high risk profiles with a “potential for a substantial change in project scope.”
(Queensland 2008)

Lastly, the legal review found that there was no existing case law that specifically addresses alliance contracting. It also drew conclusions regarding potential legal hurdles on public agencies agreeing to the “no blame/no disputes” clauses that are typical of international alliance contracts.

The use of industry outreach meetings prior to advertising was found to be an effective practice by most practitioners. These outreach sessions provide a forum for firms interested in becoming alliance members to engage the agency in meaningful dialog and gain insight on the agency’s objectives in pursuing alliancing. The outreach also encourages the agency to engage in public information planning to inform external stakeholders and the general public of the alliance’s performance throughout the course of the project. Other less prominent conclusions, effective practices, and suggestions for future research are contained in chapter six.

CHAPTER ONE

INTRODUCTION

INTRODUCTION

It is thought that projects can be delivered more efficiently “. . . by integrating teamwork for planning, design, and construction of projects” (Forgues and Koskela 2008). Integration can be achieved in a number of different ways; however, fundamentally achieving integration in a highway construction project requires bringing the project’s owner, designer, and builder into the project development process in a manner that allows each to contribute to the preliminary project definition decisions. In the United States, the industry has turned to alternative delivery methods such as design-build (DB) (Touran et al. 2009) and construction manager/general contractor (CMGC) (West et al. 2012). FHWA also encourages employing alternative technical concepts (ATC) in design-bid-build (DBB), DB, and CMGC projects to gain early contractor involvement in the final scope of work (Actis et al. 2012). While these alternative contracting methods certainly increase the level of integration, they all are implemented using a two-party contract that, if things do not go well, can devolve into disputes that may eventually end in costly and time-consuming litigation. In the words of Chen et al. (2012) “. . . long-existing problems, such as cost overrun, delay, adversarial relationship, dispute, customer dissatisfaction and low productivity which primarily stem from the traditional ‘risk transfer’ approaches, fragmentation and inadequate cooperation in the construction industry, have led to the poor performance of construction projects.”

The missing ingredient is the formation of a true team where risks and rewards are shared equally and among which decisions are made collectively rather than in the hierarchical fashion required in a two-party contract.

The missing ingredient is the formation of a true team, where risks and rewards are shared equally and among which decisions are made collectively rather than in the hierarchical fashion required in a two-party contract. One solution to attaining such equity is a multiparty contract used in Australia, New Zealand, and Europe called an alliance contract (Love et al. 2011) and is described as follows:

When forming an alliance’s culture, equality in sharing cost risk/reward was commonly described as establishing good behavioral principles at the outset which subsequently guided participants’ behaviors. Such principles included equal ownership

and commitment, ensuring that all participants ‘won together or lost together,’ driving equal and collaborative relationships with open and honest communication, thus avoiding disputes. (Love et al. 2011)

Barlow (2000) maintains that “. . . practitioners view alliancing as an alternative project delivery method to deal with fragmentation and lack of integration, to improve the efficiency and performance of the construction industry.” The central theme is not the optimistic ‘win-win’ relationship often touted by proponents of project partnering (Broom 2002), but rather the more pragmatic “won together or lost together” relationship cited by Love et al. (2011).

A Short History of Alliance Contracting

The alliance concept has evolved since it was introduced in the North Sea offshore oil industry in the early 1990s as a vehicle to share the risk of complex, costly projects among all the stakeholders (Chen et al. 2012). Prior to this time, infrastructure owners had tried a number of different approaches to enhance willing collaboration between themselves and their design consultants and construction contractors. One of those was the use of nonbinding partnering workshops in the early 1990s (Ernzen et al. 2000). Alliancing is very different from partnering in that the project alliance agreement is binding, and unlike partnering it excludes legal recourse through litigation (Cheung et al. 2006). Australia can be considered the momentum builder in the introduction and implementation of alliance contracts. Prior to the world-wide recession in 2007, it had relied on public-private partnerships (P3) as the vehicle to deliver large complex infrastructure projects. However, with the recession, “underestimated costs, overestimated revenues, undervalued environmental effects, and overvalued economic development [in P3 projects] contributed to ever increasing cost overruns, delays, loss of revenues, disputes, debt, and negative environmental and social impacts” (Love et al. 2011) and pushed the Australians to move to alliancing to better align the interests of all parties involved in delivering a large infrastructure project. The result was “. . . alliancing [became] one of the most attractive forms for pursuing efficiency in terms of cost, time, quality and other objectives” (van den Berg and Kamminga 2006). “Governments across

The Australians chose alliancing to better align the interests of all parties involved in delivering a large infrastructure project.

Australia support alliance contracting, which now represents one-third of the total value of public sector infrastructure projects delivered in Australia” (Duffield et al. 2014); strong testimony to the potential benefits of alliance contracting, and perhaps the motivation to look for methods by which its principles could be implemented on U.S. and Canadian infrastructure projects.

Principles of Alliance Contracting

Before deciding to implement a new procurement process it is important to first understand the principles upon which it is founded. The literature is rich with scholarly analyses of alliancing and how it is crafted. Before delving into the principles, it is helpful to gain a sense of what fundamental alterations to the current procurement culture are contemplated. Rezvani (2008) provides a taxonomy of the way management processes must evolve to reach a point where the necessary ingredients are present to successfully implement alliancing. It can be quickly summarized by stating that the organizations and their human resources must undergo a profound shift from a highly regimented culture that is vertically integrated to a relatively unstructured culture that places high value on individual empowerment as a means to facilitate a high degree of collaboration.

Organizations and their people must undergo a profound shift from a highly regimented culture that is vertically integrated to a relatively unstructured culture that places high value on individual empowerment as a means to facilitate a high degree of collaboration.

Rezvani’s (2008) primary message is that alliancing will be most successful in organizations where collaborative management styles are already present. Therefore, to prevent blindly attempting to implement alliancing when the necessary culture is not present to support success an agency can assess itself using the taxonomy and determine if organizational culture changes can be made in a manner that will facilitate the new project delivery method.

Figure 1 encapsulates the underlying focus of alliance contracting: performance. The contract is predicated on the equation shown in this figure. If alliance partners collaborate and perform well they are all rewarded accordingly, with the opposite being true if the alliance does not measure up to the “minimum conditions of satisfaction” (MCOS) agreed in the alliance contract. MCOS are a set of pragmatic success factors that are key to achieving the overarching objective of the alliance. For example, in the Port of Melbourne Channel Deepening Project (Case Study 8 in chapter two), the MCOS were as follows:

1. Provide competitive and efficient access to the port through innovative high-quality facilities and services.
2. Increase trade.
3. Deliver the project on time, within budget, and in compliance with environmental and other regulatory standards. (Albanese 2010)

One can see that these MCOS are very specific, although not all inclusive. When an alliance agrees to a set of MCOS all decisions made regarding the project must be made through the lens of the MCOS. This process is often termed making “best-for-project” decisions (Chen et al. 2012). It implies that since the alliance is no longer a group of individual organizations, each with its own agenda and set of success criteria for a given project, the alliance is structured such that the outcome of each decision is either a “we-win” for all parties or a “we-lose” for all parties. Fostering this type of thinking strengthens the alliance’s cohesion and creates an environment where, regardless of role in the project, the personnel who must deliver it identify most strongly with the alliance itself rather than their individual employers.

SYNTHESIS OBJECTIVE

The objective of this report is to identify and synthesize current effective practices that comprise the state of the practice related to the use of alliance contracts around the world and discuss the procurement procedures that have been used to successfully implement alliance contracting on typical transportation projects. The synthesis will also review current U.S.

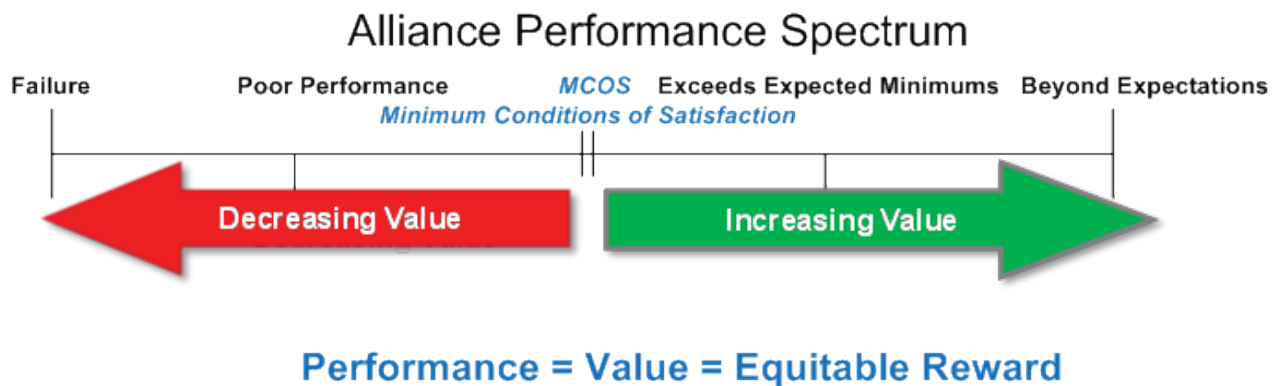


FIGURE 1 Alliance contracting performance spectrum (adapted from Gallagher 2008).

legal and regulatory provisions that might act as barriers to implementation and suggest potential remedies for an agency wishing to experiment with alliancing.

The alliance is structured such that the outcome of each decision is either a “we-win” for all parties or a “we-lose” for all parties.

In addition to a rigorous literature review, the synthesis is based on new data from a survey of U.S. state departments of transportation (DOTs) and Canadian provincial ministries of transportation, and case studies. A screening survey on alliance usage and practices elicited responses from 17 U.S. states and six Canadian provinces. Finally, 11 project case studies from Australia, New Zealand, the Netherlands, and the United Kingdom, as well as an attempt by the Washington State DOT and an analysis of potential alliancing use by the U.S. Department of Defense, were conducted to furnish specific information on different approaches to dealing with alliance projects. The case study projects range from a AU\$1.95 billion traditional alliance to upgrade a vital motorway (the Australian term for an interstate highway) in Brisbane to a NZ\$3.67 million alliance to furnish performance-based maintenance on an urban freeway. The projects were selected because each demonstrated a specific approach to alliance contracting that allowed an in-depth illustration of important information derived from the survey and the literature.

KEY DEFINITIONS

Throughout this report a number of procurement terms in a precise sense will be used. It is important for the reader to understand the specific definition of each of the terms to gain a full understanding of this study. The most important definition is for alliance contracting itself. The following definition is from the Australian Department of Infrastructure and Transport and will be the working definition for alliancing used throughout the synthesis. It is embraced by Austroads, the Australia/New Zealand version of AASHTO, and is generally applicable to alliance contracts in other countries:

Alliance contracting is delivering major capital assets, where a public sector agency (the Owner) works collaboratively with private sector parties (Non-Owner Participants or NOPs). All Participants are required to work together in good faith, acting with integrity and making best-for-project decisions. Working as an integrated, collaborative team, they make unanimous decisions on all key project delivery issues. The alliance structure capitalizes on the relationships between the Participants, removes organizational barriers and encourages effective integration with the Owner. (Casey and Bamford 2014)

Table 1 further amplifies on the definition of alliance contracting by listing six key principles and how each operates within the structure of the alliance contract. There are several notable aspects found in this table. First, the lack of the word “competition” in the team selection principle illustrates the

TABLE 1
PRINCIPLES AND FEATURES OF ALLIANCE CONTRACTS

Alliance Contract Principle	Operational Feature
Team Selection	<ul style="list-style-type: none"> - Focus on partners’ competence, reputation, and attitude - Select personnel on a “best for project” basis
Project Proposal Development	<ul style="list-style-type: none"> - Develop the project proposal by alliance partners with the owner’s cooperation and involvement - Determine the performance targets and commercial arrangements on a negotiation basis or on a competition basis, as the case may be
Risk and Reward Allocation	<ul style="list-style-type: none"> - Share risks and rewards collectively - Create a win-win or lose-lose situation through a risk/reward regime - Align the owner’s project objectives with partners’ commercial objectives
Governance and Management	<ul style="list-style-type: none"> - Make project decisions collectively and unanimously - Deliver the project by one integrated team, no duplication of functions, and roles team - Perform variations only under very limited circumstances - Establish a peer relationship where each partner has an equal say in decisions - Share information and knowledge - Commit to “open book” in terms of cost data, documentation, and reporting
Principles of Conduct	<ul style="list-style-type: none"> - Make decisions and act in a “best for project” manner - Encourage open, straight, and honest communication among all partners - Commit to cooperation in achieving the objectives - Act fairly and reasonably instead of reaping self-interests at the expense of other partners
Dispute Resolution	<ul style="list-style-type: none"> - Commit to “no fault-no blame” culture in relation to errors, mistakes, or poor performance - Resolve conflicts and disputes internally and agree not to litigate or arbitrate

Source: Chen et al. (2012).

shift in organizational culture that must take place to implement alliancing. The term “best for project” infers a form of the U.S. qualification-based selection (QBS) procurement method currently used by agencies to select engineering design consultants and CMGC contractors. The second difference is the involvement of the owner in the development of the alliance project proposal. The closest North American analog would be the use of ATCs in DB and DBB projects. This mechanism allows the owner to make limited input to the ultimate proposal, but only in approving or disapproving the contractor-initiated ATCs.

The dispute resolution principle is the one that is the farthest away from current North American project procurement culture. Many states and provinces have laws that guarantee

an entity that is party to a public construction contract the right to use litigation to seek redress of wrongs committed to the state such as breach of contract. “Because the right to sue the State is determined by statute, there are special limitations and requirements that do not exist when a non-government entity is being sued” (Stacey and Nicholson 2010). Many state DOTs are also required to utilize alternative dispute resolution methods, such as arbitration or dispute resolution boards before entering into litigation (Caltrans 2012). Thus, to introduce alliance contracting may require the agency to obtain a waiver from current statute or enabling legislation to permit it to enter into a contract where the private entities are not allowed to seek relief in the courts. Table 2 contains a list of international terms, their definitions, and equivalent U.S. terms if applicable.

TABLE 2
KEY INTERNATIONAL AND U.S. PROJECT DELIVERY DEFINITIONS

International Term	Definition	Equivalent U.S. Term	Definition and Key Differences from International Term, if Any
Actual Outturn Cost (AOC)	“The sum of actual direct project costs and overhead and profit fees.” (ADIT 2011)	Actual Project Cost	The sum of the contract amount plus the cost of changes authorized and agreed during the project.
Alliance	“A delivery model where the owner(s), contractor(s) and consultant(s) work collaboratively as an integrated team and their commercial interests are aligned with actual project outcomes.” (ADIT 2011)	Alliance	Same as international term
Client	The entity that owns the completed infrastructure; may be either a public or private entity.	Agency or Owner	Same as international term
Collaborative Alliance	An alliance where work is allocated to Non-Owner Participants (NOPs) recognizing that “[the] relative performance between delivery teams fluctuates. The system allows for poorer performing delivery teams to improve their performance and increase their share of work accordingly. Likewise, high-performing delivery teams must continue to improve or risk being outperformed by another delivery team and losing their share of work.” (NZTA 2012)	No Equivalent U.S. Term	This alliance operates somewhat like a U.S. federal major task order (MATOC) IDIQ contract where the agency selects several IDIQ contractors and they compete for task orders inside the contract.
Commercial Framework	“This sets out the structure and principles that govern the NOPs’ remuneration for the project.” (ADIT 2011)	Commercial Terms and Conditions	Same as international term
Competitive Alliance	“An alliance where tenderers are selected primarily on the basis of price competition. Typically, two tenderers are funded by the alliance owner to develop a design, target cost, and schedule for a project. The [TOC]... is used for the selection of the preferred tenderer after which an alliance is entered into for the delivery of the project.” (Queensland 2008)	No Equivalent U.S. Term	This alliance operates somewhat like a U.S. low-bid DB contract where each team submits a technical proposal and a price and the team with the lowest priced, technically acceptable proposal is selected.
Early Contractor Involvement (ECI)	“A two-stage relationship-style delivery model, generally structured to resemble a project alliance model during the first stage and a D&C [DB] model during the second.” (Casey and Bamford 2014)	Construction Manager/General Contractor (CMGC)	“...the contractor is selected during design and furnishes preconstruction services” (DBIA 2009). The CMGC contractor is normally selected later in the project design process than it is in ECI. Also called CM-at-Risk.
Earned Value Analysis (EVA)	“...a process or discipline for assessment of the true time and cost performance state of the programme [sic] compared to a ‘baseline’ forecast.” (SCIRT 2014)	Earned Value Analysis (EVA)	“...[a] method of measuring a project’s progress at any given point in time, forecasting its completion date and final cost, and analyzing variances in the schedule and budget as the project proceeds.” (WBDG 2010)
Forward Works	A program can be sub-divided into a number of projects after which contractors can be selected. (VDTF 2006)	Capital Improvement Program	The agency’s future work load. The state transportation improvement program (STIP) is an example.
Gainshare/Painshare	“...the profit of the parties would be reduced in the case that the Project Target Cost is exceeded and increased in the case where the actual costs are less than Project Target Cost, in accordance with agreed formulae.” (ACA 1999)	Shared Savings Incentive/	In projects where a GMP is used as a pricing structure, some contracts contain a clause where the owner and the contractor split any savings if the actual cost is less than the GMP. There is no known sharing of costs overruns in the U.S. system.

TABLE 2
(continued)

International Term	Definition	Equivalent U.S. Term	Definition and Key Differences from International Term, if Any
Independent Cost Estimator (ICE)	"A peer reviewer that must be independent of the organization and the project, unless otherwise formally agreed with the NZTA." (NZTA 2012)	Independent Cost Estimator (ICE)	A separate entity that "to maintain independence of the [estimate] does not report to, or receive oversight from, the [agency] Estimating Office and/or the [agency] Project Manager. (MnDOT 2013)
No Equivalent International Term		Integrated Project Delivery	"[a] project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner" (AIA 2007)
Key Performance Indicators (KPI)	"Jointly developed and agreed performance scores measured on a scale between -100 and +100, with zero designated as the neutral performance score, and +100 representing an outstanding performance outcome for a NOP. KPIs measure specific and defined aspects of performance within KRAs." (ADIT 2011)	Performance Specifications or Performance Criteria	Standards or goals that are established in the contract to describe the required outcomes. These are measured in qualitative terms more often than quantitative terms. They are also less formally controlled than KPIs.
Key Result Area (KRA)	"A performance-related bonus or penalty payment based on actual performance outcomes achieved by the NOP, compared to pre-agreed performance targets. There are cost and non-cost KRAs; e.g., timely completion, safety, quality, environmental outcomes, community outcomes, and traffic management." (ADIT 2011)	Incentive/Disincentive (I/D) Scheme	"... a contract provision which compensates the contractor a certain amount of money for each day identified critical work is completed ahead of schedule and assesses a deduction for each day the contractor overruns the I/D time." (FHWA 1989)
Non-owner Participants (NOP)	"Non-owner participants that form part of the direct project stakeholders who represent the commercial/legal framework of the project organization...the NOPs comprise one or more private sector service providers delivering the capital works project." (ADIT 2011)	Industry Parties to the Contract	Those entities that are signatories to the given contract and with whom privity is established with the public owner/agency.
Owner's Comparative TOC	An independent cost estimate "which is developed by the Owner in parallel with the Proponent in NOP selection processes. This will provide an independent comparison for the Owner during evaluation and provide the OE [Owner's Estimator] with a useful tool when analyzing the Proponent's TOC" (ADIT 2011)	Engineer's Estimate	A cost estimate prepared by the agency that "serves as a basis for probable construction cost; supports decision-making on project scope; and serves as a guide to evaluate bidders' proposals." (CLFHD 2011)
Project Partnering	Project delivery system that differs from project alliancing in that it is both a relationship management system and a project-delivery system, but where partnering encourages closer relationships and shared goals, alliancing mandates them. (Casey and Bamford 2014)	Partnering	"... long-term agreements between companies to cooperate to an unusually high degree to achieve separate yet complementary objectives." (CII 1991) Similar to international definition but not considered a project delivery method in the United States.
Pure Alliance	"Project delivery strategies, several participants joining together to share risks and outcomes on a project. Sponsor and commercial participants' objectives are aligned to maximize performance, proactively manage risk, reduce cost, and achieve outstanding results in attaining client's objectives. (Cheung et al. 2006)	Pure Alliance	Same as international term
Risk Allocation	In traditional methods of project delivery, specific risks are allocated to participants who are individually responsible for best managing the risk and bearing the risk outcome. (Casey and Bamford 2014)	Risk Allocation	Same as international term
Risk Sharing in Alliances	"... all the parties either benefit together or not at all; parties consent to their level of contribution and risk and jointly incur rewards or losses." (Casey and Bamford 2014)	Risk Management	"... an ongoing, continuous process of monitoring and managing all kinds of risks." (FHWA 2012)
Risk Transfer	Mitigating risks inherent to government projects by transferring them to another entity such as an insurance policy, privatization, or contract assignment.	Risk Shedding	The use of the contract to minimize the amount of risk the owner is exposed through contract clauses that place responsibility and liability on the contractor.
Strategic or Program Alliance	"A long term business strategy linking together client, contractor and supply chain. Establishment of inter-organisational relations and to engage in collaborative behaviour for a specific purpose." (Queensland 2008)	Strategic Alliance	Same as international term
Target Out-turn Cost (TOC)	"The agreed target cost set at the start of the project. In the project the AOC is compared with the TOC to determine cost underrun or overrun. An AOC close to the TOC demonstrates value for money." (ADIT 2011)	Guaranteed Maximum Price (GMP)	Same as international term; however, if the owner chooses to change the scope of work the GMP will also change to match it.
Tendering	"...the process of submitting a proposal (tender) to undertake, or manage the undertaking of a construction project." (ADIT 2011)	Bidding	Same as international definition
Value for Money (VfM)	"Value-for-Money is a measure of benefits (which covers quality levels, performance standards, and other policy measures such as social and environmental impacts), balanced against the price and risk exposure of achieving those benefits." (ADIT 2011)	Value For Money (VfM)	"A project is said to have positive VfM when, relative to other procurement options, it is forecast to deliver and/or is demonstrated to have delivered the optimum combination of life cycle costs and service quality that will meet the objectives of the project." (VDOT 2011)

STUDY APPROACH

The approach used to complete the synthesis relied on two independent sources of information:

- Literature review and
- Case studies of alliance projects.

The first was a comprehensive review of the literature. An effort was made to seek not only the most current information but also historical information so that the change, if any, over time in alliance practices could be mapped and related to the current state of the practice. Finally, case studies were undertaken using both direct interviews with project participants and by extracting case studies from the literature and then reformatting each to match the output derived from the direct interviews.

Literature Synopsis

Alliance contracting as a project delivery method for major infrastructure projects is increasingly being used in highway construction projects in Australia, New Zealand, and other nations. The literature review found examples of various alliance projects in the ten countries shown in Table 3 and there are most likely alliance projects in the private sector in many more. The offshore oil industry developed alliancing and continues to use it for its major projects (Chen et al. 2012).

Alliancing versus Partnering

The trend began two decades ago as a number of individuals criticized poor project performance in the public construction industry. At about the same time, partnering was introduced as a panacea for the highly adversarial and litigious environment found in the U.S. low-bid highway construction industry (Weston and Gibson 1993). The Construction Industry Institute (CII) (1991) developed partnering to provide opportunities to improve total construction quality and cost-effectiveness by creating an atmosphere that encourages innovation, teamwork, trust, and commitment. The CII regarded partnering as a process to foster collaborative business practices and gain the commitment of organizations in achieving common proj-

ect goals, as well as share a basic trust and understanding of each other’s values and expectations. A UK study by Latham (1994) found that ineffective and adversarial industry practices were not capable of delivering value for the owner and urged reform. He argued that partnering offers significant benefits by improving quality and timeliness of completion while reducing costs. Egan (1998) also reached the same conclusion in a study that focused on the development of long-term relationships in the construction industry. Similar results were found in several other studies (Weston and Gibson 1993; Larson 1995; Gransberg et al. 1999).

In Australia, a specific partnering contract called “PPC 2000” attempts to prescribe and govern the behavior and relationships of contracting parties. Although the legal status of such express good faith clauses has been questioned, their full practical import is as yet unknown (Cornes 1996; Cox and Thompson 1996). In Australia, the Queensland Main Roads Department promoted the use of PPC 2000 contracts for a variety of project types, ranging from major infrastructure projects to term services contracts.

“The contractual structure of Project Alliancing differs from those traditional risk-allocating contractual frameworks.”

(Lahdenperä 2012)

The term “partnering” has a different meaning in the United States than it does overseas. In the late 1980s, the U.S. Army Corps of Engineers (USACE) initiated the use of “formal partnering” on DBB contracts “as a means to avoid disputes and, consequently, reduce the ultimate cost of delivering public facilities” (Gransberg et al. 1999). However, such use in the U.S. does not produce any binding changes in the fundamental contract as it does in the alliance contracts used in Australia and New Zealand (Weston and Gibson 1993). Partnering in the United States is merely a programmatic method to facilitate open communications between the owner and its construction contractor, and the output from U.S. partnering workshops normally consists of a nonbinding agreement to work in a non-adversarial manner (Murdough et al. 2007). Ernzen et al. (2000) defines the U.S. version of partnering as “. . . an agreement

TABLE 3
ALLIANCE PROJECTS FOUND IN THE SYNTHESIS LITERATURE REVIEW

Country	Sector	Type of Project	Type of Alliance
Australia	Public/private	Highways, maintenance, railroad, dredging	Pure, competitive
Finland	Public	Railroad, tunnel	Pure, competitive
Germany	Public	Railroad	Pure
Norway	Public/private	North Sea oil platform	Pure
Netherlands	Public	Highway/bridge, tunnel, railroad	Alliance type
New Zealand	Public/private	Highways, bridges, earthquake reconstruction	Pure, competitive, collaborative
Sweden	Private	Road maintenance, tunnel	Pure
U.K.	Public	Water treatment, airport terminal expansion, energy; Highway maintenance and construction	Pure, strategic
Canada	Public/private	Natural gas pipeline, tunnel; sewer/water, infrastructure	Pure
U.S.	Private	Power plant, natural gas pipeline	Pure, strategic

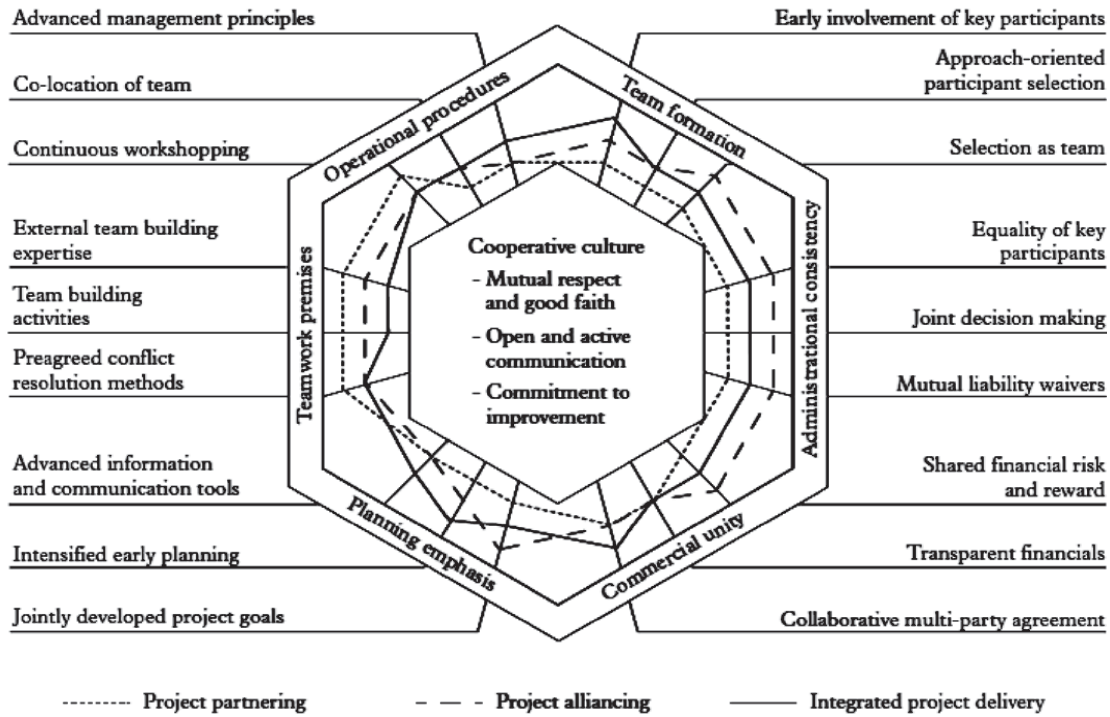


FIGURE 2 Synopsis of partnering, alliancing, and integrated project delivery principles (Lahdenperä 2012).

whereby two parties agree to cooperate at a very high level to achieve separate but complementary objectives.” Hence, the major distinction between “partnering a contract” in the United States and a “partnering contract” elsewhere, is “whether the express good faith agreements are binding on the parties to the agreement” (Scheepbouwer and Gransberg 2014).

Alliancing versus Integrated Project Delivery

In 2012, Lahdenperä addressed many of the misconers that have arisen as the U.S. and international construction mar-

ket has implemented alternative contracting methods. In Lahdenperä’s study, the term project partnering is used to describe a contractual partnership and, as such, should not be confused with the nonbinding brand of partnering in use in the United States. Figure 2 is drawn from that paper and attempts to visually display the results of the analysis. It shows that project partnering, project alliancing, and integrated project delivery are very similar and the lines that surround the central core are Lahdenperä’s relative rating of each alternative against the others. While not a scientific analysis, if one tallies the relative rank with respect to each alternative as shown in Table 4, it shows that alliancing

TABLE 4 RANKING OF ALTERNATIVE METHODS WITH RESPECT TO FIGURE 2

Relational Parameters	Relative Rank—1 Is Best		
	Partnering	Alliancing	Integrated Project Delivery
Early involvement of key participants	1	2	3
Approach-oriented participant selection	1.5	1.5	3
Selection as team	2	1	3
Equality of key participants	2	1	3
Joint decision making	2	1	3
Mutual liability waivers	2	1	3
Shared financial risk and reward	2	1	3
Transparent financials	2	2	2
Collaborative multi-party agreement	1	2.5	2.5
Jointly developed project goals	2	1	3
Intensified early planning	1	2	3
Advanced information and communication tools	1	2.5	2.5
Pre-agreed conflict resolution methods	2.5	1	2.5
Team building activities	2	1	3
External team building expertise	2	1	3
Continuous work shopping	2.5	1	2.5
Co-location of team	1.5	1.5	3
Advanced management principles	1	2.5	2.5
Total	31	26.5	50.5

appears to bring more benefits to the project than the other two relational contracts. The paper states that the differences shown in Figure 2 and Table 4 are the result of the “different degrees of integration . . . between the RPDAs [relational project delivery arrangements].” The major conclusion of the study is that alliance contracting is a project delivery method in its own right because

. . . the contractual structure of PA [project alliancing] differs from those traditional risk-allocating contractual frameworks. Therefore, the differences between RPDAs are not minor details of little importance or matters of opinion—they are so definitive that various RPDAs are undoubtedly applicable to different types of projects guided by different constraints and objectives. (Lahdenperä 2012)

The term Integrated Project Delivery (IPD) was coined by the American Institute of Architects (AIA) and focused on building construction; therefore, implementing IPD will require a large amount of retailing to make it fit infrastructure projects (Lahdenperä 2012). The National Association of State Facilities (2010) describes IPD as either a philosophy or a project delivery method. It is a relatively recent development and, as such, no rigorous performance data are available in the literature on the system. What is available

is anecdotal information published by IPD advocates (Raisbeck et al. 2010; Lahdenperä 2012). Three studies which compared IPD to alliancing were completed by Raisbeck et al. (2010), Lahdenperä (2012), and Johnson et al. (2013). All three concluded that IPD will require further implementation and study before it can be determined to be equal to or better than alliancing. Table 5 illustrates a comparison of alliancing and IPD with the other common project delivery methods across the typical U.S.DOT project development process.

Types of Alliance Contracts

Alliancing project delivery emphasizes target outcomes and risk sharing. When the alliance contract model was first introduced in Australia it was in the form now known as the “pure” alliance. This model has been widely reported and analyzed (Green 1999; Li et al. 2000; Fisher and Green 2001; Bresnen and Marshall 2002). Essentially, the pure alliance, shown in Figure 3, is formed to deliver a single project and is composed of a tripartite agreement between the owner, design consultant, and construction contractor. Like all successful business practices, the base model is subject to adjustments and adaptations and now other variations are

TABLE 5
COMPARISON OF ALLIANCING, IPD, AND DBB

Phase	Alliance	IPD	DBB	DB	CMGC	ECI
Planning	<ul style="list-style-type: none"> • Team formation of owner, contractor, and main consultants • Cost and time performance targets set • Team involvement in conceptual design, right-of-way (ROW), etc. • Gainshare/painshare agreed 	<ul style="list-style-type: none"> • Team formation of owner, contractor, consultants, and subcontractors • Cost estimation and performance targets set • Collocation 	<ul style="list-style-type: none"> • Owner and consultants • Early cost estimation 	<ul style="list-style-type: none"> • Team formation of owner and consultants • Cost and time performance targets set • Team involvement in conceptual design, ROW, etc. 	<ul style="list-style-type: none"> • Team formation of owner and consultants • Early cost estimation 	<ul style="list-style-type: none"> • Team formation of owner, contractor, and main consultants • Cost and time performance targets set • Team involvement in conceptual design, ROW
Preliminary Engineering	<ul style="list-style-type: none"> • Team involvement in environmental studies • Preliminary TOC set • Cost and time performance monitored. 	<ul style="list-style-type: none"> • Mandated use of BIM • BIM integration with subcontractors 	<ul style="list-style-type: none"> • Owner and consultants • Cost estimation 	<ul style="list-style-type: none"> • Team involvement in environmental studies • Preliminary budget set • Cost and time performance monitored 	<ul style="list-style-type: none"> • Add contractor to team • Team involvement in environmental studies • Preliminary TOC set • Target GMP set • Cost and time performance monitored 	<ul style="list-style-type: none"> • Team involvement in environmental studies • Preliminary TOC set • Cost and time performance monitored
Final Design	<ul style="list-style-type: none"> • Cost and time performance monitored • Joint approval of designs and cost estimates 	<ul style="list-style-type: none"> • Mandated use of BIM • BIM integration with subcontractors 	<ul style="list-style-type: none"> • Cost estimation • No integration with subcontractors 	<ul style="list-style-type: none"> • Done by DB contractor team <i>after</i> contract award • Cost and time performance monitored • Owner approval of designs 	<ul style="list-style-type: none"> • Cost and time performance monitored • Joint approval of designs and cost estimates 	<ul style="list-style-type: none"> • Cost and time performance monitored • Joint approval of designs and cost estimates
Bidding/Tendering	<ul style="list-style-type: none"> • Cost and time performance monitored • No bidding or tendering process* —TOC developed in design 	<ul style="list-style-type: none"> • No bidding or tendering process • GMP developed in design 	<ul style="list-style-type: none"> • Bidding costs incurred by contractors 	<ul style="list-style-type: none"> • Bidding costs incurred by DB consultants and contractors 	<ul style="list-style-type: none"> • Cost and time performance monitored • Bidding or tendering process of subcontractors 	<ul style="list-style-type: none"> • Cost and time performance monitored • Bidding or tendering process of subcontractors
Construction	<ul style="list-style-type: none"> • Cost and time performance monitored • Alliance team governance • Conflict resolved by leadership team 	<ul style="list-style-type: none"> • Project team governance • Conflict resolved by leadership team 	<ul style="list-style-type: none"> • Contract governance • Conflict resolved by negotiation 	<ul style="list-style-type: none"> • Cost and time performance monitored • Contract governance • Conflict resolved by negotiation 	<ul style="list-style-type: none"> • Cost and time performance monitored • Contract governance • Conflict resolved by leadership team 	<ul style="list-style-type: none"> • Cost and time performance monitored • Contract governance • Conflict resolved by leadership team
Post Construction	<ul style="list-style-type: none"> • Profit distribution based on agreed gainshare/painshare formula • No recourse to litigation 	<ul style="list-style-type: none"> • Profit distribution based on agreed formula • No recourse to litigation 	<ul style="list-style-type: none"> • Final payment per contract provision • Litigation a possibility 	<ul style="list-style-type: none"> • Final payment per contract provision • Litigation a possibility 	<ul style="list-style-type: none"> • Final payment per contract provision • Litigation a possibility 	<ul style="list-style-type: none"> • Final payment per contract provision • Litigation a possibility

Adapted from Raisbeck et al. (2010).

*Only true for pure alliance.

ROW = right-of-way; TOC = target outturn cost; BIM = building information model; GMP = guaranteed maximum price.

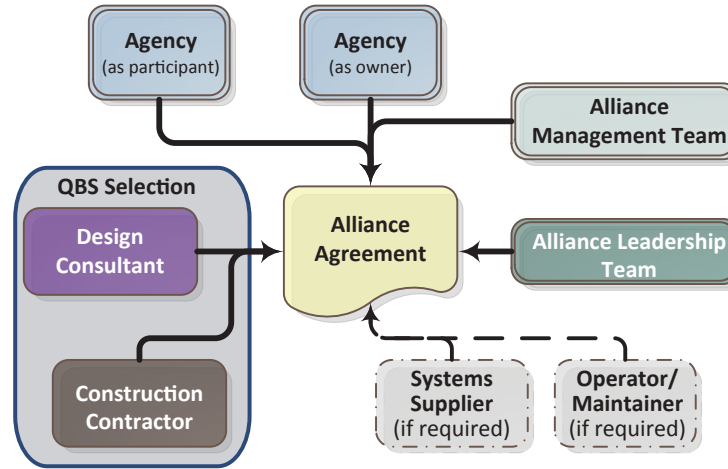


FIGURE 3 Pure alliance.

in use that contain significant differences from the pure alliance model. Two common variants are termed “competitive alliancing” and “collaborative alliancing.” In both cases, elements of the project delivery phase are much the same, including the risk allocations and the project management structures.

The key operating features of a pure alliance are as follows:

- Sole source QBS selection of the designer and the construction contractor.
- Alliance leadership team led by the agency.
- Alliance management team led by mutually agreed member from one of the three alliance members.
- Single project.
- Initial project alliance agreement written around “best for project” theory.
- Final project alliance agreement centered on gain-share/painshare scheme developed around transparent financials.

The key modification is that in the “competitive” alliance (Figure 4) multiple teams compete for the award of a single project. Collaborative alliances take that notion to the next level and require multiple alliance members to compete for work during the project. This newest form of alliancing was developed as a response to the need to quickly react to the devastation caused by the 2010 and 2011 earthquakes in Canterbury, New Zealand.

The key operating features of a competitive alliance are as follows:

- Competitive selection of the designer and the construction contractor including financial factors, usually proposed profit margin and overheads.
- Alliance leadership team typically led by the agency.
- Alliance management team typically led by a mutually agreed upon member brought from outside the three alliance members’ organizations.
- Single project.

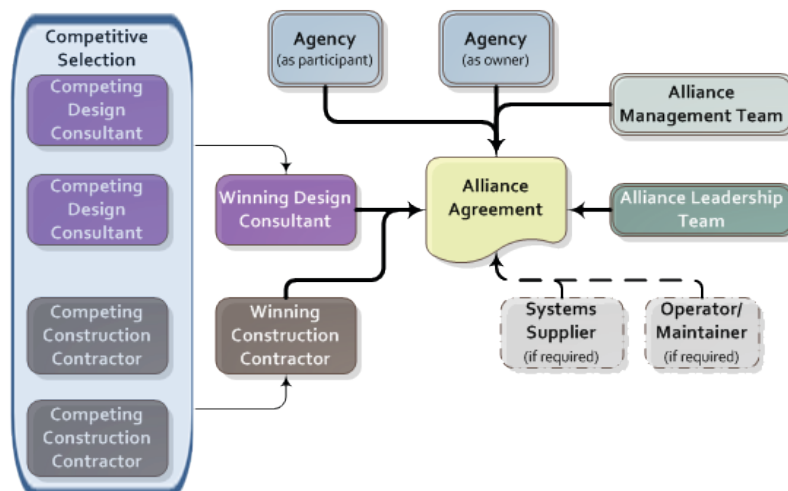


FIGURE 4 Competitive alliance.

- Initial project alliance agreement written around “best value” theory.
- Final project alliance agreement centered on gain-share/painshare scheme developed around transparent financials.

As shown in Figure 5, collaborative alliancing has multiple equivalent project teams that compete on the basis of set rules to win sub-projects during the term of the alliance. A major difference from the two other forms is that the alliance is no longer formed with a fixed amount of work for each participant. The collaborative alliance is comprised of teams that during construction compete for new work based on their performance on past work as measured by key result areas. In addition, because of the competitive nature of the post-award workload for multiple projects, each alliance member “seconds” its personnel assigned to the alliance management team. This means that the alliance itself pays the alliance management team employees’ salaries directly, as well as a number of other standard human resources administrative activities. The purpose of temporarily reassigning personnel from their parent companies to the SCIRT program is to remove the issue of potential bias in the forward workload decisions, which are based on each competing contractor’s performance of previous alliance projects.

The key operating features of a collaborative alliance are as follows:

- QBS selection of the designer and multiple construction contractors.
- Alliance leadership team led by mutually agreed upon member from outside the three alliance members’ organizations.

- Alliance management team led by mutually agreed upon member seconded from one the three alliance members’ organizations.
- Other members of the alliance management team are seconded to the alliance.
- Multiple projects.
- Initial project alliance agreement written around “best value” theory.
- Final project alliance agreement centered on gainshare/painshare scheme and increasing forward workload based on performance of past alliance projects.

The collaborative alliance is comprised of teams that during construction compete for new work based on their performance on past work as measured by key result areas.

P3 contracts involve a concessionaire with post-construction responsibility for providing the designated transportation services. Alliance contracts typically end once the constructed facility is turned over to the owner-agency and thus are similar to CMGC contracts.

In New Zealand, the New Zealand Transport Agency (NZTA) has used an increasing number of delivery options; “pure” alliance since 2001, “competitive” alliance since 2007, and “collaborative” alliance since 2012. Each of the variations depends on a strong collaboration between the project partners as opposed to the more adversarial approach found in traditional DBB projects. The 2010 NZTA procurement manual indicates that project characteristics that lend them-

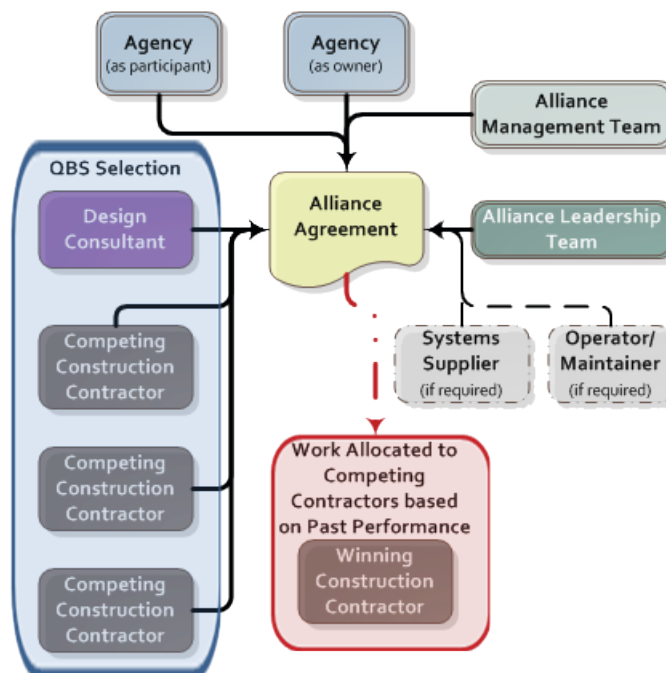


FIGURE 5 Collaborative alliance.

TABLE 6
COMPARISON OF ALLIANCE TYPES

Alliance Type	Owner Participants	Design Consultants		Construction Contractors		Project	Selection Type	TOC Determination
		Single	Multiple	Single	Multiple			
Pure	Single	Single	Single	Single	Single	Single	QBS	Negotiated
Competitive	Single	Multiple	Single	Multiple	Single	Single	Best Value	Fixed at Selection
Collaborative	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	QBS	Negotiated

TOC = target outturn cost.

selves to project alliancing are large-scale, high-risk projects in difficult environments that have complex stakeholder issues that require flexibility during design and construction.

In the United States, some have argued that public-private partnership (P3) contracts are the same as a pure alliance contract overseas (Harness 2014). While the two share many similar features, P3 contracts are in actuality design-build-finance-operate-maintain projects where the concessionaire has post-construction responsibility for providing the designated transportation services. Alliance contracts typically end once the constructed facility is turned over to the owner-agency and thus are similar to CMGC contracts with a contractually guaranteed collaboration between the owner, designer, and contractor and a contractual agreement to share both the costs and benefits of the project. They would not be considered DB contracts because the designer and contractor do not have a separate agreement that does not include the owner (West et al. 2012).

PROTOCOL TO DEVELOP CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Subjects where two or more of the three lines of information (i.e., the literature, case example, or screening survey) intersected were considered significant and used to develop the conclusions and the candidates for the list of effective practices. Points where only one source furnishes substantive information on alliance contracts were used to identify gaps in the body of knowledge that showed potential for future research.

The major factor in developing a conclusion was the intersection of trends found in two or more research instruments. The intersection of more than two lines of converging information adds authority to the given conclusion. In addition, greater authority was ascribed to information developed from the case study projects of highway agencies. The literature review was considered to be a supporting line of information. Finally, the screening survey output was used to gauge the perceptions of North American agency members with respect to the utility of alliance contracting within their specific jurisdictions.

Suggestions for future research were developed based on the common practices that were described in the literature

and confirmed as effective by one of the research instruments but generally not widely used. Gaps in the body of knowledge found in this study were also used to define the areas where more research would be valuable.

Given the authority, North American transportation agencies would probably use alliance contracting on the same projects that they are delivering today with P3, DB, or CMGC.

CONCLUSIONS AND EFFECTIVE PRACTICES

Although there were no effective practices identified in the chapter, the following conclusions were reached:

- There are three separate and distinct models for alliance contracting as shown in Table 6.
- Once they were granted enabling authority, North American transportation agencies would probably use alliance contracting on the same projects that they are delivering today with P3, DB, or CMGC.
- Alliance project partners will in most cases be selected using a form of the U.S. QBS procurement method currently used by agencies to select engineering design consultants and CMGC contractors.
- Implementing alliancing will require agencies to develop an education and outreach strategy to overcome internal and construction industry resistance to change.

ORGANIZATION OF THE REPORT

The next chapter details the legal and contractual principles of alliance contracts through a series of case studies. The major issue in alliance projects is to influence and control the behavior of the various members of the alliance and encourage “best-for-project” decision making at all levels. Therefore, chapter two contains information to provide the reader a foundation upon which to understand chapters three and four. Chapter five provides the legal background for determining whether alliance contracts can be implemented in the United States, as well as some legal case studies from overseas that illustrate some of the pitfalls found in alliance contracting.

ALLIANCING CASE STUDIES

The following reasons were used for selecting the various alliance cases. First, there are three distinct types of alliances now practiced, the pure alliance, the competitive alliance, and the collaborative alliance. Table 7 synthesizes the primary facts on each case.

Before getting into the details of each case, the reader must remember that the laws and governmental structure of the countries in which these projects were delivered is very different from that of the United States; Australia, New Zealand, and the United Kingdom are all parliamentary democracies, which at the risk of over-simplifying, generally gives more power to the national government than to the governments at the state, province, county, or local level. Thus, it is somewhat less difficult to make procurement policy changes on a national basis. In the United States, only the presence of federal funding will provide the national government the power to call the shots. The second major difference is the extreme litigious nature of the U.S. construction industry. When compared with Europe the American legal culture is seen as “as adversarial, leading to high litigation rates, while . . . others [European] as more relationship-oriented and thus less litigious” (Blankenburg 1994). Therefore, although the outlook for alliancing is bright in these countries, the outlook for implementing this new project delivery method in the United States is less sanguine. There is a very fundamental difference in the way Americans and Australians approach construction contracts. In the United States, the contract is essential because neither party to the contract trusts the other. In Australia, the rule can be simply put as: you would never sign a contract with someone you do not trust. The bottom line is that American construction contracts govern the dispute process, which if found to be irresolvable is then referred to the courts for adjudication. Alliance contracts forbid resorting to litigation except in the extreme case of willful default by one of the parties (Holt et al. 2004).

The Dutch case (#4) is cogent to the U.S./Canadian context in that the agency was able form a contract that operated like a pure alliance; however, it is illegal to form an entity between state and private enterprises, and did not take the final step to create a binding project alliance agreement. The alliance procedures were implemented by all parties on a voluntary rather than contractual basis. Therefore, for purposes of the synthesis report this procurement method and all others that do not consummate a full-scale project alliance agreement will be referred to as “alliance-type” procurements.

Most cases are primarily related to delivering major highway construction projects. However, Case #6 from the United Kingdom is a strategic alliance among nine public transportation agencies with no industry members. There are no alliances used in the UK highway construction sector for much the same legal reasons as the Dutch case (#4). Case #7 from New Zealand is an urban freeway maintenance alliance with no capital projects involved. Case #9 from Australia is a channel deepening project in a congested port. The value of the highway construction projects ranged from NZ\$67 million (~U.S. \$59 million) to AU\$1.6 billion (~U.S. \$1.5 billion); both cases were selected. Finally the Northern Gateway Toll Road (Case #1) was selected because of the complexity of the project in that it used tunneling technology that had not been used in New Zealand for decades and whose alignment passed directly through an environmentally sensitive area requiring a very sophisticated environmental protection plan.

CASE 1: NORTHERN GATEWAY TOLL ROAD ALLIANCE, NEW ZEALAND

The Northern Gateway Toll Road (NGTR) was the first toll road in New Zealand to be fully electronic. To date, it has been one of New Zealand’s largest and most challenging highway construction projects. It extends the Northern Motorway (SH1) 7.5 km north from Orewa to Puhoi and provides an alternative to the two-lane road through Orewa and Waiwera. The NZTA awarded the project to the Northern Gateway Alliance in 2004. At its peak, approximately 300 people worked on the project.

Value: NZ\$365 million

Start: December 2004

Completion: February 2009

Scope: The Northern Gateway Toll Road is a four-lane, 7.5-km-long highway development as shown in Figure 6. It was a technically challenging project that came with significant risks. The engineering risks were associated with the scale of the project and the steep and difficult terrain. The project had large earthwork operations and many bridges and tunnels. There were also risks with constructing through an environmentally sensitive area, as well as unresolved regulatory planning issues.

TABLE 7
ALLIANCE CASE STUDY PROJECT SUMMARY

Agency (case no.)	Case Study Project (value)	Construction Type (location)	Alliance Model	Rationale for Including in the Synthesis
NZTA (1)	Northern Gateway Tollroad (NZ\$365 M)	Highway construction including tunneling (Northland, New Zealand)	Pure	Complexity of project; first generation alliance
NZTA/CERA/CCC (2)	SCIRT (NZ\$1.6 B)	Infrastructure repair (Christchurch, New Zealand)	Collaborative	Price competition after the award
NZTA (3)	Grafton Gully (NZ\$67 M)	Highway construction (Auckland, New Zealand)	Pure	First generation alliance
Ministry of traffic (4)	A2: Hooggelegen (€ 140 M)	Highway expansion (Utrecht, Netherlands)	“Alliance-Type”	No joint ventures in NL allowed between state and private enterprise at start time; project proceeded as ‘alliance-type’
QDTMR (5)	Origin Alliance (AU\$1.6 B)	Highway construction; extensive unknown geotechnical conditions (Goodna, Australia)	Pure	Very large and complex project with sub-alliance with a sub-contractor
The Highways Agency (6)	Midland Highways Alliance (£300 million)	Highway construction and maintenance (8 English Counties and the UK Highways Agency)	Strategic	In UK law “not suing is not legal” Agencies-Only
NZTA (7)	Auckland Maintenance Alliance (NZ\$48.8 M)	Bridge and road maintenance (Auckland, New Zealand)	Pure	Maintenance alliance
NZTA (8)	Manukau Harbour Crossing (NZ\$180 M)	Bridge, interchange, highway construction (Auckland, New Zealand)	Competitive	Second generation alliance
Port of Melbourne (9)	Channel Deeping Project (AU\$969 M)	Dredging, berth upgrades, navigation aids, utilities (Melbourne, Australia)	Pure	Highly complex project requiring specialized technical expertise with a potential to disrupt millions of AU\$ trade.
WSDOT (10)	SR 519 Intermodal Access Phase 2 (\$66 M)	Interchange to link I-5 and I-90; massive utility conflicts, ROW, coordination with commuter transit (Seattle, Washington)	“Alliance-Type”	No specific agency authority for alliancing so project went forward as “Enhanced Design-Build” and convert to standard DB before the alliance was formed.
USAF (11)	Alliance Contracting Analysis (N/A)	In-depth analysis of issues associated with applying alliancing and IPD under FAR constraints	N/A	Provides an example of a U.S. agency rationally assessing the statutory barriers to implementing alliance-style contracting.

NL = the Netherlands; ROW = right-of-way; N/A = not available.

The major features of work on the toll road project were as follows:

- Extension of SH1 north by 7.5 km
- Two lanes in each direction for most of the route
- Seven bridges totaling 1.1 km in length
- Two eco-viaducts built to protect corridors at Otanerua and Nukumea
- A local road bridge at Hillcrest
- 380-m-long twin tunnels at Johnstones Hill
- Five major culverts
- More than 4,000,000 cubic meters of earth moved
- 130,000 cubic meters of road surface
- 750,000 native plants
- 60,000 cubic meters of concrete
- New Zealand’s first fully electronic toll road.

Challenges: The specific challenge on this project was to route the new highway through difficult and environmentally sensitive terrain. The NGTR Alliance envisioned creating a visual showcase of environmental and engineering excellence. To help achieve the vision, the bridges were not only designed to be constructible and durable but also visually attractive. There was also timeframe pressure, as a series of the consents for land access were due to expire (Lipscombe 2013).

Rationale for choosing alliancing: The NGTR had a number of major risks and constraints that made alliancing the best fit as a procurement model. There were several mitigating factors during the consenting phase. The area over which the construction was to take place was designated Recommended Area of Protection 21 under the Auckland regional district plan. The environmental consent stipulated that only the bush that was



FIGURE 6 Location of Northern Motorway in New Zealand.

required for the footprint could be removed. There were also strict regulations on the amount of sediment that could be released. As a result, major revegetation, reinstatement, and landscaping were required. Tendering contract groups had to create innovative ways to limit the footprint made by the construction and how best to reinstate the native bush. The extremely aggressive schedule required created an opportunity

to use risk sharing among the alliance members to compress the schedule and made alliancing a more attractive option than traditional DB contracts.

Procurement: Tendering for the NGTR project was done in two phases. Contractors and consultants formed their own groups and submitted a bid for short-listing. The agency received three bids for this job, and two groups were subsequently selected, based on non-price attributes. The next step in the tendering process was a workshop to test these non-price attributes. The tendering groups were put into scenarios that tested how they worked together with the agency, how well they tackled difficult problems, and their ability to come up with innovative solutions to those problems. A preferred alliance from the workshop was selected to prepare a target outturn cost (TOC) for the project; the price then had to be negotiated. A TOC was developed by the contracting group and a parallel price based on first principles by the agency determined. During contract negotiations these prices were reconciled and a project cost of NZ\$260 million was agreed to.

Contract pricing: The contract pricing provision for this project was typical of alliance contracts (see Figure 7) and consisted of:

- **Limb 1—Direct Costs.** This covers plant, labor, and materials and totally excludes profit and overheads. Limb 1 was calculated by the contractors and paid on a monthly basis.
- **Limb 2—Offsite Overheads and Profits.** This is calculated by auditing the contractors for the previous five business years to determine an average margin. This margin is typically between 10% and 15%, and is applied to Limb 1—again calculated and paid on a monthly basis.
- **Limb 3—Pain/Gain Sharing.** This is based on the savings or cost overruns that occur. Savings are split as the profit share of 50/50 between the agency and the alliance

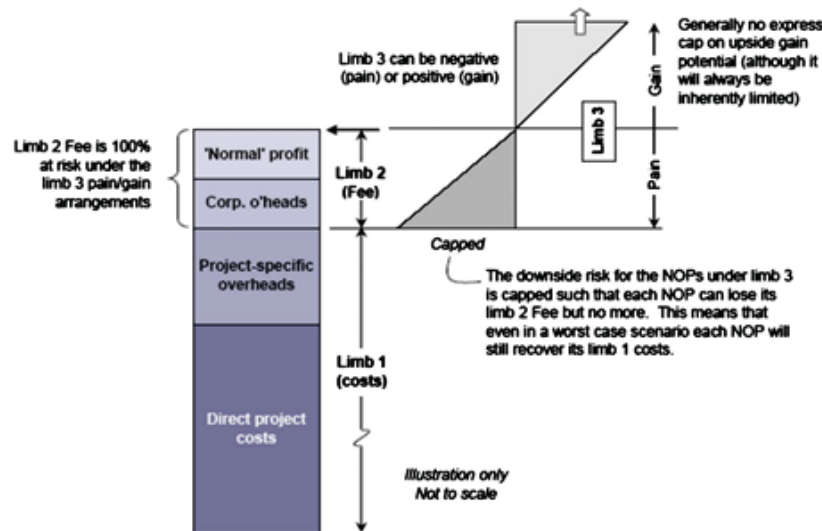


FIGURE 7 Three-limbed compensation model for NOPs (Ross 2006).

partners. This is an uncapped amount. Cost overruns have the same split; however, this is capped to the Limb 2 level and done so that if the project goes wrong the contractor does not lose money.

NZ\$2 million was set aside as a bonus pool from which to pay performance bonuses based on the key performance indicator (KPI) system for the project. As the project began, NZTA had key result areas (KRAs) based on the organization’s triple bottom line reporting as shown here:

- Economic (20%),
- Social (40%), and
- Environmental (20%).

Key performance indicators: The KPIs were developed by the contractors during the tendering phase to meet the KRAs. These were modified and agreed upon with NZTA during contract negotiations and are shown in Table 8. Each of these KPIs had a percentage and an associated dollar value assigned to them to facilitate the division of the performance bonus pool. The alliance was in charge of scoring itself against the KPIs. This score then went to the project alliance board for review on a monthly basis. This was also audited by an expert outside reviewer at the end of the project to ensure that the performance score was fair and correct.

Summary: The project actual outturn cost (AOC) was NZ\$300 million, which was in line with the current TOC at completion and the project was concluded ahead of schedule.

CASE 2: STRONGER CHRISTCHURCH INFRASTRUCTURE REBUILD TEAM ALLIANCE, NEW ZEALAND

Christchurch experienced three major earthquakes between September 2010 and June 2011. The city suffered significant damage to its vital infrastructure and many inner city businesses were disrupted for a prolonged period. The land

damage suffered was particularly unique in that nowhere else in the world had liquefaction been repeatedly experienced across such a great expanse than that which occurred in Christchurch. The total cost of damage is estimated to be approximately 10% of New Zealand’s Gross Domestic Product, and the Christchurch earthquake is ranked as one of New Zealand’s most expensive natural disasters since 1950.

“Stronger Christchurch Infrastructure Rebuild Team (SCIRT) is a purpose-built organisation rebuilding publicly owned horizontal infrastructure, . . . damaged by the Canterbury earthquakes of 2010 and 2011.”
(SCIRT 2014)

Immediately following the September 2010 earthquake a program of public works managed by the local city council was established to repair the broken infrastructure. This program was referred to as the Infrastructure Rebuild Management Office (IRMO). In effect, the city was sub-divided into four geographical areas called “pods,” with each being allocated to a reputable construction company that in turn engaged a design consultant to provide the necessary professional services. The companies worked on an emergency cost reimbursement model and provided an instant response for what now could be described as a modest amount of earthquake damage.

The extent of the damage following the February 2011 earthquake was on a far greater scale to that experienced four months earlier, which meant that a different procurement model had to be implemented to maximize productivity by sharing knowledge and resources. In addition to being able to incorporate a substantial portion of IRMO projects either in construction or well advanced in the design, the new model had to effectively manage the high risk associated with the unknown scope of work involved in disaster recovery projects, the pressures on schedule performance, coordination of resources, and a need to facilitate early contractor involvement (ECI) during the detailed design phase in order to reduce

TABLE 8
NORTHERN GATEWAY ALLIANCE KEY PERFORMANCE INDICATORS

Economic KPIs	Social KPIs	Environmental KPIs
<ul style="list-style-type: none"> • Timely and practical completion • Engineering and construction excellence • Operational toll way 	<ul style="list-style-type: none"> • Safety in the work place • Legacy—Skill development: How the alliance was making a contribution to the industry (developing its staff, training people, and raising the bar for people in the industry, etc.). • Legacy—External recognition: Delivering a project that was receiving awards across a variety of categories, both nationally and internationally (i.e., technical, human, environmental, etc.). • Wider community: Engaging community and neighbors, coupled with media perception. • Follow-up times: How long it took the alliance to respond to letters and feedback and engaging the key stakeholders. 	<ul style="list-style-type: none"> • Successfully implementing the environmental management plan. Compliance with legislation: Measured against Auckland Regional Council site score. • Environmental benefit: Being neutral from environmental perspective by offsetting the damage done within the project area.

Source: Gallagher (2008).

risk by providing constructability input (Song et al. 2006). This made alliancing an ideal procurement model (VDTF 2006; Eriksson 2010). To deliver the program of works for the rebuilding of Christchurch’s horizontal infrastructure, the Stronger Christchurch Infrastructure Rebuild Team (SCIRT) Alliance was formed. SCIRT became responsible for repairing the water supply reticulation and reservoirs, waste water reticulation and pump stations, storm water reticulation and pump stations, and road networks for both the Local Council and the National Roads Authority, including bridge repairs and retaining walls (Figure 8).

The SCIRT Alliance was developed as a multi-agency, multi-contractor program alliance to deliver the large number of smaller projects that make up the program of works associated with the reconstruction the of city. The framework is different from other alliance structures in that it relies on *collaboration and competition* between cooperating companies.

Value: NZ\$1.6 billion

Start: 2011

Completion: September 2016

Scope: Horizontal infrastructure repair including roads, bridges, retaining walls, freshwater, and wastewater storm water networks.

Challenges: The major challenge was the scale of the reconstruction, combined with an unknown scope. The alliance has to manage the high risk associated with the unknown scope of work involved in disaster recovery projects, the political pressures on schedule performance, coordination of resources, and a need to have the construction contractors involved during the detailed design phase to reduce risk by providing constructability input.

Rationale for choosing alliancing: An alliance can be used for an unknown scope of works and start immediately. The unknown scope of works makes other delivery systems in use impractical.

Procurement: The formation of the SCIRT Alliance came out of the prior rebuild organization, IRMO. This organization was set up after the first major earthquake in September 2010. Parties that had maintenance contracts in the Christchurch area were invited to participate in IRMO, where the work was divided into regions. After the second major earthquake that

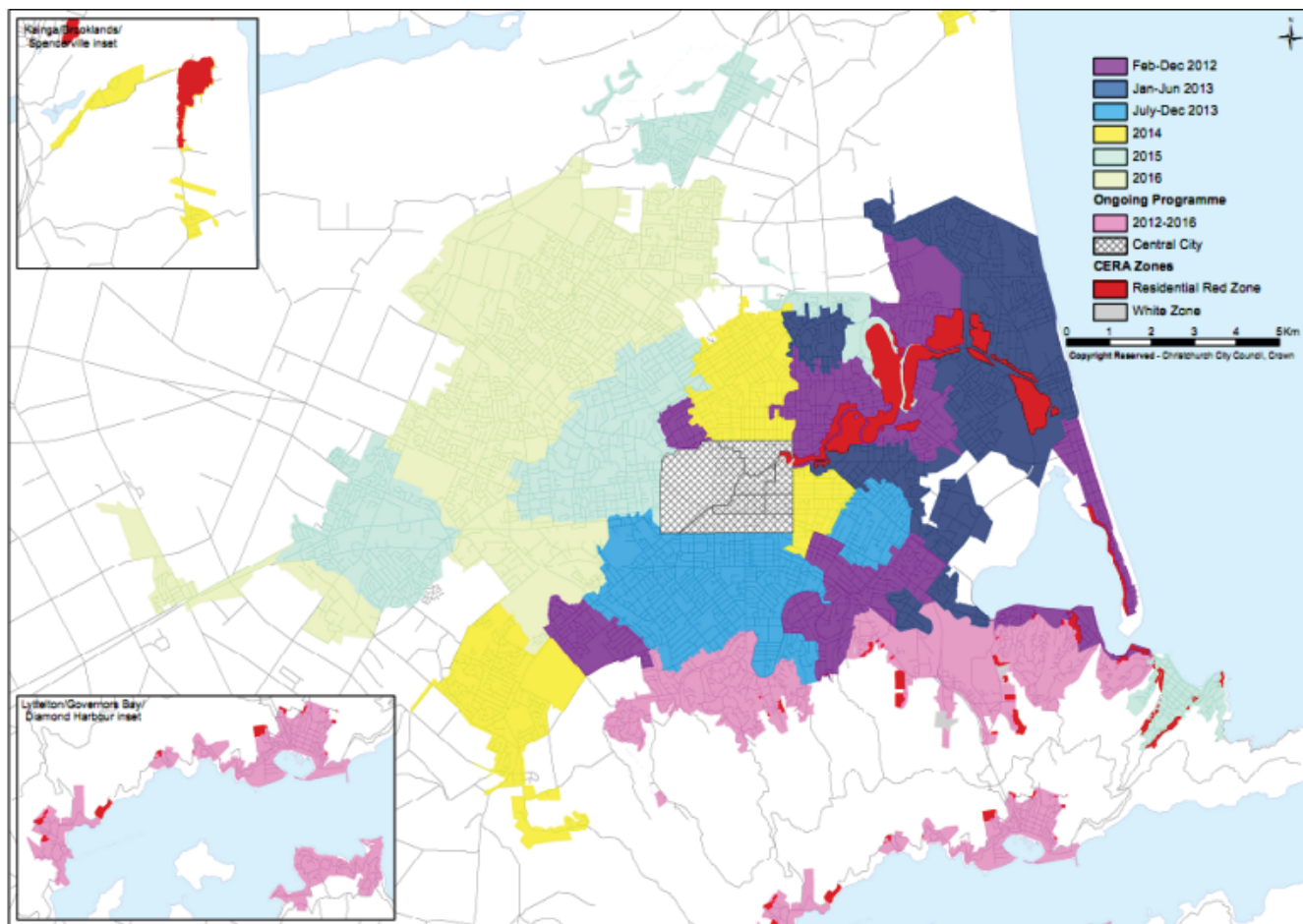


FIGURE 8 Stronger Christchurch Infrastructure Rebuild Team (SCIRT) rebuild schedule.

caused most of the damage, a new model, the SCIRT Alliance, was negotiated with the five main contractors in New Zealand.

Contract pricing: The Alliance services are progressively reimbursed across several categories within the Alliance structure as follows. The actual cost to deliver each project is fully reimbursable with a Pain/Gain Incentive also known as a 3-Limb payment structure (Queensland 2008). Each project will have a TOC, which is the estimated actual cost to deliver the project (Limb 1). The Limb 2 component for each project is a fixed amount calculated as an agreed upon percentage to compensate for corporate overheads and assumed profit on the TOC value. The Limb 2 component for each project is a percentage mark-up and thus changes with revisions of the TOC value through approved work scope changes. Limb 3 is the aggregated TOC overruns and underruns across the whole program of works of which a 50% share is taken by the Owner Participants. The remainder is distributed among the delivery teams based on the share of completed TOCs assigned to each individual delivery team expressed as a percentage of the program TOC.

The delivery teams also provide a significant proportion of the resources and services required for the integrated service team (IST) to function and are reimbursed for actual costs as well as a Limb 2 margin as seen in Table 9. This includes costs for staff required to run the business effectively; that is, safety, quality and environmental management, commercial, communications teams, etc., but excludes any project-specific staff such as supervisors and project managers.

Each delivery team’s off-site overhead percentage is set annually based on the expected turnover for each delivery team for the following financial year. Reimbursement for the cost of the off-site overheads is also paid under a 3-Limb commercial framework. The Limb 2 (and Limb 3) calculation does not apply to any goods and services provided by the Owner Participants who are reimbursed only for actual costs (Limb 1).

Competition between delivery teams has been built into the pure alliance model. The actual costs per project of each

delivery team are compared with the respective TOC and its performance is also measured against non-cost KRAs. This serves to benchmark each delivery team against other teams. During the program, projects are allocated based on total performance; those delivery teams that perform most effectively are allocated a greater share of future work. This has been devised to ensure that the owner participants get value for money (VfM). Earned value analysis is undertaken monthly to provide a measure of actual cost and schedule performance of each project, but importantly serves as an early warning tool for cost overruns and delays.

Key performance indicators: Five non-cost KRAs have been identified in the alliance agreement and a set of KPIs has been developed for each of the KRAs to measure the performance of each team by calculating a Delivery Performance Score (DPS) for each delivery team on a 6-month, weighted rolling average as seen Table 10.

The cost performance of each delivery team is measured for each of its assigned projects, both completed and under construction. The results are aggregated in a performance metric termed “earned value per delivery team/cost to date” and then a combined performance score is calculated. The overall performance score is then calculated and each delivery team’s standard deviation is determined to measure the change in target work share split.

Gainshare/painshare calculation example for the SCIRT Alliance: The following is an example of how alliance members had their reimbursable payments calculated and represents the cash flow scheme inherent to a collaborative alliance. Additional examples of how gainshare/painshare payments are developed for pure and competitive alliances are contained in chapter four and Appendix A.

Terms of the Agreement:

- Monthly—all contracts get paid their actual costs (irrespective of whether they are over or under budget).
- These costs are the direct project cost (Limb 1) and the contractors also get paid their negotiated margin on top of that (Limb 2).

TABLE 9
THE 3-LIMB PAYMENT SCHEME

Target	TOC	TOC Established by the SCIRT Estimating Team and Verified by the Independent Cost Estimator
Payment	Limb 1	Net Actual Cost
	Limb 2	Margin (agreed percentage) (“offsite overheads & profit”) on TOC Agreed percentage of cost incurred on services + plus delivered to Integrated Service Team
	Limb 3	If Limb 1 > TOC → Pain/Limb 1 < TOC → (Gain) <ul style="list-style-type: none"> • If Pain = NOPs will pay 50% x Pain less a bonus to a maximum of 10% based on KRA performance. • If Gain = NOPs retain 50% x Gain plus bonus to a maximum of 10% on KRA performance. • Final distribution in proportion to NOPs allocation of TOCs completed as the percentage of the overall program.

TABLE 10
NON-COST KRAs AND ACCOMPANYING KPIS

Key Result Area (% weighting)	Key Performance Indicator (% weighting)
Safety (25%)	<ul style="list-style-type: none"> • Measure of safety engagement/awareness (12.5%) • Safety initiatives/action (7.5%) • Protection of utility services (5%)
Value (30%)	<ul style="list-style-type: none"> • Productivity (12%) • Construction quality (9%) • Innovations (9%)
Our Team (15%)	<ul style="list-style-type: none"> • Alignment and involvement of team (7.5%) • Wellbeing initiatives (3.75%) • Developing a skilled workforce (3.75%)
Customer Satisfaction (20%)	<ul style="list-style-type: none"> • Community and stakeholder satisfaction with product (8%) • Community and stakeholder satisfaction with communication (8%) • Planning and execution of communication strategies (4%)
Environment (10%)	<ul style="list-style-type: none"> • Construction culture and incident/hazard reports (6%) • Waste minimization (4%)

- Each month every contractor’s performance is calculated based on specific KPIS.
- Keeping at or below the SCIRT budget of each project carries 50% of the total weight for the gainshare/painshare payments.
- The other 50% is allocated among non-cost KPIS including safety scores, etc.

Every month the DPS is calculated using the KPIS of the contractors for the previous 3 months. The DPS is expressed as a percentage and stands for the percentage of the future share of the upcoming workload for each contractor. For the five contractors in SCIRT the DPS scores add up to a total of 100%. The individual DPS scores therefore calculated as the relative scores as opposed to the absolute scores.

Each actual paid cost (Limb 1) is added to the AOC, and this is compared at the end of the whole program with the sum of all TOCs. If the actual cost is larger than the target cost, 50% of the difference up to the Limb 2 cap is returned to the owner. The 50% is because the contractors are 50% part of the alliance. If the actual cost is less than the target cost, the difference is divided between the contractors and the owners.

Table 11 is a sample of a typical monthly financial computation. Contractor 4’s performance over the past 3 months was best as measured by its KPI relative to the other contractors.

TABLE 11
EXAMPLE OF A MONTHLY FINANCIALS

	Actual Project Cost (NZ\$)	Margin (NZ\$)	Total Reimbursed (NZ\$)	KPI	DPS
Contractor 1	1,000,000	120,000	1,120,000	87%	21%
Contractor 2	800,000	96,000	896,000	85%	20%
Contractor 3	900,000	108,000	1,008,000	80%	19%
Contractor 4	1,100,000	132,000	1,232,000	95%	23%
Contractor 5	700,000	84,000	784,000	74%	17%

This results in a higher DPS score, which earns that contractor 23% of the future work.

Table 12 shows the cumulative calculation for the total projected AOC (the sum of the cumulative total reimbursed project costs for all contractors) versus the current TOC. The current TOC is \$1.6 billion and Table 12 shows that the alliance as a whole overspent it by \$6,954,869. As 50% participants in the Alliance, the contractors have to pay back 50% of this amount to the owner. The operating principle in the collaborative alliance’s payment is twofold:

1. Top performance is rewarded by an increased share of future workload, and
2. Every member earns the same gainshare/painshare regardless of performance.

Net impact shown in Table 12 is that in a pain situation; the top performer ends up losing the least because it has been able to earn more reimbursable margin on the increased amount of work it has earned based on its DPS. If the alliance was in a gain situation, the top performer would also get a larger share of the gain because of its DPS.

The previous example leads to the conclusion that the SCIRT Alliance’s incentive/disincentive scheme not only incentivizes good performances but it also encourages the poorer performers to improve their work to gain an

TABLE 12
EXAMPLE OF AN END CALCULATION

	Total Reimbursed Project Cost (NZ\$)	Total TOC (NZ\$)	Total Gain/(Pain) (NZ\$)	Contractor's Share Gain/(Pain) (NZ\$)	Contractor's Individual Margin (NZ\$) (Table 11)	Contractor's Individual Net Profit/(Loss) (NZ\$)
Contractor 1	340,560,570	330,641,330	(1,390,974)	(695,487)	120,000	(575,487)
Contractor 2	313,349,169	323,040,380	(1,390,974)	(695,487)	96,000	(599,487)
Contractor 3	313,159,145	304,038,005	(1,390,974)	(695,487)	108,000	(587,487)
Contractor 4	350,213,777	361,045,131	(1,390,974)	(695,487)	132,000	(563,487)
Contractor 5	289,672,209	281,235,154	(1,390,974)	(695,487)	84,000	(611,487)
Totals	1,606,954,869	1,600,000,000	(6,954,869)	(3,477,435)	540,000	(2,937,435)

increased share of future work. The truly unique aspect of this scheme is that it reinforces the “we-win or we-lose” principle that acts as the foundation of alliancing project delivery.

Summary: The Alliance had initial problems in coping with the amount of work and creation of a new organization. Work allocation increased sharply in the first 6 months. To date, the program runs on schedule and slightly over budget.

CASE 3: GRAFTON GULLY, NEW ZEALAND

Grafton Gully was the first alliance project for highway construction projects in New Zealand. The NZTA used a model that involved integrating the owner, designers, and constructors into one project team sharing the risks, rewards, and responsibility for solving problems. The alliance, named the Freeflow Alliance, was made up of the NZTA, a single design consultant, and two primary construction companies. The project was governed by the project alliance board with representatives of each participant. The alliance charter prescribed that all their decisions must be unanimous.

Value: NZ\$67 million

Start: January 2002

Completion: February 2004

Scope: The Alliance had to deliver a new major motorway link in an already congested section of highway, with many stakeholders and utility providers involved, as well as complete a significant number of earthworks. The planning and management of traffic flows was a critical task, with 40,000 vehicles passing through the site each day. As the site was located near both residential and commercial areas, the Alliance had to ensure that there would not be any significant environmental or noise issues resulting from the construction. Figure 9 shows just how close to the Auckland Central Business District the project was constructed.

Rationale for choosing alliancing: This was a complex project and it was imperative that a high-performance team be recruited to undertake it. This might have been difficult through a conventional competitive procurement process; a traditional measure and value contract would not provide incentives to contractors and designers to “think smarter,” because they would not gain from seeking innovative solutions to cut costs. Under an alliancing approach, all participants would benefit from net profit gain. The proposal for a nonadversarial approach was attractive to the NZTA, which saw advantages for the agency. The NZTA was also aware that this approach had worked well in Australia for highway projects (OAG 2006).

Challenges: The alliance was required to deliver a new major motorway link in an already congested section of highway, with many stakeholders and utility providers involved; a significant

After the pre-selection, two-day selection workshops were held with each team to let the agency . . . assess how they reacted to hypothetical issues presented to them. . . . effective cooperation and individual skills were important factors. The team with the most potential to bring the project to a successful outcome was selected by NZTA.

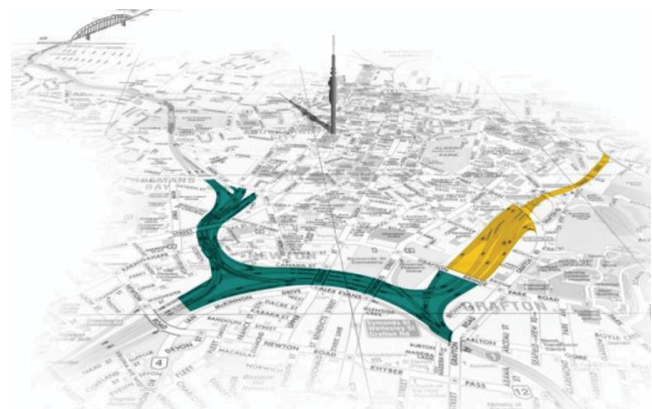


FIGURE 9 Grafton Gully Alliance Project Map (Fletcher 2013).

amount of earthwork also needed to be completed. The planning and management of traffic flows was a critical task, with 40,000 vehicles passing through the site each day, throughout the project's life. As the site was located near a residential and commercial area, the alliance had to make sure that there would not be any significant environmental and noise issues resulting from the construction works (Le Masurier 2006).

Procurement: In conventional procurements, where selection can be based on both price and non-price attributes, price generally determines who receives the award. In this case, short-listing of the NOPs was based on management, technical skills, and the track record of the organizations and of the individuals that would work on the project. After the pre-selection, two-day selection workshops were held with each team to let the agency and tenderers get acquainted and to assess how they reacted to hypothetical issues presented to them. Demonstration of effective cooperation and individual skills were important factors. In the end, the team determined to have the most potential to bring the project to a successful outcome was selected by NZTA. In a conventional competitive procurement, the selection is often tied to cost and schedule; however, by using the previous approach NZTA could choose the most effective team for the project. The nonadversarial approach was attractive to NZTA because it was able to focus its energy on project progress rather than documenting occurrences to insulate themselves in a dispute (OAG 2006).

Contract pricing: The project followed the 3-Limb pain/gain sharing model described in Figure 7. Initially, the open-book audit process determined each NOP's historical margin using respective NOP's business information of the previous 5 years as Limb 2. Next, the Limb 3 pain/gain mechanism was discussed and agreed upon. The NOPs now entered into an interim project alliance agreement to start design and construction planning in such detail that they could develop the Limb 1 project cost estimate. The project cost estimate was then combined with Limb 2 to become the TOC. The TOC was assessed by an independent cost estimator (ICE) and differences were resolved between the NOPs and ICE without agency intervention. The ICE then verified to the NZTA board that the TOC offered appropriate VfM (OAG 2006).

Key performance indicators: The KRAs were environmental impact, traffic management, road safety, health and safety, stakeholder involvement, and quality and aesthetics. A comprehensive list of the KPIs used in the project was not available. However, this project used the typical set that included:

- Customer Satisfaction—Well above established metric measured by surveys
- Customer Satisfaction—Satisfactory
- Quality—Noncompliance reports here established metric
- Safety—No serious accidents
- Predictability (time)—Completed 1.5 months early

- Predictability (cost)—Finished 7% under budget
- Turnover and Profits—Satisfactory.

Summary: The project was completed 6 weeks ahead of schedule, on budget, and the KRAs were met. The “nonproduction” objectives relating to environmental impact, traffic management, road safety, health and safety, stakeholder involvement, and quality and aesthetics were met despite a number of significant risks and obstacles that had to be overcome. The alliance approach generated agency cost savings that were fed back into the project as betterments to the baseline design.

CASE 4: AUTOBAAN A2 HOOGGELEGEN ALLIANCE, THE NETHERLANDS

The Netherlands highway agency explored using an alliance for the A2 highway projects. The construction environment in the Netherlands has customarily been an adversarial one, and the highway agency controlled all aspects of a project with contractors chosen based on low bids. The level of cooperation required in an alliance was a very different business model for the Netherlands, requiring substantial changes in business mentality for all concerned. The agency was compelled to accept risks and, at the same time, the contractors had to start accepting design responsibility and work collaboratively. Equality and trust are the central principles of alliancing, and decisions are made by consensus on a “best for project” basis. The A2 project goals were listed as follows:

- Project completion must be accelerated;
- Traffic disruption must be minimized;
- Safety is a top priority;
- Quality and aesthetics must be good; and
- The cost must be kept within budget, including a healthy margin for all concerned.

Value: €140 million

Start: Awarded November 2006

Completion: December 2010

Scope: The scope of the project consisted of widening and partly realigning the A2 highway between the Leidsche Rijn Tunnel and Junction Oudenriijn to five lanes in each direction, including new connections to existing roads, a new viaduct over the A2, and upgrading and heightening the Meern Bridge over the Amsterdam Rijn Canal shown in Figure 10. Finally, sound barriers will be installed along stretches of the new highway. To enable the work, a water pumping station will be relocated. The highway agency (Ministry of Transport, Public Works and Water Management) and Trajectum Novum worked together to realize the project. Trajectum Novum is joint venture between Van Hattum and Blankevoort, Mourik Groot Ammers, KWS Infra, Boskalis, and Vialis. A number of engineering consulting firms were also involved in the project.



FIGURE 10 A2 highway between the Leidsche Rijn Tunnel and Junction Oudenriijn.

Rationale for choosing alliancing: The agency selected this project delivery method to expedite the start of the construction of this complex project.

Challenges: The biggest challenge in the construction process was maintenance of traffic and minimizing the necessary disruptions to traffic on the motorway. This portion of the A2 motorway is crucial to the Dutch logistics infrastructure and there was considerable political and social pressure to compress the construction schedule to its shortest form.

Procurement: The tender procedure started with an industry outreach and information meeting in November 2006. All interested parties were invited to receive explanations about the project, the tender procedure, and the chosen procurement method. By February 2007, the number of qualified parties had been reduced from six to five. The primary pre-qualification criteria were corporate financial soundness and past experience with projects with similar complexities. The next tender phase consisted of the submission of a preliminary project management plan, which was then evaluated on the following criteria:

- Project governance and cooperation in an alliance project,
- Quality and risk management,
- Design and construction processes, and
- Traffic management.

Three parties responded and permitted to advance to the next phase, which consisted of several rounds of one-on-one discussion and a workshop. Also, the parties had to agree to accept the maximum project cost of €140 million. In this round, qualitative criteria were weighted at 60% and consisted of evaluating an updated overall plan, traffic management plan, and project management. The remaining 40% weight was assigned to price. Traffic planning was accorded

17% of the weight, making it the second most weighted criterion after price. The project was awarded in November 2007.

This project has been classified an “alliance-type” project because it is not currently legal for a public agency to join a private entity in a joint venture in the Netherlands. Therefore, the alliance went ahead and formed an entity without the agency. The project was then executed as if it were a joint venture.

Contract pricing: The contract used an alliance-type pricing scheme for design, construction, and traffic management. The contract sum was paid according to progress plus a negotiated percentage for overhead and profit, plus or minus incentives and disincentives on the KPIs. It was all public finance. The public owner operates and maintains the facilities in the construction zone and during the project the contractor was permitted to limit access to the road in coordination with the approved traffic management plan. However, full access to adjacent properties had to be maintained throughout the course of work. In this instance, there was an alliance between the owner and the consortium of contractors; however, this alliance was not a separate entity, which is why the contract was an alliance type. The project was a pilot into alliancing; the working of the contract was “as if” the alliance was a separate entity. In an alliance the risks are distributed fairly between agency and non-agency. The risk pot is managed by both during the project with the goal of sharing the remaining money at the end of the project.

Key performance indicators: The KRAs were schedule, budget, safety, traffic hindrance, quality, and image. Extra bonuses were made available for the KPIs on this project, one of which concerned traffic disruption based on a traffic model.

Summary: By late September 2010, the job was finished within the allotted time, on-budget, and with little inconvenience during construction. The close partnership between the various disciplines and the customer/contractor was seen as worthwhile. The project was finished in three years. For a project of this scale, this is regarded as very expeditious.

Upon project completion, the following “best practices” were drawn up:

- Cooperation and working ‘best for project’ without losing sight of one’s own interests can be effectively stimulated by using a pain/gain payment structure.
- Openness leads to an increased stakeholder satisfaction, less arbitration, and construction expedience.
- Aspects that make a project suitable for alliance procurement are urgency, schedule and quality pressures, complexity, and large risks that increase the need for nonadversarial thinking.
- Finally, there will always be disagreements between parties; however, in an alliance the way to solve them is through collaboration instead of arbitration or litigation. (van den Berg and Kamminga 2006)

CASE 5: THE ORIGIN ALLIANCE, AUSTRALIA

The Queensland Department of Transport and Main Roads (QDTMR) established the Origin Alliance project in 2008 to deliver the Ipswich Motorway Upgrade between Dinmore and Goodna, Australia. The motorway forms part of the Auslink National Network, providing a vital link between Brisbane, Sydney, Melbourne, and Darwin. As such, it forms the major freight corridor between the Port of Brisbane and Brisbane's southern industrial hub and interstate destinations. The project was funded by the Australian federal government and it is being delivered by the QDTMR. The Origin Alliance was formed to deliver the project and comprised QDTMR, Abigroup, Fulton Hogan, Seymour Whyte Constructions, SMEC Australia, and Parsons Brinckerhoff. Construction of the AU\$1.95 billion Dinmore to Goodna Upgrade was officially announced on June 30, 2009. The upgrade is one of the largest Alliance projects in Australia, with the staff, workforce, and contractors to exceed more than 1,000 individuals at peak times. It represents the largest federally funded road project in Queensland.

Value: AU\$1.95 billion

Start: 2009

Completion: 2012

Scope: The project featured widening of the motorway to a minimum of six lanes (three in each direction), and construction of an extensive network of new service roads designed to improve local access as shown in Figure 11. It included 7 km of new service roads adjacent to the motorway to separate local slower moving traffic from fast flowing motorway vehicles, 25 km of shared pedestrian pathways, and bicycle lanes. The upgrade also included construction of 26 new bridges, five of which are new pedestrian/bicycle facilities. An intelligent transport system was added to pro-



FIGURE 11 Origin Alliance project layout (KBS 2014).

vide increased driver safety and road conditions information to motorway users while also ensuring more effective management of the motorway long into the future.

The project required 1.67 million cubic meters of earthworks, as well as 500,000 tons of asphalt. Detailed traffic modeling and ongoing consultation with stakeholders were needed to successfully implement all traffic detours and temporary closures. Complex construction scheduling accommodated traffic flow and minimized property impacts.

Organizationally, there was a challenge in bringing together a large group of people from six alliance partners, all of which were very different organizations, culturally, in size, and experience-wise, into one cohesive team.

Challenges: The new highway is partially located on top of three abandoned underground coal mines that are up to 80 m deep. To remedy this, a sub-alliance team was formed that included specialist mine-filling contractors. A purpose-built concrete mixing plant near the site produced the specially designed grout used to fill the mines. It was necessary to use innovative technology to meet the project quality requirements. Organizationally, there was a challenge in bringing together a large group of people from six alliance partners, all of which were very different organizations, culturally, in size, and experience-wise, into one cohesive team. The most challenging constraint for the project was the construction corridor itself, which is used by more than 90,000 vehicles every day, 13% of which are heavy vehicles. The project needed to be constructed in an extremely narrow construction corridor, with significant Queensland Rail assets and the Brisbane River on one side and established businesses, industry, and residential suburbs on the other. In addition, the upgrade had to be delivered under live traffic conditions, with a requirement to keep two lanes of traffic open in both directions during peak traffic periods.

Rationale: The project was complex and had an unknown scope relating to the filling in of the mines. Traffic disruption was required to be minimized.

Procurement: Traditionally, alliances are formed ahead of the tender process so that the associated risks and rewards can be shared as well as strong working relationships formed before construction commences. In this case, the QDTMR selected five organizations that it wanted to work with on the project and then asked them to forge an alliance. One of the main reasons was to provide two smaller-sized contractors with access to a “mega-sized” project to enhance the capabilities of the local construction industry in Queensland.

During the execution, a sub-alliance contract was made with specialist mine-filling contractors, while an expert panel provided guidance on the mine-filling process. In a traditional

subcontract, a specialist subcontractor would be employed with a set of unit prices for every item in the scope. That subcontractor would then have more incentive to increase the scope of the works than they would have to reduce it. With this refined sub-alliance contract, the pain/gain share component incentivizes all to control or reduce the scope.

Contract pricing: The original cost of the overall project was AU\$1.95 billion, including all design and construction works. The overall project was delivered approximately 10% under budget.

Key performance indicators: During project start-up, the agency defined a set of KRAs based on the most important non-cost project items. Over the life of the project, each KRA was independently measured using a set of detailed KPIs. The KRAs were:

- KRA 1—Traffic Flow Safety
- KRA 2—Traffic Flow Reliability
- KRA 3—Community and Stakeholders
- KRA 4—Connectivity and access during construction
- KRA 5—Design Optimization and Maintenance Minimization.

Summary: Despite the major impacts of the January 2011 floods on the motorway and project site offices in Queensland, the project was completed six months ahead of schedule and 10% under budget. It included the remediation of three abandoned coal mines, 7 km of new service roads, the widening of 8 km of rebuilt motorway with three lanes each way with room for four in the future, 24 km of shared pedestrian pathways and cycle ways, and 26 new bridges. The work was carried out in traffic volumes of more than 90,000 vehicles/day.

CASE 6: MIDLANDS HIGHWAY ALLIANCE, LEICESTER COUNTY, ENGLAND

In the United Kingdom there are several different types of Highway Agency contracts in use; Early Contractor Involvement (CMGC), Design and Build (DB), Managing Agent Contractor (CM-Agent), individual (DBB), Private-finance (P3), and Frameworks (IDIQ) (Highways Agency 2012). However, alliancing between public agencies and the private-sector designers and construction contractors is not currently used in the transportation project procurement by the Highways Agency.

In the United Kingdom, the construction industry has a statutory right to adjudication in order to speed up the resolution of disputes, reduce costs, and promote dealing with disputes in a more commercial way. This agrees with the principles of partnering and alliancing should a dispute arise. Outside of the United Kingdom, many countries whose procurement procedures are based on English Common Law have sought to adopt “no disputes” clauses. These have become increasingly common in alliancing agreements in Australia, where

the parties agree not to litigate their differences other than in instances of willful default. However, the drafting of these clauses has given rise to some concern and, as is the case under English law, care must be taken so that a no disputes clause does not preclude litigation completely, thus rendering the clause void for ousting the jurisdiction of the courts.

One solution suggested in Australia is to draft an exclusion clause that excludes any liability (tortious or contractual) other than for willful default. However, under English law this approach may be subject to the constraints of Unfair Contract Terms Act 1977, the effect of which may be to render such a clause unenforceable. An alternative solution might be to draft procedures and preconditions aimed at the resolution of disputes that the parties must satisfy before they resort to litigation. This can even extend to the parties agreeing that no right of action may accrue until a third party has reviewed the dispute. The intention is to avoid recourse to external dispute resolution by providing for the means for resolution within the agreement. What is clear is that some form of dispute resolution is required.

The U.K. Highways Agency produced a “Collaborative Alliance Toolkit” to be used for creating alliances among public agencies to procure highway maintenance services for long periods of time and to achieve economies of scale by banding together (Highways Agency 2012). The Midlands Highway Alliance (MHA) was formed in 2007 as an “unincorporated association by agreement of East Midland highway authorities (13 in number) and the Highways Agency” (Highways Agency 2012).

Value: £130 million as of November 2011; expected to deliver nearly £300 million when its term expires in 2014.

Start: 2007

Completion: Ongoing

Scope: The MHA is oriented toward highway maintenance in much the same manner as a U.S. indefinite delivery/indefinite quantity contract. The alliance has working groups that focus on the following six categories of the MHA’s scope:

1. Major schemes (projects and developments costing £12 million–£50 million).
2. Medium schemes (projects and developments up to £12 million).
3. Term maintenance (performance-based maintenance contracts let on an area basis).
4. Professional services (planning, design, etc.).
5. Commodities (bulk materials purchases).
6. Skills Academy (learning and development for alliance member personnel).

Challenges: The MHA was the first of its kind in the United Kingdom. It took two years to develop and implement the

first agreement among the original ten members and another 18 months to execute the medium schemes procurement framework. A political action plan was required to gain the necessary political support to move to “open books accounting” and to deal with the labor union issue created by outsourcing maintenance work previously completed by public employees.

Rationale for choosing alliancing: A new national policy produced British Standard BS11000: Collaborative Business Relationships that was designed to achieve the following:

- The creation of new value that could not be achieved by working independently—all share the benefits.
- The development of a joint strategy and objectives.
- Working through a joint Management Team.
- The joint management of risks.
- Formal knowledge sharing.
- Better collaboration skills and competencies.
- Continual innovation through a structured approach.
- An understanding of how and when to bring the relationships to an end (Highways Agency 2012).

The new policy created the statutory environment that permitted smaller public entities to join forces to gain a more competitive position in the highway maintenance and construction supply chain.

Procurement: This does not apply to the formation of the MHA. However, the alliance is authorized to procure major and minor scheme contracts, as well as term maintenance contracts using any of the methods listed in the first paragraph of this case example.

Contract pricing: Each alliance member must contribute £200,000 per year to operate the alliance overhead and then is responsible for paying its fair share of construction and maintenance project costs.

Key performance indicators: The major KPI categories are as follows:

- Achieving business plan outcomes including total savings and nonquantifiable benefits.
- Implementing “hard” measures (e.g., achieving business plan and sharing of innovation and efficiencies).
- Implementing “soft” measures (such as the annual questionnaire).
- Sharing innovation and efficiencies—number being used by at least one other authority.
- Emphasizing the increase of efficiency savings to expenditures.
- Updating the outcomes of an annual questionnaire to each authority—seeking to measure trends for increased usefulness, added value of the alliance, and satisfaction of members.
- Providing more joint services—increasing on the previous year and/or more authorities involved.
- Increasing training (Highways Agency 2012).

Summary: Simply put, it is illegal for the UK government to take away the contractor’s right to sue for damages. Thus, the MHA functions as an umbrella organization that advertises, awards, and administers contracts for highway construction and maintenance for its members. Although this eliminates the benefit of enhanced collaboration found in an alliance formed with public and private members, it does create a situation where various political entities agree not to interfere with each other’s infrastructure improvement and maintenance programs. Therefore, it is included as a potential variation on the alliancing theme, which might be considered in North American projects where numerous municipal, county, state, and federal agencies have a high probability of conflict during the planning, design, and construction process. It would also appear to be a potential candidate for projects such as bridges that cross state boundaries to reduce potential conflict between adjoining agencies.

CASE 7: THE AUCKLAND MOTORWAY ALLIANCE, NEW ZEALAND

On October 1, 2008, the Auckland Motorway Alliance (AMA) began a 10-year contract to operate and maintain the Auckland Motorway Network. The AMA is responsible for the maintenance and operation of the Auckland Motorway network and State Highway 22 (SH22). The Auckland Motorway system extends for more than 230 km and has more than 50 interchanges and 170 bridges. It carries more than 900,000 vehicles each day; more than 8% of the nation’s traffic. The pavement area is expected to increase by 21% over the next 10 years. Until October 2008, maintenance and operational management was provided through approximately 60 contracts. The work includes renewals and special projects, but not large capital projects or planning issues. The primary objective of the AMA is to provide a motorway network that allows road users to travel to their destinations comfortably, safely, and quickly at all times of the day and night. The AMA is a formal Alliance led by the NZTA, with Fulton Hogan, Opus, Beca, Resolve Group, and Armitage Systems Ltd. There are approximately 60 staff members in the Greenlane toll collection office plus site crews who carry out the physical maintenance and operations work. There are nine management team members including an alliance director. There is also a leadership team made up of senior directors and executives from the partner companies.



The Auckland Motorway Alliance began a 10-year contract to operate and maintain the Auckland Motorway Network.

Value: NZ\$48.8 million

Start: October 2008

End date: July 2018

Scope: Operations and maintenance of the Auckland tolled motorway network.

Challenges: The objectives of the AMA are to manage and deliver the maintenance and operations of the network to:

- Maximize the efficiency of the motorway and wider Auckland transportation network,
- Deliver excellent service to our customers and stakeholders,
- Create a positive legacy,
- Deliver value for money, and
- Grow our people.

Rationale for choosing alliancing: NZTA chose alliancing because of the complexity of the Auckland motorway system infrastructure. The focus of the maintenance effort needed to be on stakeholders. NZTA wanted to leave a lasting positive legacy, which it believed was possible by sharing the alliance risks among all involved parties. Also, the alliance model provides all alliance participants with incentives to innovate and exceed required performance measures.

Procurement: In August 2007, an industry outreach meeting was held for all interested parties, followed by the submission of a Statement of Interest and Ability (SIA) and shortlisting of candidate teams. After the Request for Proposals (RFPs) went out, the selection of the preferred candidate and the negotiation of the interim alliance agreement was finalized in October 2007 and executed in April 2008. This started the development of the forward works program and the TOC estimation by the preferred partners. After further negotiations the Alliance agreement was signed in October 2008.

Contract pricing: In the proposal the teams listed rates for selected activities. These rates were applied to the estimates of work, which resulted in the first TOC. The TOCs are benchmarked every three years. Three TOC periods have been defined for the AMA contract: TOC 1—the first 3.75 years; TOC 2—3 years; and TOC 3—3 years (OAG 2011).

Key performance indicators: The AMA has five specific KRAs for the purposes of measuring the AMA achievements. The KRAs relate the following five overall objectives to the AMAs.

1. Maximum network efficiency,
2. Customer and stakeholder driven organization,
3. Positive legacy,
4. Value for money, and
5. Healthy organization.

Each KRA score is calculated by measuring the performance against KPIs to determine performance, which ranges from unsatisfactory, through business as usual, to breakthrough. The KRA scores contribute to an overall performance score, calculated on an annual basis. The AMA's progress against its KRAs is reported monthly to the Alliance Leadership Team.

Summary: The AMA annual report for the year ending June 30, 2010, outlined its performance in achieving VfM against its objectives for the year. It also reviewed the progress made during the second year of the AMA. The annual report emphasizes that delivering enhanced VfM for the AMA is about five key components:

1. TOC (the budget set and agreed upon by alliance partners for a defined period),
2. Forward works program,
3. Levels of service,
4. KRAs, and
5. Risk.

In terms of the AMA's performance against its key VfM money components, the calculated provisional savings made against the TOC for the period to June 30, 2010, were NZ\$3.67 million. Also, the AMA's forward works program was delivered, levels of service were delivered in most areas, and all programmable risks had mitigation strategies in place despite some risks eventuating. The AMA also demonstrated a range of innovative approaches to its work systems and practices including, but not limited to, capturing and using detailed asset management information to enable asset managers to more accurately forecast cash flows and opportunities to optimize investment and making pavement resurfacing decisions lane by lane (instead of the entire width of the road), resulting in longer average surface life. At present, these innovations and good practice lessons are only informally disseminated throughout NZTA.

In its first full year of measurement, the AMA achieved a lower than anticipated overall KRA score of 57.99%. This was from a baseline of 50% and against a commitment to achieve 65%. The overall score was adversely affected by a high number of fatalities and serious injuries from motor vehicle accidents and low travel time reliability on the network, primarily as a result of new capital projects that were not the responsibility of the AMA. In November 2010, a clear strategy to improve the AMA's performance against its KRAs was agreed to. The strategy involved "champions" within AMA staff being assigned to prepare an improvement plan for each KRA measure. The strategy sets the overall KRA target score for June 2011 as 67.7%. In the March 2011 quarter, the AMA achieved 62.9%.

The AMA has a clear performance framework, is generally performing well across the wide range of its performance measures, and is demonstrating innovation in its work systems and practices. However, improvement is required to lift its performance against its KRAs. This case example highlights some aspects for NZTA to consider when measuring performance and promoting innovation—in particular, the need for:

- Continuing to closely monitor, on an ongoing basis, performance against KRAs;
- Ensuring that improvement plans identify what is required to improve those targets and who is responsible for making sure targets are met; and

- Capturing, disseminating, and, where applicable, having a process to formally implement innovative work practices and approaches from regions and network management areas throughout NZTA.

CASE 8: MANUKAU HARBOUR CROSSING, AUCKLAND, NEW ZEALAND

The Manukau Harbour Crossing (MHX) project constructed a key part of the Western Ring Route that links the cities of Manukau, Auckland, Waitakere, and North Shore by means of State Highway (SH) 20, SH16, and SH18, providing an alternative route to SH1. Driven by the upcoming 2011 Rugby World Cup, the NZTA adopted the competitive alliancing concept for the first time. The project covered the stretch of SH20 between the Mt. Roskill Extension in Hillsborough and Walmsley Road in Mangere shown in Figure 12, and resulted in improved travelling times for commuters into the Auckland CBD and improved access to the airport to create significant economic benefits for the region. Beca Infrastructure, Fletcher Construction, and Higgins won the competitive tender to join the NZTA in the alliance. The team was first formed several years ago on the first generation alliance project at Grafton Gully where the alliance partners had already worked together.

The Manukau Harbour Crossing was built to increase capacity for the 2011 Rugby World Cup. The Alliance was made of the same members as for the Grafton Gully Alliance, who leveraged that experience to accelerate the delivery of this critical project.

Value: \$180 million

Start: March 2008

Completion: August 2010



FIGURE 12 Manukau Harbor Crossing (NZTA 2012).

Scope: The scope for the project involved the widening of existing SH20 between Walmsley Road and Queenstown Road, modification and rebuilding of several existing motorway bridges, foot bridges, and the construction of a duplicate bridge over Manukau Harbor. A new interchange was also to be constructed at Gloucester Park.

Rationale: A competitive alliance was chosen by NZTA to alleviate political pressure to show that it was getting VfM in its mega-projects. In addition, the MHX was essential to providing the necessary capacity to accommodate the spike in traffic that would occur during the World Cup and as such the delivery schedule needed to be compressed.

Challenges: The major challenge for the project was the high public profile. The Rugby World Cup in 2011 meant that there was a hard deadline. Communication with the local communities was crucial because of the increased use of local roads for commuter- and construction-related traffic. There were also significant environmental design and construction constraints.

Procurement: The project was procured by the NZTA on a dual TOC basis. The dual TOC, termed a competitive alliance, is the core difference with a pure alliance model that chooses one project team that forms one TOC. The reason for the choice for competitive alliance was that there was pressure on the NZTA to demonstrate that it was obtaining best value for the project funded with public money. In this case, the alliance team had already delivered the Grafton Gully project (Case 3). This prior experience was cited by NZTA as one of the major contributors to winning the MHX contract. Having worked together at Grafton Gully meant that the project participants were familiar with other, understood their roles, and were aware of how they could contribute to the overall outcome of the project. The typical learning curve that exists between project participants at the start of any project was less acute on this project, and the trust and working relationships that had been created and developed at Grafton Gully continued to develop on MHX, an important lesson learned for other agencies that must justify their best value award decision and demonstrate a return on their construction procurement investment.

Contract pricing: After the award the competitive alliance is exactly the same as a pure alliance and it also uses the 3-Limb reimbursement structure shown in Figure 7. In a pure alliance, the TOC is confirmed by an ICE, whereas in a competitive alliance the agency has two project teams that propose a TOC and chooses one. Subsequently, the NZTA relies on competition for the VfM criterion.

Key performance indicators: After selection it took two months to develop and agree on the KRAs and award the

project. The NZTA saw the KRAs as integral to driving the Alliance’s performance. The six KRAs at MHX were:

1. Schedule,
2. Stakeholder engagement,
3. Environmental,
4. Traffic management,
5. Quality, and
6. Safety.

Having the relevant measures and reporting them on a regular basis enabled the MHX team to empower individuals to meet shared Alliance goals. Ongoing benchmarking throughout the project enabled inflexible targets to be set and the clock was “reset” when these targets were reached. Ultimately, this approach drove behaviors and was a significant factor in enabling the project to be delivered seven months early and having very low rework rates.

Summary: The project was delivered within budget and seven months ahead of schedule and considered a success. The competitive alliance model was successful in demonstrating VfM as hoped and relieved some of the political pressure on the project’s alliance team.

CASE 9: CHANNEL DEEPENING PROJECT, VICTORIA, AUSTRALIA

The Port of Melbourne Corporation (hereafter referred to as the Port) is Australia’s largest container port and the Channel Deepening Project was undertaken to make the Port accessible to larger vessels carrying heavier container loads. The result was an increase in allowable vessel draft from 11.6 to 14.0 m.

The alliance had only two operational members: the Port of Melbourne and an international dredging contractor with internal design capability, making a bipartite alliance agreement rather than the more common Australian tripartite alliances.

This case was included in the synthesis to demonstrate a successful example of using an independent entity outside the alliance contract to oversee environmental compliance in a project fraught with environmental challenges as well as a high degree of public scrutiny. The case also demonstrates how the alliance, as a corporate entity, can issue DB contracts to deliver features of work that require special expertise to design and install.

In this case, the alliance essentially had two operational members: the Port and an international dredging contractor with internal design capability. Therefore, there was no separate design consultant in the contract and this was a bipartite

alliance contract rather than the more common tripartite contracts seen in Australian alliances.

Value: AU\$969 million

Start: December 2007

Completion: November 2009

Scope: The project’s major feature of work was the dredging and disposal of more than 22 million cubic meters of sand and silt. It also included berth upgrades, installation of new navigational aids, and the protection of utility services in the channel.

Challenges: The major challenge was to comply with Australian environmental regulations during the dredging process, which were considered to be Australia’s “most stringent ever” (Albanese 2010). The other challenge involved sequencing the work in a manner that minimized operational conflicts with cargo traffic entering and departing from the Port.

Rationale for choosing alliancing: The Port’s rationale is detailed in the following:

The complexity of the Channel Deepening Project, the degree of research and innovation required and the nature of the global dredging market were key qualitative factors that led to the Port selecting a project alliance as the preferred procurement method. Within the alliance framework these conditions also required alignment of the culture, values and commitment of the parties in the alliance. The Port’s procurement decision was validated by the Victorian Auditor General’s Office. (Albanese 2010)

Procurement: The project was delivered using a classic alliance model with a governance board called the “Project Taskforce” made up of the following stakeholders:

- Port—the owner;
- RBW—the contractor with in-house design;
- Representatives from the State of Victoria’s Departments of Transportation, Sustainability, and Environment; Premier and Cabinet; Treasury and Finance; Industry; Innovation and Regional Development; and Primary Industries;
- An independent Office of the Environmental Monitor to oversee environmental compliance;
- Project Stakeholder Advisory Committee made up of local community and environmental groups; and
- Dive Industry Liaison Group to oversee safety of the construction of underwater marine works.

Cost overruns are split 50/50; however, this is capped to the Limb 1 level to address the risk to the contractor of unforeseen circumstances. This is different than Case 1 where it was capped at Limb 2.

The alliance also developed and awarded several large DB contracts for the design and construction of specialty marine features of work such as the navigation aids and features constructed entirely underwater by divers. In these contracts, the alliance was the “owner” and the partners to the alliance shared the risks and rewards of the performance by the DB contractors with regard to schedule milestones, environmental compliance, and design and construction quality.

Contract pricing: The project utilized a classic contract pricing structure similar to the one described in Figure 7, which consisted of:

- **Limb 1—Direct Costs.** This covers plant, labor, and materials and totally excludes profit and overheads. Limb 1 was calculated by the contractors and paid on a monthly basis.
- **Limb 2—Offsite Overheads and Profits.** This was agreed to at the time the alliance agreement was executed and based on industry norms. This margin is applied to Limb 1—again calculated and paid on a monthly basis.
- **Limb 3—Pain-Gain Sharing.** This is based on the savings or cost overruns that occur. Savings are split as a profit share of 50/50 between the agency and the alliance partners. This is an uncapped amount. Cost overruns have the same split; however, this is capped to the Limb 1 level (note this is different than Case 1 where it was capped at Limb 2) to address the risk to the contractor of unforeseen circumstances, most likely from environmental issues or container vessel traffic conflicts that are outside the contractor’s normal risk profile.

The project also developed a Pool of Key Results that included AU\$137 million that would be used to pay incentives to alliance subcontractors for meeting or exceeding their individual performance measures.

Key performance indicators: In addition to the KRAs mentioned previously there were also 150 environmental KPIs monitored by the Office of the Environmental Monitor and 60 project delivery KPIs dealing with construction quality, timely delivery, and project safety record.

Summary: This alliance is an interesting example of how flexible an alliance arrangement can be structured. In this case, because the high degree of specialized expertise involved the public, the owner decided to ally with an industry partner that had the capability to conduct both the design and construction with internal resources. Then the Alliance awarded a series of DB contracts for the major features of work that were not within the contractor’s expertise. Finally, it surmounted the barriers formed by the environmental issues by setting up an independent watchdog to monitor and measure the alliance’s performance by means of a comprehensive list of KPIs. The alliance then shared all gains and losses equally and eventually finished the project one month ahead of schedule and nearly AU\$200 million below its AU\$969 million budget. Finally, it encouraged honest, open

communication both within the alliance and with its external stakeholders through its community advisory council and dive industry liaison group. In the words of Nick Easy, the alliance’s executive director, “. . . while the focus of the alliance is on developing a strong relationship, it is critical that the alliance partner be incentivized in the agreement to perform in an efficient and effective manner in order to optimize costs and project outcomes such as schedule and compliance. . . . [This fosters a] true partnership, where shared culture, values, work ethic and commitment were fundamental to the success of the alliance” (Albanese 2010).

CASE 10: SR 519 INTERMODAL ACCESS PROJECT, PHASE 2: ATLANTIC CORRIDOR, SEATTLE, WASHINGTON

This project is the only U.S. project known to the authors where a DOT, in this case the Washington State DOT (WSDOT), attempted to implement alliance contracting. WSDOT needed to execute this project under its existing statutory authority. Therefore, they called the project delivery method, “Enhanced Design-Build” (Tharp 2009). Even though WSDOT had executed a robust industry outreach plan and had crafted the procurement to address the major issues, the department “at the eleventh hour—switched back to [a] conventional Design-Build Template” (Tharp 2009) and delivered the project using its conventional DB procedures. This project is included in the report because it not only demonstrates that given necessary internal support alliancing can be implemented under U.S. legal and statutory constraints, but also furnishes a potential template for structuring an alliance contract procurement process.

Value: \$66 million

Start: October 2008

Completion: November 2012

Scope: The project’s scope provides a more direct route between I-90 and I-5 and the Seattle waterfront as shown in Figure 13, including:

- Providing a new off-ramp for westbound traffic;
- Making waterfront access more efficient for freight and other vehicles;
- Improving safety and mobility by separating vehicles and pedestrians from railroad traffic on Royal Brougham Way by means of a grade-separated crossing;
- Improving the intersections at First Avenue South and South Atlantic Street; and
- Improving intersections at Occidental Avenue and South Atlantic Street.

Challenges: Figure 13 illustrates the challenges that drove WSDOT to consider alliancing. This is but a partial list of the issues that needed to be resolved to deliver this project:

- Two professional sports arenas that depend on the project infrastructure to provide access and egress for their fans.

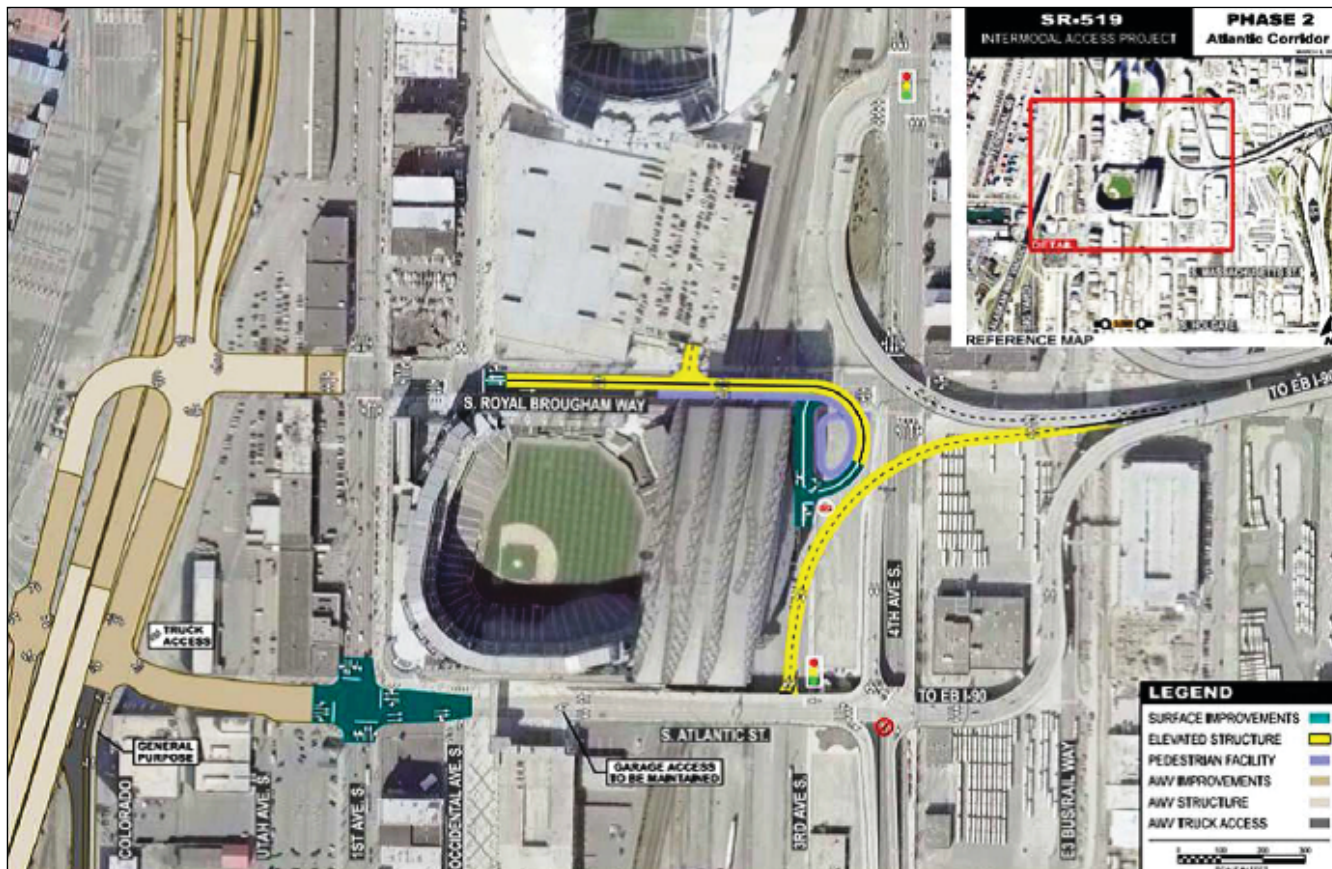


FIGURE 13 SR 519 Intermodal Access Project, Phase 2 (Tharp 2009).

- Parking traffic movements from several urban parking structures that fill and empty at rush hours; port and truck traffic that cannot be interrupted.
- Old underground utilities.
- Operation of a central bus terminal plus a new light rail system scheduled to be constructed during the same period.
- City of Seattle ownership of portions of the project.
- Undefined architectural requirements resulting from the massive numbers of major and minor stakeholders impacted by the project.
- An insufficient budget.

Rationale for choosing alliancing: WSDOT was hoping to get early stakeholder buy-in by means of the alliance as well as the following benefits:

- Provide early contractor involvement in design;
- Create a stronger partnership between owner, design, and builder;
- Reduce proposal development requirements;
- Provide incentives to encourage innovation and efficient delivery;
- Share risks appropriately;
- Select contractor on combination of project approach, capability, and fee structure; and
- Demonstrate viability of alliancing approach in the field.

Procurement: The project was not finally delivered using alliancing; however, the procurement plan if it had been allowed to proceed as planned included the following:

- Responses to Request for Quotation (RFQ) expected to include
 - Project Team—Firms, key personnel, organization
 - Relevant project experience.
- Responses to RFP expected to include
 - Fee structure
 - △ Contractor costs included in fix fee versus contract work overhead
 - △ Rate included in contract work overhead
 - △ Fixed fee
 - △ Other pricing considerations.
 - Project Management Plan—identify and address risks
 - Traffic Management Plan
 - △ Other areas under consideration—Safety Management Plan, Environmental Compliance Plan, Quality Control/Quality Assurance (QC/QA) Approach.
- Contractor interview would include questions relevant to management and delivery of the project/
- Final selection would be combined proposal and interview.

Contract pricing: The proposed alliance pricing structure is shown in Figure 14.

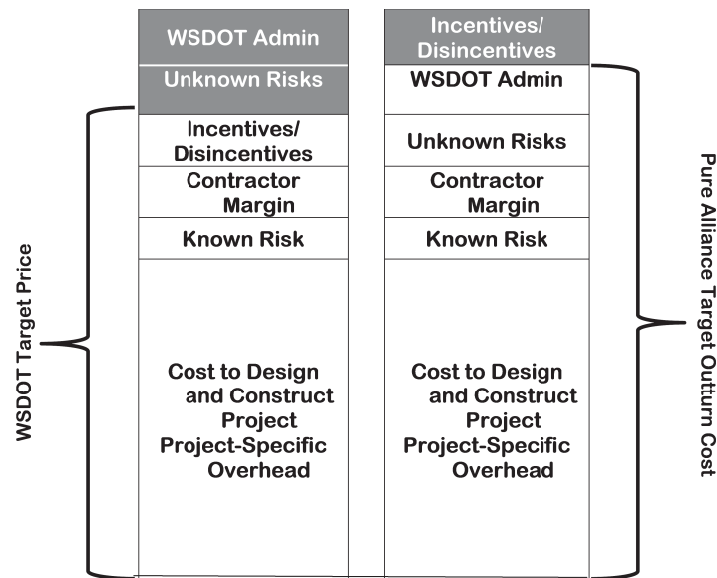


FIGURE 14 WSDOT Target Price Components versus Pure Alliance Target Outturn Cost.

The structure is broken down as follows:

- Elements in the target price
 - Contractor margin (fee)
 - Incentives
 - Risk (known)
 - Cost to construct
 - Cost of design
 - Project-related overhead
 - Risk management.
- Elements not included in the WSDOT target price:
 - Unknown risks would be outside of target price
 - Disincentive would need to exclude changed conditions
 - WSDOT direct costs for project administration
 - Agency contingency for owner’s share of overrun and to cover changed conditions.

Key performance indicators: None were established for this project.

Summary: The previous scheme was presented to industry and their feedback indicated a cautious acceptance of the change, especially if the amount of pre-award engineering was minimized. The industry requested that the Phase 1 prequalification process be kept short and simple, with limited key personnel requirements, and be no more than 20 pages in length. Industry feedback indicated that the target price concept would be fair if WSDOT provided the number and industry were then allowed to propose their own margin, risk allocation, incentive distribution, and design and construction costs. They indicated that they would support the procurement if WSDOT could accelerate the selection process and not compel them to tie up resources for an extended period of time. This leads to the conclusion that

implementing alliance contract project delivery can be done in the United States under most of the current statutory constraints on procurement.

CASE 11: U.S. FEDERAL ACQUISITION REGULATION ALLIANCING CONTRACT ANALYSIS

This case is not project-based; it is an analysis of the potential to implement alliance contracting in the U.S. federal sector under the provisions of the Federal Acquisition Regulation (FAR). It is included in the synthesis because it is the only literature that directly addresses U.S. constraints on implementing the principles of alliance contracting. It is also included because it compares alliancing with the IPD contract, a three-party contract promulgated by the AIA and thought by some to be the U.S. analog for alliance contracting.

The analysis is limited to the application of alliance contracts on federal military construction projects. As a result, the conclusions reported in the case example are limited to that sector and may not apply to individual state DOT statutes that govern alternative project delivery. Therefore, it is quite possible that some of the constraints cited in the federal study may not be present in a given locality. In addition, although federal-aid highway projects are subject to federal provisions, this case example is based on the Department of Defense (DoD) supplement to FAR and further supplemented by the U.S. Air Force (USAF) FAR supplement. The U.S. DOT and FHWA are bound to 23CFR in procurements, which although similar to the DoD supplement, is not identical. Thus, the reader must be careful to not jump to conclusions without individual research into local procurement statutes to clearly outline local constraints and applicable

regulatory and policy proscriptions. Nevertheless, the methodology used by Johnson et al. (2013) provides an excellent example of how to conduct this type of analysis at the local level and the reader would be well served to read the entire paper before conducting her/his own analysis of the applicability of alliance contracting to the local procurement system.

Introduction

The USAF Institute of Technology was commissioned to evaluate the potential of developing a DoD infrastructure procurement contract that was based on the underlying principles to alliance contracting as applied internationally (Johnson et al. 2013). The project's objective was as follows: "This research aims to determine if an alliancing contract can be effectively utilized in federal construction and, if so, to create a framework under which federal agencies can utilize the advantages of alliance contracts within existing regulations" (Johnson et al. 2013).

The research also started with the premise that the AIA standard contract for IPD, termed AIA C191, appeared to be a logical analog to assess since it was a three-party contract and touted to be highly collaborative (AIA 2010). The project also evaluated the applicability of the ConsensusDOCS 300 Contract *Standard Form of Tri-Party Agreement for Collaborative Project Delivery* (2007). The authors of the study then evaluated both contracts against the five primary principles of alliance contracting: (1) joint decision making; (2) shared risk; (3) budget development and management; (4) pain/gain sharing and incentives; and (5) dispute resolution (Love et al. 2011). They found the ConsensusDOCS contract to be much closer philosophically to a typical international alliance contract from Australia than the AIA's version of IPD.

Lastly, the U.S. contract documents' "alliancing elements" were compared with FAR Subpart 16.403-2—Fixed-price Incentive (successive targets) Contracts, the seemingly closest model to the Australian contract and, using the ConsensusDOCS contract as a model for U.S.-based contract clause language, evaluated the potential of being able to implement a U.S. federal version of alliance contracting compliant with FAR Subpart 16.403-2. The analysis was conducted using a rigorous protocol appropriate to the problem and published in the *ASCE Journal of Construction Engineering and Management* (Johnson et al. 2013), indicating that it stood up to a top notch peer review.

Results of the Study

Table 13 shows the results of the final analysis. One can see that there appear to be about as many impediments to adapting the alliance contracting principles in the U.S. federal contracting arena as there are facilitators. The chief barrier to implementation is probably the lack of litigation as the ultimate remedy for dispute resolution. It can be posited that the government cannot legally make itself immune to

litigation in construction contracts. However, this ignores a key founding principle in public contracting called sovereign immunity. This fundamental principle is based on the premise that a citizen cannot sue the government for damages unless it waives its immunity and consents to the suit (Sisk 2008). Hence, to the uninitiated it would at least appear that the authors of the study are technically wrong; however, to be fair the cost of government construction contracting would skyrocket if statutory waivers of sovereign immunity were not routine. Therefore, one must assume that the study's authors were taking a pragmatic rather than theoretical perspective.

The conclusions reached by Johnson et al. (2013) are synopsized in Table 13. They are organized by the alliance contract principle. The remarks in the table are comments made by the synthesis authors with regard to the potential impact of common state-level statutes on the same alliancing principles. The remarks should not be taken as definitive owing to the great diversity of state statutes in effect in the nation. They are merely professional opinions on potential barriers to implementing alliance contracting by a typical state DOT.

Conclusions

The analysis described in Table 14 concludes that implementing alliance contracting will be complex but not impossible. Like most alternative delivery methods, it will require a DOT to specifically seek enabling legislation. However, that legislation will not be restricted to providing for a modification in open competition rules as has been the case in past initiatives to implement DB and CMGC delivery. The enabling legislation for alliancing will require a thorough investigation of statutes that may be impacted to ensure that the legislation is broad enough to address the issues shown in Table 14 as well as any other that might be peripherally impacted with the potential to create implementation problems.

The second conclusion is that states that currently have authorization to enter into P3 contracts may be best served by modifying that authorization rather than seeking explicit authority for alliance contracting. The advent of CMGC found some DOTs, such as the Arizona and Utah DOTs, as well as the Maryland State Highway Administration (West et al. 2012) were able to implement that method without the need to gain additional authority, because existing statutes governing best value selection or initially enacted for use in public building procurement were sufficiently broad as to allow CMGC without modification.

Lastly, the earlier analysis leads one to infer that although full-scale alliance contracts such as the ones described in the project case studies may be impossible without specific enabling legislation, there are aspects of the alliance concept that can be successfully implemented within current alternative contracting methods that will add value by increasing

TABLE 13
COMPARISON OF CONSENSUSDOCS 300 CONTRACT CLAUSES TO FAR REQUIREMENTS

Article	Impediments	Facilitators
Tri-party Agreement Article 1	<ul style="list-style-type: none"> No precedent for binding tri-party contract Competitive selection required by FAR Possible organizational conflict of interest 	<ul style="list-style-type: none"> Similar to FAR DB method Possible use of associate contractor agreement*
Shared Risk Article 3	<ul style="list-style-type: none"> 3.8.2.1, 3.8.3 limitations on hazardous indemnification authority not compatible with FAR 3.8.2.1-3 FAR claims cannot be limited in some cases 3.8.3 FAR requires damages under certain conditions 	<ul style="list-style-type: none"> 3.8.2.1, 3.8.3 similar to FAR limitations on indemnification apply to unusually hazardous only 3.8.2.2 similar to FAR equitable adjustments
Management Group Article 4	<ul style="list-style-type: none"> 4.6—FAR requires contracting officer approval required for decisions 	<ul style="list-style-type: none"> 4.1/4.6—Parallel existing FAR mandated contractor/government relationship precedents 4.1/4.6—Compatible with FAR mutual agreement policy 4.6—The Article owner’s final determination allows for contracting officer approval
Budget, Compensation Incentives, and Risk Sharing Articles 8–11	<ul style="list-style-type: none"> 8.1.1 conflicts with FAR restriction on contract types 8.1.1 lack of price competition conflicts with FAR 8.1, 8.3, 11.4, 11.5 limitations on incentive contracts 	<ul style="list-style-type: none"> 8.1, 8.3, 11.4, 11.5 adaptable to FAR contract types 11.2, 11.3 similar to FAR incentive programs
Dispute Resolution Article 23	<ul style="list-style-type: none"> 23.3-5 conflicts with FAR requirement that alternative dispute resolution must be voluntary 23.5 conflicts with FAR strict limits on binding arbitration 	<ul style="list-style-type: none"> 23.3-5 FAR precedence for alternative dispute resolution 23.3-4 similar to FAR neutral party resolution

Adapted from Johnson et al. (2013).

Note: First clause number (e.g., 4.6) identifies ConsensusDOCS 300 clause number affected (Article 1 is a single clause).

*An Air Force agreement (not a binding contract) that requires the contractor to share information, data, technical knowledge, expertise, or resources (USAF 2013).

the current level of collaboration between the state and its contractors. For example, risk can be shared in a lump sum DB contract by adding unit pricing for elements that are difficult to quantify before design, as was done by the Montana DOT (McLain et al. 2014). WSDOT effectively employs a pain/gain sharing scheme in its DB differing site conditions clause, which caps the design-builder liability to a specific amount above which the state assumes responsibility (McLain et al. 2014).

Summary

The Air Force Institute of Technology analysis of alliancing raises a number of issues that public transportation agencies must consider if they are interested in developing an alliancing contracting program of their own. It shows that, at least at the federal level, alliancing can be implemented after the FAR constraints are addressed; to do so will likely take some years of work to acquire the requisite FAR waivers, changes, or interpretations. Thus, it cannot occur overnight. Nevertheless, selected alliancing concepts can be implemented immediately to enhance collaboration and accrue the documented benefits that research has shown come with integrated delivery of highway construction projects (FHWA 2006).

CASE STUDY ANALYSIS

To properly understand the concept of applying alliancing as practiced internationally in the U.S. context one must first examine the challenges each project contained and then match that with the tools employed to meet those challenges. In doing so, the characteristics of the project can be mapped with the agency’s motivation for employing this project delivery method on the given case example project. In this instance, the major challenges captured in each case example will be compared with the KRAs developed by each agency to measure the performance of the alliancing. Although the rationale for using alliancing was also collected, this is perceptual information, whereas the KRAs are hard contractual requirements.

Table 15 synthesizes the challenges that have been reported. Interestingly, scale is not reported as a main issue here although no project was smaller than \$NZ67 million. Maintenance of traffic during construction was cited as a challenge in eight of ten cases. That was followed by the need to manage stakeholders throughout the projects and to deal with complexity and the need for innovation to achieve project success. Alliance contracts are relational contracts (Lahdenperä 2012) and as such depend on creating positive

TABLE 14
CONCLUSIONS REACHED IN THE FAR ALLIANCE CONTRACTING STUDY

Alliance Contract Principle	FAR Implementation Issues	Remarks on Potential State Implementation Issues
Tri-party Agreement	<ul style="list-style-type: none"> • Competition requirement—FAR mandates two competitive solicitations to procure design services and construction services. • DB results in a 2-party agreement. • USAF associate contractor agreements are not binding. 	<ul style="list-style-type: none"> • Competition requirements in state statutes will play a large part in whether or not a given agency can enter into a tri-party alliance contract. • Unsolicited P3 proposals may provide precedent for entering into noncompetitive agreements. • No precedent available for a public agency joining a joint venture and forming a legal entity. Would probably require enabling legislation. • P3 agreements may provide a de facto tripartite agreement.
Shared Risk	<ul style="list-style-type: none"> • FAR limits owner’s ability to indemnify its contractors to only cases where “unusually hazardous conditions” exist. Would not apply in most construction contracts. • FAR mandates recovery of damages like liquidated damages. • FAR guarantees contractor’s right to claim damages caused by the government. 	<ul style="list-style-type: none"> • State statutes on limits on indemnifying its contractors may parallel FAR restrictions and create the same implementation issue. • State and agency regulations on recovering damages suffered as a result of contractor-induced situations parallel the FAR mandate. • State and agency regulations on contractor rights to promulgate a claim may create same implementation issues.
Joint Decision Making	<ul style="list-style-type: none"> • FAR mandates that all contract decisions be made by the contracting officer alone. • Could be implemented on a contract-by-contract basis if pre-approved at USAF HQ-level. 	<ul style="list-style-type: none"> • State statutes can be more or less restrictive than the FAR mandate and will need to be assessed individually. • Internal resistance to relinquishing decision making will form a barrier to implementation.
Pain/Gain Sharing	<ul style="list-style-type: none"> • FAR fixed-price incentive (successive targets) contracts provide for this scheme. • FAR does not allow limiting contractor liability to its profits and overhead. • FAR requires that incentives be formally found to be in the government’s best interest. 	<ul style="list-style-type: none"> • State statutes may restrict or prohibit pain/gain sharing. Most do not allow the owner to forgive damages caused by its contractors. • State statutes generally do not permit agencies to limit the liability of its contractors.
Dispute Resolution	<ul style="list-style-type: none"> • FAR permits direct discussions, mitigation, and mediation of disputes. • FAR severely limits the use of binding arbitration. • FAR guarantees a contractor’s right to litigation. Voluntary waiver of that right might be impossible. 	<ul style="list-style-type: none"> • State statutes can be more or less restrictive than the FAR provisions and will need to be assessed individually. • As a general rule most state statutes permit most forms of Alternative Dispute Resolution.

Source: Johnson et al. (2013).

relationships between organizations and the people that are involved with the project as well as those that are affected by the project. While maintenance of traffic may appear like a technical challenge, it is really a work zone safety issue and requires that the plan be accepted as sound by all members of the alliance and communicated to the traveling public, the impacted stakeholder, to gain their acceptance, which if done well, causes many commuters and commercial truckers to decide on a self-imposed detour to avoid the project during construction when possible. Hence, the stakeholder management is partially linked with the traffic planning.

The use of alternative delivery methods to manage complexity was first documented in the SHRP 2 R-10 project on strategies for complex project management (Shane et al.

2011). That study found that 15 of 18 case study complex projects resorted to nontraditional project delivery methods to build project teams. The Northern Gateway Toll Road alliance case was one of the projects included in that research. Complexity theory maintains that complex project management must be conducted at the “point between order and chaos where the system gets the benefit of some level of chaos and the resulting creativity whilst the system still has enough order to survive, maintain coherence, and specialization in some functions” (Remington and Pollack 2007). The SHRP 2 R-10 study found that relational contracts allow the project manager to “make plans to deal with external factors that introduce chaos and *assign resources to influence the interrelationships* to at very least mitigate the impact of those external influences” (Molenaar et al. 2000; *italics added by*

TABLE 15
MAJOR REPORTED CHALLENGES

Case No.	Case Study Project	Major Reported Challenges									
		Technical	Environmental	Resource availability	Schedule	Traffic	Need for innovation	Risk sharing	Stakeholders	Tangible demonstration of value for money	High Complexity
1	NGTR	x	x		x						x
2	SCIRT			x	x		x			x	x
3	Grafton Gully		x			x			x		x
4	A2: Hooggelegen				x	x	x				x
5	Origin Alliance	x		x		x					x
6	Midlands			x		x		x	x	x	x
7	AMA					x	x	x	x		x
8	MHX	x	x		x	x			x	x	x
9	Channel Deepening		x			x	x		x		x
10	SR 519	x				x	x		x		x
	Total	4	4	3	4	8	5	2	6	3	10

NGTR = Northern Gateway Toll Road.

author). This leads to the conclusion that alliance contracting is chosen to leverage the interrelationships necessary to manage the project at the edge of chaos and to leverage the potential benefit of the creativity that comes from chaos. Simply put, alliancing appears to be a sound choice to deliver complex projects that require innovative solutions to the challenges presented in their scopes of work.

Continuing along the line, Table 16 displays a summary of the KRAs from each of the case example projects. It shows that alliance practitioners establish KRAs in the same areas as the challenges: safety, stakeholder management, and traffic control. The literature shows that U.S. transportation agencies often select alternative project delivery methods

to accelerate the project’s schedule (Molenaar et al. 2000). Construction contractors understand that scheduling has a direct impact on cost. Finishing early will reduce the cost of time-related cost items, such as mobilization and project overhead, increasing the profit earned on a traditional DBB project. In alliancing, early completion increased the alliance’s gain so it is in everyone’s best interest to finish early. Past DB research also found a disconnect between owners’ perceptions of what they thought they were stating in their procurement documents and what those documents actually articulated in their evaluation plan weighting schemes (Lopez del Puerto et al. 2008). A study involving 110 federal DB projects found that price was the most heavily weighted factor in determining best value; however, a survey of the

TABLE 16
CASE STUDY KEY RESULTS AREAS SUMMARY

Case No.	Case Study Project	Key Results Areas									
		Social	Environmental	Value	Safety related	Stakeholder related	Traffic related	Design related	Legacy/aesthetics	Schedule	Quality
1	NGTR	x	x	x							
2	SCIRT	x	x	x	x	x					
3	Grafton Gully	x			x	x	x		x		x
4	A2: Hooggelegen				x	x	x		x	x	x
5	Origin Alliance				x	x	x	x			
6	Midlands										
7	AMA	x		x	x	x	x		x		
8	MHX		x		x	x	x			x	x
9	Channel Deepening	x	x		x	x	x			x	
10	SR 519	Not applicable; no KRAs established.									
	Totals	5	4	3	7	7	6	1	3	3	3

NGTR = Northern Gateway Toll Road.

TABLE 17
ALLIANCE CONTRACTING PRACTICES OBSERVED IN MORE THAN ONE CASE STUDY PROJECT AND CONFIRMED IN THE LITERATURE

Practice	Case Study Project	Literature	Remarks
Industry Outreach Meetings	Origin, WSDOT, A2, AMA, Grafton	Queensland (2008); Ross (2006)	Information meetings, briefings
Industry Partner Selection Using Scenario Testing	NGTR, Grafton, A2, AMA	Lipscombe (2013); Ross (2006); OAG (2006)	Two-day workshop designed to measure the competing entities' ability to collaborate and innovate.
Sub-alliances for Specialty Contractors	Melbourne, Origin	Queensland (2008); Albanese (2010)	Specialty contractors/consultants that join the alliance to furnish specialty services awarded after the alliance is established. Sub-alliances have limited participation in the pain/gain sharing scheme.
3-Limb Pricing Structure	NGTR, SCIRT, AMA, Melbourne, Grafton, MHX	Queensland (2008); OAG (2006)	See Figure 7
Alliance Lets Separate Sub-project Contracts	SCIRT, Melbourne, NGTR, MHA	Albanese (2010); Highways Agency (2012); Le Masurier (2006)	Contracts for specific services awarded after the alliance is established with the alliance playing the traditional role of the owner. The sub-project prime contractor does not join the alliance.
Public Information Plans	MHX, Melbourne, WSDOT	Albanese (2010); Ross (2006); Tharp (2009)	Specific plans aimed at gaining public support for the alliance during execution.
Use an ICE to Validate Alliance TOC Estimate	MHX, Grafton, SCIRT	OAG (2006); Le Masurier (2006)	Independent validation of the TOC prior to it being made part of the alliance contract.

federal agencies that produced those RFPs believed that qualifications and past performance were the most important (Gransberg and Barton 2007).

Table 16 shows that only three cases had KRAs established for scheduling. However, all the case example projects, except the maintenance alliances, finished ahead of schedule. The MHX Alliance schedule KRA is easily explained owing to the critical need to be ready for the Rugby World Cup, a situation that resembles the Utah DOT's rationale for implementing DB to prepare for the 2002 Winter Olympics (FHWA 2006). The scarcity of schedule KRAs leads one to infer that the agencies may view alliancing's gain-sharing arrangement as sufficient incentive for all parties to the agreement to complete the project as expeditiously as practical and as if schedule was the primary motivation for selecting alliancing. This is confirmed by there being only three cases that mentioned scheduling as one of the primary motives in their rationale for selecting alliancing.

CONCLUSIONS

The following conclusions can be drawn from the case example analysis:

- The WSDOT attempt to experiment with alliancing lead to the conclusion that implementing alliance contract project delivery can be done in the United States under most of the current statutory constraints on procurement.

- The findings of the FAR analysis shown in Table 14 lead to the conclusion that implementing alliance contracting will be complex but not impossible. Like most alternative delivery methods, it may require an agency to specifically seek enabling legislation.
- As a follow-up to the previous conclusion, the FAR analysis shows that states that currently have authorization to enter into P3 contracts may be best served by seeking to modify their P3 authorization rather than seeking explicit authority for alliance contracting.

Without repeating all of the details contained in this chapter, the final analysis concludes that public agencies choose alliance contracting primarily to leverage the interrelationships necessary to manage complex projects, which at times may be “at the edge of chaos” (Shane et al. 2011) and benefit from the innovation produced by chaos by building a highly integrated and highly collaborative project execution environment where decisions are made using “best for project” as the default decision criterion.

Simply put, alliancing appears to be an excellent choice to deliver complex projects that require innovative solutions to the challenges presented in their scopes of work by leveraging the interrelationships of the alliance members.

A number of promising practices were observed in each case example project. Based on the protocol described in chapter one, Table 17 shows those practices that were observed in more than one case example project as well as confirmed by the literature.

ALLIANCE CONTRACTING PROCUREMENT POLICIES, PROCEDURES, AND PROGRAMS

INTRODUCTION

This chapter reviews findings as they relate to the policies, principles, and guidelines currently being followed by state transportation agencies to implement alliance contracts for infrastructure construction and maintenance projects. This chapter will combine information collected through the literature search, the screening survey, and interviews with case example agencies and industry professionals. The focus of this chapter is the pre-award tasks necessary to bring an alliance into existence.

ALLIANCING POLICIES

Having a clear target of what the agency wants to produce is the key to establishing policies and procedures to implement any new form of project delivery. The “target” is defined essentially by the reason the agency chose to deviate from traditional forms of project delivery. Alliance contracting is no different. Often the motivation to deliver an alliancing project is a requirement for enhanced collaboration and integration during early project development phases to gain the benefits of constructability, biddability, and maintainability in the project’s design documents (van den Berg and Kamminga 2006). One author provides some insight on the target addressed by alliancing:

An alliance can be defined as a working partnership in which there is mutual recognition and understanding that *the success of each firm depends in part on the other firm/firms . . .* The pooled advantages can stem from each organization’s strengths compensating for the other’s weaknesses or from amplifying or enhancing their combined strengths. (Iyer 2003)

The alliance contracts are relational contracts and offer a fundamentally different approach to targeting outcome and sharing risk. The most well-used alliancing model is now commonly known as the “pure” alliance. The literature is rich with analyses reporting the advantages and disadvantages of the pure alliance (Green 1999; Uher 1999; Bresnen and Marshall 2002; Naoum 2003). In the past few years, new variants of the alliance model have appeared with significant differences from the pure alliance model. Relational contracts of any type require “a change . . . within the modus operandi of the industry and its clients” (Lahdenperä 2012). Agencies in Australia and New Zealand regard them as “strategic means to improve the performance of their core operations and it is considered that these variants may offer a project delivery model that is

suited to different situations” (Lahdenperä 2012). The new variants are termed “competitive alliancing” and “collaborative alliancing.” They are very much the same as pure alliancing, including the risk allocations and the project management structures, during design and construction. However, the “competitive” alliance requires multiple teams to compete for the award of the project and a collaborative alliance involves multiple members competing for work during the project based on their past performance in previous alliance work.

The case studies showed that there were three primary areas in which policy had been developed to implement alliancing.

1. Project selection policy,
2. Policy for selecting the type of alliance, and
3. Policy for the selection of alliance members.

Alliance Project Selection

“Many experts believe that the key to the success of a construction project is the process by which it is organized and managed; i.e., the project delivery method” (Reicke 2004). Therefore, it is important to select a project whose characteristics make it a good candidate for alliance contract delivery. The 2009 NZTA *Procurement Manual* notes that large scale, high-risk projects in difficult environments with external stakeholder issues must be addressed during design and construction as having the project characteristics that lend themselves to alliancing. Table 18 is a summary of the project characteristics that were found in the policy documentation from Australia, New Zealand, and the United Kingdom.

Synthesizing the information contained in Table 18 by selecting characteristics with at least four observations leads to the conclusion that projects with the following listed set of characteristics are good candidates for alliance contracting delivery:

- AU\$50 million (~U.S. \$47 million) or more: The project must be of sufficient size to make potential cost savings as a result of collaboration and integration worth the cost of the additional upfront expenses to form the alliance for all parties to the agreement.
- High-risk profile: “Alliancing will generally be appropriate for projects that are characterized by major risks and complexities that cannot be dimensioned in the

TABLE 18
ALLIANCE PROJECT CANDIDATE CHARACTERISTICS

Project Characteristic	UK	Australia				New Zealand	Totals
	HA	VDTF	Austrroads	ADIT	QDTMR	NZTA	
Size	—	>AU\$50 million	>AU\$50 million	>AU\$50 million	>AU\$30 million	>NZ\$100 million	>AU\$50 million*
Risk Profile	High	High	High	High	High	High	6
Complexity	High	High	High	—	High	High	5
Number of Stakeholders	High	—	High	—	High	High	4
External Factors	High	—	High	—	Special need	High	4
Need for Flexibility	—	High	High	—	High	High	4
Schedule	—	Urgent start required	Time pressure	Urgent start required	Limited	—	4
Technical Requirements	High	High	High	—	—	High	3
Scope Definition	—	Uncertain	Uncertain	—	Unclear	—	3
Need for Innovation	—	—	High	High	High	—	3
Agency Resources	Limited	—	—	Insufficient	—	Insufficient	3
Competition	—	—	—	Low	—	Low	2
Demonstrate VfM	High	—	—	—	—	Low	2
Budget	—	—	Tight	—	—	—	1

*Average = AU\$56 million.
— = not applicable.

Business Case or soon thereafter. This is likely to have a material but indeterminate impact on achieving project objectives, which means that the flexibility and collaborative decision made under an alliance contract may be desirable. Under the alliance approach, the parties can deal with any risks and complexities if and when they arise over the life of the project” (ADIT 2011).

- Highly complex: Complexity extends from merely the engineering challenges into attempting to control external contextual and financial factors that ultimately impact the final engineering solution. Therefore, a project needs to be one where having early contractor involvement in both planning and design would be expected to generate the optimal design with respect to social, political, environmental, and technical demands.
- Large number of stakeholders: “. . . project characteristics that lend themselves to Project Alliancing are large scale, high-risk projects in difficult environments that have complex stakeholder issues that require flexibility during design and construction” (Le Masurier 2006).
- Need for flexibility: In this context, flexibility is defined as the ability to make decisions and change plans in an expeditious and agile manner. It also speaks to the risk “potential for a substantial change in project scope” (Queensland 2008).
- Aggressive schedule: “Tight time constraint is another significant reason for using alliancing” (Chen et al. 2012).

The ranking of the project characteristics indicates that alliancing is used primarily as a risk management approach on large complex projects in the three countries that use alli-

ancing. The QDTMR *Relational Contracting Guide* contains a helpful tool for determining if a project is a good candidate for alliance contract delivery, which is shown in Table 19.

Lastly, the Australian State of New South Wales *Procurement Methodology Guidelines for Construction* (2005) provides its lessons learned regarding those projects that are not good alliance candidates.

The following circumstances provide an indication of where alliancing is unsuitable:

- The personnel involved (from the agency and other stakeholders, consultants and contractors) are not experienced at working together and unwilling or unable to adopt the attitudes and corporate cultures necessary to work as a team;
- The agency is not prepared to invest the resources required to participate in a relationship contract and accept a risk sharing arrangement;
- The project is relatively small, and the additional tendering and implementation costs are disproportionate with the cost of the work and the likely benefits;
- The . . . budget and financial risks to . . . the state are too great to enter into a commercial arrangement where project costs or schedules are uncapped; or
- More conventional contracts will achieve the outcomes required, since the project is not complex, risks are well understood or there is little room for improving outcomes or issues can be resolved without contractor involvement early in the design process. (NSW 2005)

Once the agency has convinced itself that a given project will benefit from alliance contracting project delivery, it must then determine which type of alliance contract is most appropriate for the specific project.

TABLE 19
QUEENSLAND ALLIANCE SELECTION DECISION MATRIX

Question	Alliance Selection
Is the project value in excess of \$30 million?	Score 3 for Yes, 0 for No
Can project risks be equitably assigned to contractors?	Score 0 for Yes, 3 for No
Are complex community and stakeholder issues expected?	Score 1 for Yes, 0 for No
Are there significant schedule constraints?	Score 1 for Yes, 0 for No
Does the procurement agency have the requisite resources to support an alliance board and provide input into the alliance?	Score 2 for Yes, 0 for No
Is there a requirement for flexibility in project delivery; e.g., potential for substantial change in project scope?	Score 3 for Yes, 0 for No
Are there a sufficient number of industry participants available to provide competitive responses to requests for tender?	Score 0 for Yes, 1 for No
Is the alliance owner capable of embarking on relational style contracts?	Score 2 for Yes, 0 for No
Are alliance participants vendors of equipment that is integral to the delivery of the project?	Score 0 for Yes, 1 for No
Is the project subject to high environmental or cultural risks?	Score 1 for Yes, 0 for No
Can high-risk elements of the project be separated from the main project?	Score 0 for Yes, 1 for No
Is the procurement agency willing to accept a commercial arrangement with uncapped costs and schedules?	Score 1 for Yes, 0 for No
Total	
Score 0–7 not suitable for alliancing; Score 8–14 consider using alliancing Score 15–20 alliancing is highly suitable	

Source: Queensland (2008).

Alliance-Type Selection

When choosing the type of alliance to enter into it is useful to consider the progression of procurement actions each takes and how the various parties to the alliance are involved. The collaborative alliance model differs from pure and competitive alliancing in that it consists of different teams that have to collaborate but also compete for work during the project on a basis of the quality and timeliness of earlier work completed in that alliance. Pure alliances completed with partners

picked by the QBS process consist of a single alliance team. Competitive alliance partners are selected on a best-value basis with an emphasis on the proposed TOC; however, they do not compete for work after selection. Figure 15 illustrates NZTA’s comparison of the three alternatives against the different phases in a project.

Initially, an agency considering a collaborative alliance must develop the project’s business case and funding using its internal staff. Next, the agency proceeds to tender and selects

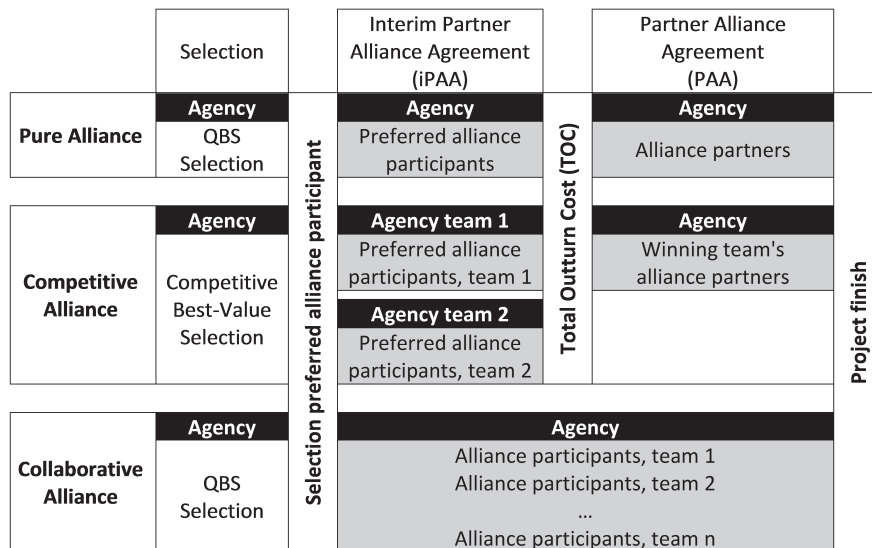


FIGURE 15 New Zealand alliance contracting options (Scheepbouwer and Gransberg 2014).

the NOPs, its preferred collaborative alliance partners. The NOPs form teams that bid for the project and usually consist of contractors and consultants that, as a team, have the necessary expertise and size to take on the project. Once the agency selects the preferred alliance partners, they sign an interim project alliance agreement. In a pure alliance, the agency chooses a single team, and in a competitive alliance, the client chooses multiple teams that compete for the right to be the sole team to join the agency in the alliance.

During the interim project alliance agreement phase the team(s) together with staff from the agency carries out preliminary design, development of the risk profile, prepares the project methodology, and prepares the proposed cost of the project, the TOC. The TOC is similar to the U.S. concept of a guaranteed maximum price and includes direct costs (e.g., investigations, permits, land purchase, design, construction, and commissioning), overheads, and profit margins. The financial drivers for the NOP teams are collected in Table 20 and show the differences between the alliance models.

During the interim phase, decisions can be made on a “best-for-project” basis in both the pure and collaborative alliances, while in a competitive alliance, the short-listed teams compete to produce the “best” TOC proposal. This proposal has various qualification and experience parameters as well as cost. In the final phase, there is no difference between the competitive and pure alliances. However, because a collaborative alliance has more than one construction team, the NOPs must compete for work packages as well as the allocated profit margins and final pain/gain sharing.

Therefore, the pure alliance’s NOP financial drivers are the profit earned during construction and the pain/gain sharing at project termination. In a competitive alliance, competition determines who gets to sign the final project alliance agreement. Hence the NOP’s financial drivers become the same as in the pure alliance. The collaborative alliance is different in that the contractors compete to increase their share of work as a means to maximize their profit. This creates an incentive to continuously improve KRA ratings in areas of time, cost, quality, etc. Again, the pain/gain share drives best cost outcomes on each project work package and, because the pain/gain share is spread across all delivery teams, it also drives support between teams and sharing of ideas and advice

to minimize the probability job losses, which must be shared by all at the end of day. The juxtaposition of internal competition based on performance on the pain/gain share creates an environment that enhances collaboration and encourages the construction teams to provide outstanding outcomes in the KPIs and KRAs. The situation incentivizes all teams to perform at their best to secure a larger share of the work, and follow up by delivering it for best cost.

Alliance Member Selection

The literature review revealed a surprising number of references to selection based on individual personnel who had the correct skills, experiences, and, mostly importantly, the attitude that fosters collaboration. For example, the *Victoria Project Alliancing Practitioner’s Guide* (2006) directs that “an integrated project team [be] selected on the basis of best person for each position.” Chen et al. (2012) recommends that team selection criteria be based on: “Focus on partners’ competence, reputation and attitude; and select personnel on a ‘best for project’ basis.” The Austroads *Building and Construction Procurement Guide* (2011) cites “difficulty sourcing personnel with the right personal attributes and preparedness to work in an alliance structure” as a potential disadvantage of alliancing. Another source advocates retaining “behavioral coaches” to assist the agency selection panel to “develop a better understanding of the Proponent’s [potential partner] potential to form an alliance with the Owner’s personnel” (ADIT 2011). The same source goes on to recommend that after the project alliance agreement is signed, “the alliance may decide to use a Behavioural [sic] Coach to consolidate alliancing behaviours [sic].”

The Australian Department of Infrastructure and Transport advocates retaining “behavioral coaches” to assist the agency selection panel “develop a better understanding of the Proponent’s [potential partner] potential to form an alliance with the Owner’s personnel.”

(ADIT 2011)

The North American power industry has been using alliancing for at least a decade (Ray 2013) and has come to the same conclusion as the international public transportation agencies discussed previously. One insightful article on the

TABLE 20
DRIVERS FOR THE NONOWNER PARTICIPANTS DURING THE INTERIM PROJECT ALLIANCE AGREEMENT PHASES IN THE THREE ALLIANCE FORMS

Model	Interim Project Alliance Agreement	Project Alliance Agreement
Pure Alliance	best-for-project	profit margin and gain sharing
Competitive Alliance	best value	profit margin and gain sharing
Collaborative Alliance	best-for-project	profit margin, gain sharing, and increasing forward workload

Source: Scheepbouwer and Gransberg (2014).

benefits of alliancing in the power industry provides a quasi-public perception of alliance member selection:

You have to be real careful about the partner you pick. It's kind of like entering a marriage. You don't want to do this very often. You just want to do it once and hopefully be done with it. The companies need to have a shared value system and the cultures need to complement each other. That doesn't mean it's always rosy every day. Without a little bit of conflict, you're probably not sharpening your saw and getting better . . . We challenge each other and we work to get better . . . You have to define the parameters around working toward that shared goal. You also have to provide some kind of framework for resolving conflicts . . . If you're going to be an alliance contractor, you have to see yourself as the brother-in-law sleeping on the couch. You better add value every day if you want to have a place to stay. (Ray 2013)

This all leads to the conclusion that unlike other alternative project delivery methods where the emphasis on key personnel qualifications focuses on their experience and credentials, the emphasis in the qualifications evaluation process for an alliance is focused on the personalities of the key personnel. While U.S. and Canadian agencies have dabbled in the “soft factors evaluation” by experimenting with problem-solving scenarios in the CMGC selection process (West et al. 2012), the inherent subjectivity of evaluating an individual's personality to determine their ultimate qualification to join the alliance team may make this aspect very difficult to implement in North America.

Alliance Team Building

For an American agency, the notion that litigation is not an option in a construction contract is shocking at best and absurd at worst. However unattainable it may seem in the United States, that “one third of the total value of public sector infrastructure projects delivered in Australia” are alliance contracts (Duffield et al. 2014) demonstrates that to effect real change there must be a will to change (Yeung et al. 2012). The conclusion reached in the previous paragraph underscores the need to approach complex projects with a keen focus on creating a team consisting of representatives from each stakeholder who are willing to make the shift from the status quo to something better.

Hauck et al. (2004) cited five factors that must be present to maximize collaboration among construction stakeholders: (1) high-performance teams, (2) optimization and performance measurement, (3) communication, (4) incentives and risk sharing, and (5) problem solving and decision making. Yeung et al. (2012) goes on to argue that successful relational contracts such as an alliance require the team members to possess the following five attributes: (1) commitment, (2) trust, (3) cooperation and communication, (4) common goals and objective, and (5) win-win philosophy. That paper goes on to evaluate alliancing using the “Wittgenstein family-resemblance philosophy” that approaches complicated issues by defining them as “a network of overlapping similarities. This is dissimilar to the traditional definition whereby a concept is given necessary

and sufficient conditions.” The selection of the term “family resemblance” is somewhat unique when analyzing a major infrastructure construction project; however, the analogy is appropriate (Hauck et al. 2004).

Thus, the question of how to form a collaborative “family” of design and construction professionals that each represents a different organization must be answered. The answer is easier to show than explain. Therefore, the next two sections contain cases where specific actions were taken to accomplish the same goal to form a highly collaborative team made up of members with both the ability and the will to make the collaboration a reality. The SCIRT Alliance in New Zealand illustrates a facilitated workshop approach to selecting alliance members. The National Museum of Australia project demonstrates the development of a work environment to keep the team after selection operating at a high level of productivity and amicability.

SCIRT Two-Day Alliance Team Selection Workshop

The selection of alliance partners includes a two-day, off-site team evaluation workshop. Instead of evaluating individual personalities based on a resume, the whole proposed alliance (management) team is evaluated during scenarios that are played out during the workshop. Every alliance tender phase in Australia and New Zealand has this selection element in it. The scoring is part of the qualitative evaluation of the tenders and, although this process could be viewed as subjective, according to the NZTA in principle all qualitative or non-price elements in a tender evaluation are and they have not yet been challenged on the results (by the non-owner participants). The goals of this part of the evaluation are to see how the alliance operates as a team and under pressure, how they make decisions, how they interact with the owner, and how they interact with each other. An example of a scenario is as follows:

All members of the management team of the alliance (except the owner staff) pretend to be on a construction site where there has been a fatality with one of the workers. The media heard about it and has called and wants to know what is going on and what you are going to do about it. In this scenario the proposed project director would be “on holiday” and is therefore taken out of the exercise. The rest of the people then have 20 minutes to tell the owner what the response would be on site, and how you would respond to the media.

In some scenarios there is a full proposed alliance management team present; that is, including the members of the client organization and for some scenarios only the participating non-owner members are part of the exercise (possibly with key members removed as described previously). The workshop is led by facilitators specializing in alliancing and selection procedures. The owner staff, among which include the tender evaluation team and proposed alliance staff, observe the scenarios. After the two days the client team comes together and talks about the observations and tries to answer questions such as,

do they perform well as a team and do they complement each other. According to the NZTA, sometimes there are strong but disparate personalities that just do not work well together.

This whole exercise is repeated for every proposed alliance team that has reached this procurement phase.

National Museum of Australia Alliancing Development Process

Like SCIRT, the National Museum project took extraordinary steps to ensure that the members of the alliance were both competent and compatible. Each potential consultant or contractor was asked to prepare a statement of qualification that provided specific evidence that each member of the organization's proposed team complied with the following 12 criteria:

1. Demonstrated ability to complete the full scope of works including contributing to building, structural, mechanical, and landscaping design.
2. Demonstrated ability to minimize project capital and operating costs without sacrificing quality. (Value analysis and life-cycle costing.)
3. Demonstrated ability to achieve outstanding quality results.
4. Demonstrated ability to provide the necessary resources for the project and meet the project program. (Including resumes of key staff.)
5. Demonstrated ability to add value and bring innovation to the project.
6. Demonstrated ability to achieve outstanding safety performance.
7. Demonstrated ability to achieve outstanding workplace relations.
8. Successful public relations (PR) and industry recognition.
9. Demonstrated practical experience and philosophical approach in the areas of developing sustainability and environmental management.
10. Demonstrated understanding and affinity for operating as a member of an alliance. (Collaborative experience and views on risk/reward schemes.)
11. Substantial acceptance of the draft alliance document for the project including related codes of practice, proposals for support of local industry, and employment opportunities for Australian indigenous peoples.
12. Demonstrated commitment to exceed project objectives. (Hauck et al. 2004)

Once selected the members of the alliance were required to collectively put their profitability at risk if these performance measures were not met. Because of this collective nature of the risk and reward incentives, no member of the alliance could succeed unless all members succeeded and the failure of one partner could directly threaten the profitability of all other alliance members. It is this joint, rather than just shared, risk and reward structure that distinguishes project alliances from other forms of contracting and partnering arrangements. (Hauck et al. 2004)

The most effective example of developing a collaborative environment that penetrates to the grassroots of the project team was an incentive-based project labor agreement with the trade unions with which the craft workers were affili-

ated. It included an “excellence allowance” that increased the workers’ hourly pay by as much as AU\$1.75/hour for achieving key performance indicators for production, quality, and safety. The agreement was attributed with increasing production by 30% (Hauck et al. 2004).

To summarize this section’s take-away points, a successful alliance is one that is composed of *faces with personalities* not just *positions with credentials*. The SCIRT workshop demonstrated an effective way to “filter” the personalities of potential team members using scenario-based interactions. The Australian National Museum provided an approach for creating a work environment where those selected collaborative personalities can thrive.

ALLIANCING PROCEDURES

Although the literature review found a myriad of agency procedures related to alliancing, it appears that two stood out as the most prominent and critical to understanding the principles of this new project delivery method; developing the “commercial framework” and developing the TOC. Therefore, this section will limit its discussion to these two topics.

Commercial Framework

The commercial framework is defined as the terms and conditions under which the project alliance agreement will operate. These are directly connected to the statutes that govern procurement by the agency seeking to consummate a project alliance agreement. As such, there is no attempt to spell out specific language, but rather the emphasis is on the underlying principles based on English Common Law, which is the basis for both the Canadian and U.S. legal systems. More specific legal guidance is contained in chapter five of this synthesis.

There are three factors that alliances address in their commercial framework. The first is to make the business case for the project as well as for delivering it using an alliance of the type proposed by the agency. All of the case example projects, except for Washington State, used the VfM methodology for demonstrating that the proposed approach to forming an alliance and then delivering the project was the “best or preferred” alternative (ADIT 2011). The procedures are virtually the same as those used by U.S. DOTs during early stages of the project development process.

The second factor is the required level of integration that must be achieved by the alliance itself (ADIT 2011). “The greater the degree of integration of the skills and disciplines of its different members, the more likely it is that a collaborative approach is possible, and outstanding results achieved for the project sponsor (where applicable), project owner, and the team” (Austroads 2014). Therefore, the commercial framework must address organizational changes that

may need to be made to achieve the required integration. For example, the SCIRT Alliance’s framework required each alliance member to second its personnel to the alliance, thereby changing their individual corporate identities to meld them into a single alliance identity (Scheepbouwer and Gransberg 2014). This involved making arrangements for collocation of all the personnel to SCIRT offices and issuing SCIRT-labeled hard hats, safety vests, shirts, etc., to reinforce the idea that they no longer worked directly for a contractor, a consultant, or an agency. This undertaking required an enormous administrative effort by the human resources managers for each alliance member.

The third factor is to align the commercial objectives of the alliance members. The owner’s typical commercial objective is to complete the project on time at the lowest practical cost. The design consultant and the construction contractor have maximized the profit they earn on the job. Therefore, one way to align these two objectives is to create an incentive for cost savings as was done in the Port of Melbourne alliance case.

This also takes a collaborative effort, so the agency must produce its procurement documents in a manner that allows their modification as new members are brought into the alliance with disparate commercial objectives. One common example found in most of the case example alliances was the mechanism for developing each member’s profit/loss share. Once again SCIRT furnishes a good example of how to accomplish this task on a very complex project. Once the collaborative project alliance agreement was executed, the alliance’s audit arm conducted audits of each member’s books and determined their “usual margin,” the actual average profit they made on each completed project (Scheepbouwer and Gransberg 2014). These rates were then used as a starting point for filling that line item cost by negotiation.

Developing the Target Outturn Cost

The typical structure for a TOC is shown in Figure 16. It is important to note the difference between what are reimbursable costs under the alliance’s open books accounting system and what is considered the NOPs’ fee.

The literature and case studies yielded four methods to develop the TOC. Each is specific to both the agency involved and the type of alliance being undertaken.

1. In a pure alliance, the agency chooses a project team that then proceeds to develop a project plan of action for design and construction. Once the plan is solidified, the team proceeds to develop the design to a point where a mutually agreeable TOC can be developed. After the TOC formation, the agency decides whether to continue or halt the project. If the decision is to halt the project, the agency is free to proceed with the

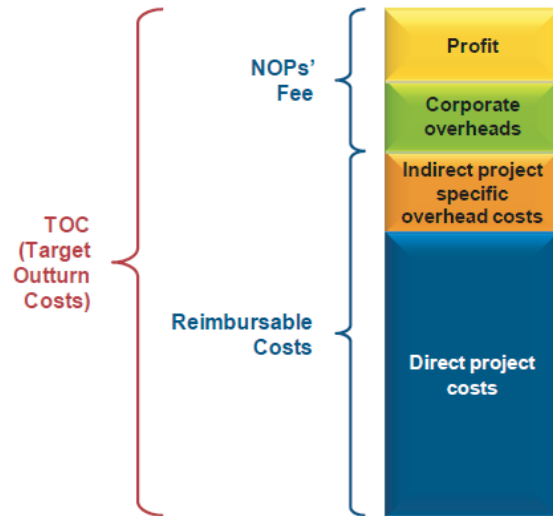


FIGURE 16 Typical target outturn cost structure (ADIT 2011).

designs to choose another delivery model such as DB and solicit proposals or tender offers to complete the project.

2. In the Netherlands case, the TOC was developed with a ceiling of €140 million. This encourages the agency and its partners to work together until they agree on a conceptual design and project plan with a corresponding cost estimate that conforms to functional requirements, the commercial objectives of the private-sector members, and the timeline desired by the agency. Once a number was agreed upon that fell below the cap, the parties were free to enter into a project alliance agreement.
3. In the competitive alliances used in Australia and New Zealand, prequalified project teams develop a project plan and respective TOC in much the same manner as a best-value DB proposal. Agency personnel are assigned to work with each competing team and provide the same input that the agency would provide in a pure alliance when establishing the TOC. The TOC proposals are submitted and evaluated by the agency, which then selects the winning team to join the alliance. The award makes the TOC a contractual part of the project alliance agreement.
4. In a collaborative alliance (SCIRT) each individual project in the program of works receives a TOC. A conceptual TOC is produced during preconstruction services provided by the construction contractors during the design phase; however, in the end, the final TOC is set by the agency.

It is important to note that the type of alliance determines the pay scheme for the alliance members. In the pure and collaborative alliances, a reimbursable payment scheme is used. This is done to achieve the principle that everyone wins or everyone loses financially. A reimbursable scheme covers

the project direct costs and the overhead costs for alliance members. The competitive alliance uses the winner’s proposed TOC as the alliance agreement’s contractual TOC. The competitive alliance was developed to counter criticism that the agency may not be getting good VfM. Therefore, it might be inferred that a reimbursable payment scheme is preferred unless the agency believes the need to demonstrate that it got VfM by implementing a competitive alliance.

ALLIANCING PROGRAMS

Once again there are a number of agency programs that attend to alliance contracting; however, the three described in this section appear to be the most unique. They are the alliance’s governance program, risk management program, and the painshare/gainshare scheme.

Governance

“Governance can be described as a process for directing and managing projects, a system for holding projects account-

able and controlling them, and a framework for the effective assignment of specific and overall accountability for delivering the project. It is a set of policies, principles, rules, and supporting practices put in place to run a project” (ADIT 2011). Figure 17 illustrates the structure of a typical alliance and serves as a generic example of how the hierarchy of governance must be established. The Australians call this system a “joint management structure” and have detailed guidance on the roles and responsibilities of each of the individuals shown here. A brief synopsis of the major points about each group in Figure 17 is as follows.

- Alliance Leadership Team (ALT): The primary rule of the ALT’s role is that all decisions assigned to the ALT must be made unanimously, in keeping with the “we all win or we all lose” philosophy. To work, each of the alliance members must assign a representative that is truly “the best person for the job.” This group is where the emphasis on key personalities becomes valuable and where the “no sue” rule is ultimately tested. The group’s scope of decision making must be well-defined and the agency normally reserves the right to make

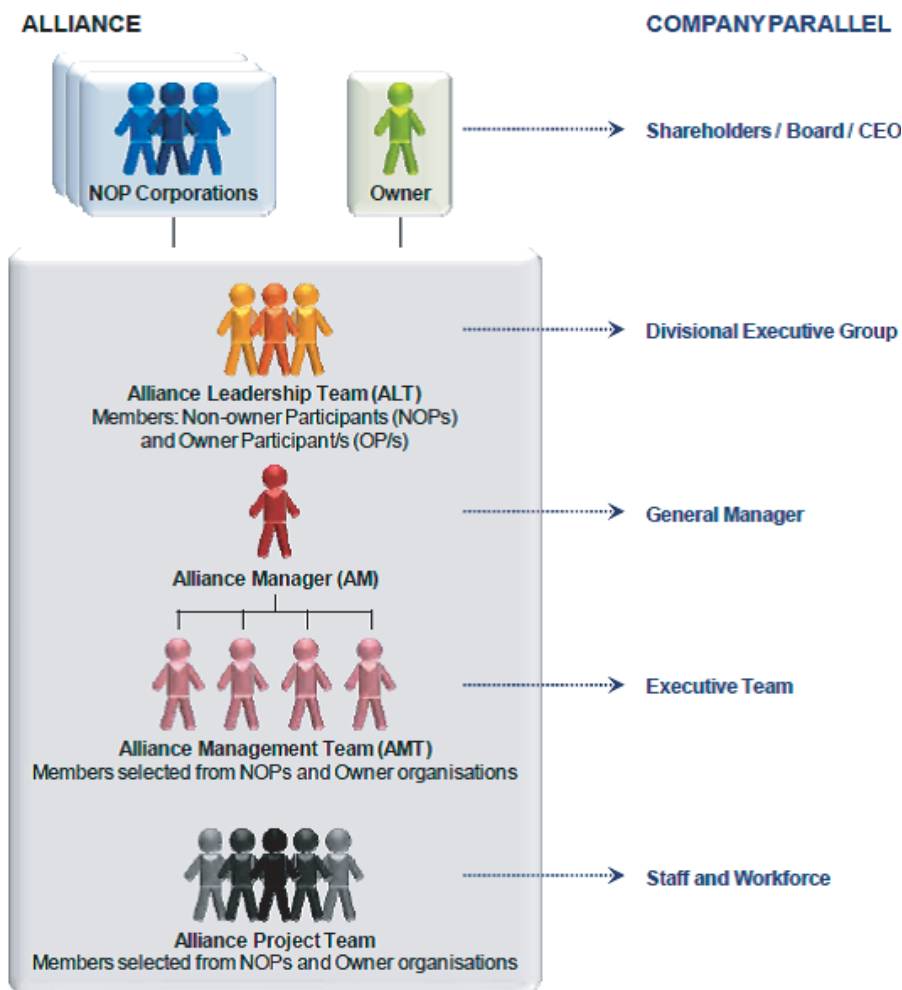


FIGURE 17 Typical alliance governance structure (ADIT 2011).

certain decisions unilaterally, especially those related to long-term operations and maintenance issues.

- Alliance Manager (AM): This is the individual charged with leading the alliance and who is usually vested with the authority to make many routine decisions. The AM reports to the ALT and is typically a senior project manager from a NOP. The ALT may select a person from within its current base of member's senior personnel or it may choose to hire a specialist with no affiliation to any of the members. The AM chairs the AMT.
- Alliance Management Team (AMT): This group is the one that actually ensures that the project gets designed and built and is normally composed of members selected for their special expertise and experience. They usually come from the agency and NOP staff and are seconded to the alliance from their parent organizations.

Risk Management

“The most significant difference between traditional contracting methods and alliance contracting is that in alliancing, all project risk management and outcomes are collectively shared by the Participants” (ADIT 2011). The very core of an alliance is the equal sharing of all risks and rewards. Other project delivery methods advocate assigning risks to the party that can most effectively manage them and, as a result, that party is the sole recipient of any rewards or penalties based on how well it managed the risks.

The Melbourne Channel Deepening case is a good example of an alliance with a comprehensive risk management plan that was jointly governed by the members of the alliance. This project was faced with a complex risk profile that included a bewildering array of potential external impacts that threatened the success of the project. The following is a brief review of the major risks and how the alliance dealt with each.

- Environmental issues during dredging: An external independent environmental watchdog organization was set up to monitor the alliance's compliance with more than 150 KPIs.
- Negative public opinion: The environmental monitor regularly kept the public informed of the alliance's record through reports and news releases. They also established a project stakeholder advisory committee to provide a conduit for information to the alliance and a platform for the alliance to respond to queries and concerns.
- Disruption of ocean-going freight traffic: The alliance awarded DB contracts to specialty firms with specific expertise in the types of marine facility construction needed and coordinated the work with the Port of Melbourne to minimize disruptions.
- Underwater construction safety: The alliance developed a specific dive industry liaison group to coordinate the underwater construction and ensure safety standard compliance.

Risk management programs are always directly related to the project-specific technical requirements as well as the environmental, social, and political context in which the project must be delivered. This leads to the conclusion that implementing an alliance will require many agencies to make a large shift in their traditional risk management programs away from risk shedding and risk allocating to true risk sharing to benefit from this project delivery method.

Gainshare/Painshare Schemes

The risk sharing philosophy discussed in the previous section is implemented in the specifics of the alliance's gainshare/painshare scheme. Typically, the basis of the scheme is found in the KRAs and the various KPIs used to measure performance of the outcomes. The scheme will include both cost and non-cost metrics, which are combined to calculate the shares of the each member's gain or loss. Non-cost performance criteria are generally related to design and construction quality, timely achievement of scheduled milestones, measures of traffic disruption, customer satisfaction, environmental compliance, safety, and other areas found in a typical large construction project.

Figure 18 shows how two typical gainshare/painshare schemes are developed. The one on the left has no limitations on either the agency or the NOP's gains or losses. The right-hand graph shows a more common scheme where the NOP's losses are capped at the amount of fee (profit) they were accorded in the project alliance agreement (Queensland 2008; ADIT 2011). This scheme is Limb 3 of the typical 3-Limb pricing structure discussed in chapter two.

Table 21 provides an example of how the left-hand scheme in Figure 18 is calculated for both the industry members and the agency. It contains a NOP incentive/disincentive mechanism for achieving the non-cost performance criteria in the KRAs. In this case it is ±AU\$2 million. Appendix A contains an extract of the Australian *National Alliance Contracting Guidelines* and describes in detail the full set of options with example calculation available to public highway agencies in that country.

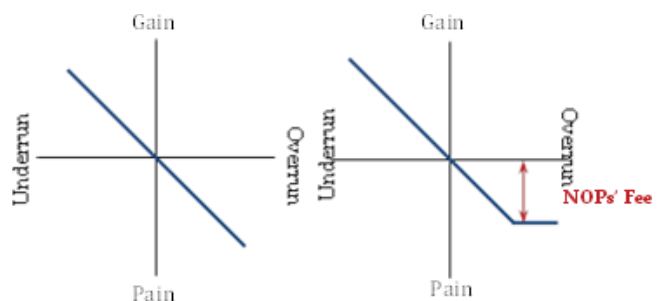


FIGURE 18 Typical gainshare/painshare models (ADIT 2011).

TABLE 21
 AUSTRALIAN DEPARTMENT OF INFRASTRUCTURE AND TREASURY MODEL
 FOR GAINSHARE/PAINSHARE EXAMPLE

Cost Gainshare/Painshare	50:50, no caps	Alliance Performance	Score	Reward/Penalty to NOP
TOC Components				
Reimbursable Costs	\$88 M	Achieve Stretch Target	100	\$2 M
NOP Aggregate Fee (Profit)	\$12 M	Business as Usual	0	\$ 0
TOC	\$100 M	Poor	-50	-\$2 M
Risk or Reward Calculations				
Model 1a) Cost and Non-Cost Performance Not Linked	Scenarios			
	1 Very good cost and non-cost performance	2 Mixed—Very good cost and poor non-cost performance	3 Very poor cost and non-cost performance	
TOC	\$100 M	\$100 M	\$100 M	\$100 M
AOC	\$90 M	\$90 M	\$125 M	\$125 M
Under (overrun) to TOC	\$10 M	\$10 M	-\$25 M	-\$25 M
Non-Cost Performance Score	100	-50	-50	-50
Cost Gainshare/Painshare Owner 50%	+\$5 M	+\$5 M	-\$12.5 M	-\$12.5 M
NOPs 50%	+\$5 M	+\$5 M	-\$12.5 M	-\$12.5 M
Non-Cost Reward/Penalty to NOP	+\$2M reward	-\$2 M penalty	-\$2 M penalty	-\$2 M penalty
Total Gainshare/Painshare Owner	+\$5 M	+\$5 M	-\$12.5 M	-\$12.5 M
NOP	+\$7 M	+\$3 M	-\$14.5 M	-\$14.5 M

Source: ADIT (2011).

CONCLUSIONS

The following conclusions were developed in this chapter:

- From Table 18—Projects that are good candidates for alliance contracting delivery are highly complex projects worth AU\$50 million (~U.S. \$47 million) or more. They have high-risk profiles with a “potential for a substantial change in project scope” (Queensland 2008) and therefore require flexibility to make decisions and change plans in an expeditious and agile manner. The

risk profile is complicated by the large number of external stakeholders and often an aggressive schedule.

- Alliance contracting procurement demands that a considerable amount of weight be placed on the personalities of the key personnel, unlike other alternative project delivery methods where the emphasis on key personnel focuses on their experience and credentials.
- Implementing alliance contracting will require North American agencies to shift their risk management programs away from risk shedding and risk allocating to real risk sharing to benefit from this project delivery method.

ALLIANCE CONTRACT ADMINISTRATION PROCEDURES

INTRODUCTION

This chapter will synthesize the data obtained from the literature, the survey, and the case studies regarding the alliance project. It will combine information collected through the literature search, the document content analysis, and the case example interviews with agency personnel and design and construction industry professionals.

ALLIANCE DESIGN ADMINISTRATION PROCEDURES

Design administration in an alliance is no different than it is in other project delivery methods. The objective is still to deliver a high quality set of construction documents that minimizes the need for changes after construction has begun. The major shift is in the level of direct involvement the agency and the contractor have during the design process. As a result, procedures must be developed for establishing preconstruction milestones that support the construction schedule. The alliance team must also document its procedures to control the preconstruction flow of design information and, lastly, procedures for agency review of ready-for-construction design products needs to be set to permit the early start of construction if desired.

Preconstruction Schedule and Milestone Development

One of the core values of alliancing is early contractor involvement (ECI). This idea is virtually the same as preconstruction services in a U.S. CMGC contract (West et al. 2012). Preconstruction milestones and schedules are created with early contractor input to decrease the risk that the design will develop in a manner that fully supports the construction. The development of the TOC requires the alliance parties to jointly develop milestones that support the time-related elements of cost such as job site overheads. As a result, preconstruction milestones are typically developed in parallel with the TOC before the signing of the project alliance agreement. When the project alliance agreement takes effect, the preconstruction milestones are validated and incorporated into the project's schedule. The main difference here between a relational alliance contract and nonrelational contracts such as DBB and DB is in the level of assurance that the design will enable the TOC to include informed risks as opposed to unknown risks that if realized lead to cost overruns.

Procedures for Controlling the Flow of Design Information to and from the Agency

The design in an alliance is fully integrated, with both the contractor and the agency providing input to the design consultant. The governing rules for most alliance agreements stipulate that any major decisions taken by the alliance leadership team must be unanimous. This process ensures that proper risk registers are made, the design is constructible, and there are “no surprises” during execution. The SCIRT case example reported that there are fewer design changes after construction commences if the ECI has been executed properly for each project of the program.

An alliance relies on the principle of early contractor input. An ECI is a model that is used in alliancing similar to the U.S. CMGC preconstruction services phase. The procurement model is named after the process of involving the general contractor early in the project life cycle, notably during the initial planning and design stages. However, where an alliance is based on a formal cooperation between all parties, the ECI works on the basis of the client hiring the main contractor who then takes responsibility for the design process to a point where a reliable target price for construction can be made (NZTA 2012). In terms of the control of information and other activities that occur before construction the models are very much alike. Both the SCIRT and Northern Gateway Toll Road cases are good examples of this. Mosey (2009) for instance relates the following series of benefits derived from using the ECI model in the building procurement process:

- Designs—designs can be developed with the main contractor and specialist subcontractor to establish their constructability and affordability at an early stage.
- Costs—the cost plan developed by the cost consultant can be tested for affordability with the general contractor and with subcontractor bidders at each stage of design development.
- Risks—risk management actions can be agreed to and implemented without delaying the start on site.
- Joint activities—time and processes can be created for joint agency/consultant/contractor activities such as value engineering and joint risk management activities, and for the agreement of outputs from such activities, without delaying the start on site.
- Program—the construction phase program can be agreed prior to the start on site, including key dates for

activities such as the release of remaining consultants, contractor design details, and the pricing and approval of provisional sum items.

- Subcontractor appointments—subcontractor appointments can be finalized by the general contractor prior to the start on site, creating greater cost certainty and greater subcontractor commitment.

Figure 19 shows the early contractor involvement in a typical SCIRT project.

The purpose of the ECI in the SCIRT alliance is to reduce the risk to the client organizations through constructability input from the delivery team's dedicated ECI teams. An objective for the ECI in the SCIRT alliance is to provide means, methods, and risk input to the TOC development for each project. As soon as a project is defined and allocated to a design team, an ECI team will be assigned. During the design there is continuous communication between these teams to ensure both are fully informed on the potential impact of alternatives under review on the TOC and the schedule. In addition, the project receives constructability input. The ECI team is then required to provide the estimating team with deliverables to ensure the TOC is based on a price that reflects the correct methodology, and safe management of traffic and all risks have been identified and evaluated.

Procedures for Controlling the Design Review Process by Agency Designers

Personnel from the agency are seconded to the alliance; they are therefore involved in the entire process, which makes review easier and available earlier. Ross (2003) provides a summation of the scope variation alignment process. Scope changes are possible for instance if the owner wants to include an extra facility that was not previously part of the project and therefore is not included in the TOC. A notable exception here is the case for the Northern Gateway, where the alliance opted for a more durable pavement that was not agreed on beforehand. In this instance the alliance chose to carry the cost. The rationale for this was to enhance the alliance's public image. The alliance did not want to be associated with expected pavement failure in the medium to long term on a tolled facility.

It is the responsibility of the alliance leadership team to determine if potential changes constitute a variation in project plan or a scope change. During the initial project agreement, before the agency's notice to proceed is issued, a variation guidelines document will be created that contains scenarios that may arise during the design and execution. This document does not become part of the alliance agreement; rather, it is meant as an informal reference document (Ross 2003). According to the alliance contracting guidelines (2011), any scope variations that occur during the construction will generally involve a change to which the owner must give approval.

Payment Provisions and Incentive/Disincentive Provisions Related to Performance

Payment is done through the 3-Limb system; however, agencies have sometimes used an extra bonus account. For instance, the Northern Gateway had set apart approximately 1% of TOC for additional KPI performance. Contractors consistently make these targets because they are seen as "easy money" and they are perceived to be an effective method for the client to reach certain social or environmental goals as observed in the Northern Gateway and SCIRT cases.

The earlier discussion leads to the conclusion that alliancing does not alter post-award design administration procedures in a significant manner. Its impact is primarily on enhanced information flow between all members during the design process.

ALLIANCE CONSTRUCTION ADMINISTRATION PROCEDURES

Again, once construction starts, the administration process is very similar to the traditional construction administration procedures in effect at a typical public agency. The major difference is the amount of attention that is paid to non-cost KRAs and KPIs, since the NOPs are able to increase their overall margin by delivering a product that is better than the one shown in the documents.

Design and Construction Quality Assurance Method Differences in Alliance Projects

Quality assurance within the SCIRT alliance is based on self-reporting of noncompliance and joint resolution by the alliance management team of all noncompliance reports. The project direction, deliverables, and quality are set out in the project commercial framework and the NOPs verify and assure their work. There are usually standard assurance principles; however, they are measured in-house.

Quality is one of the strong points of an alliance. In the Northern Gateway case example, the project team opted to increase the pavement quality at the project team's expense. It was observed that the original design was not sufficient. Because that design was used in the TOC, no extra money was available and hence the cost was carried by the alliance itself. Other examples include increasing the quality of items to lower the whole life costing, as was found in the SCIRT and MHX case example projects.

Reporting Value for Money

An alliance does not generally know the estimated cost before it is formed. The Hooggelegen case is an exception in that it had a cost ceiling. Traditionally, procured projects have a well-defined scope and a fixed cost. In an alliance, the project means and methods, deliverables, and TOC are established after the participants have set up an alliance and signed the project

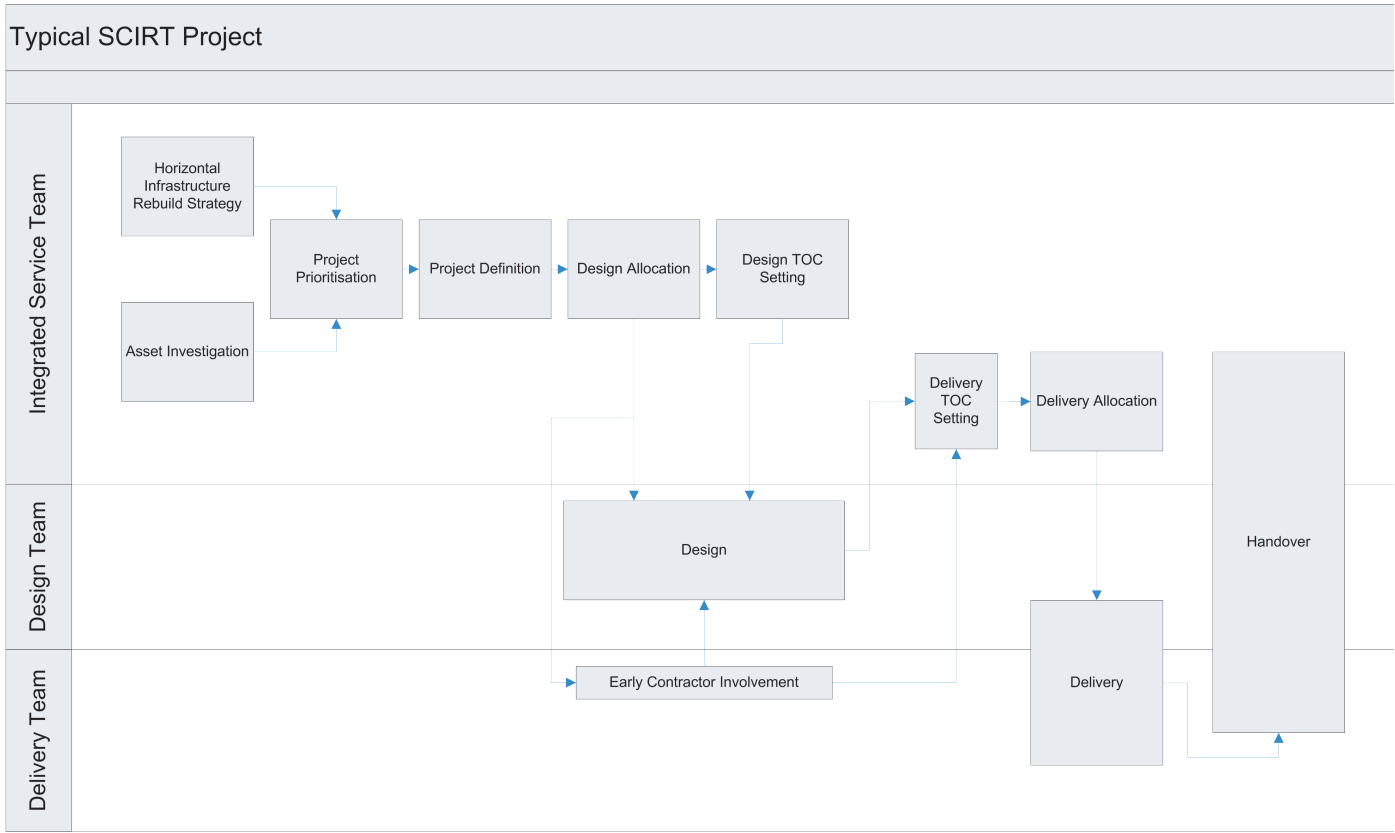


FIGURE 19 Project stages in SCIRT.

alliance agreement. This means that the alliance “self-approves” deliverables. It is therefore important to show that public funding has been well spent. Sometimes a competitive alliance or a collaborative alliance (MHX and SCIRT cases, respectively) can assist in making the VfM money business cases based on the competition that occurs prior to alliance execution or after the Project Alliance Agreement (PAA). A definition of VfM is “a measure where the required benefits (including quality levels, performance standards, and other policy objectives such as social and environmental impacts) are balanced and judged against the cost (price and risk exposure) of achieving those benefits” (ADIT 2011). The assessing of VfM in an alliance is needed for the alliance to demonstrate to the client and, conversely, the client to the government that the selection of the NOPs, the project solution, the TOC, and the legal and commercial framework were demonstrably best-in-market. It should show where the alliance has succeeded or failed to achieve the project goals as set out in the PAA (ADIT 2011).

Procedures to Modify the Alliance Agreement When Changes Are Encountered

With increasing complexity, the project costs will be less certain and the bids will incur increasing risk premiums and/or the projects will have significant variations as the work progresses. This can lead to significant time and effort spent negotiating variations to the original agreement, which can be time-consuming and costly. Alliance contracting provides an alternative approach where the buyer and seller collaborate to develop the requirements and the proposal, combining their knowledge and experience to address the complexities and unknowns. They share exposure to the project outcome, which forms the basis of the commercial framework. The buyer and seller are aligned as minimizing actual cost to the buyer and increasing profit to the seller. Time otherwise spent negotiating variations under a traditional contract becomes time spent finding the best solution to resolve issues and problems through the life of the project. The time and energy of the leadership team is spent on value-adding activities rather than contractual disputes; solving the overall project outcome is the objective and this aligns to each party’s individual commercial objectives. Changes in alliance contracts are rare; however, in the Netherlands case it was deemed necessary, as alliance contract close-out procedures were necessary, including the determination of each party’s share of the gain or loss.

Contract Termination and Default Issues

Even if the participants meet their obligation to act in good faith this does not change the outcome or financial implications of their performance. That is, whether or not the participants have exercised good faith in the decision-making process the cost and time objectives of the project will still need to be achieved, and the actual outcomes of the project will be dealt with under the commercial framework. Ultimately, the owner will bear the consequences of the project’s outcomes regardless of the exercise of good faith by the other participants. Also, the good faith bargain can be hard to enforce. Under most alliance con-

tracts, failure to act in good faith is treated as a willful default. However, identifying what is not good faith can be difficult. The development of the project alliance agreement would assist in creating more objective standards of conduct for the alliance participants (ADIT 2011).

Partnering Documents

The alliance arrangements are sometimes used as an adjunct to a separate principle agreement, and the alliance arrangements may be binding or nonbinding. An agreement may range from a statement of general principle to a more contractually specific document. In comparison, the UK construction sector has moved toward incorporation of the partnering and alliancing principles into the underlying contractual documentation. A number of standard form partnering and alliancing agreements have been developed such as the Joint Contract Tribunal Framework Agreement, the New Engineering Contract Partnering Option, the PPC2000 Association of Consulting Architects Standard Form of Contract for Project Partnering, and the Be Collaborative Contract, all of which are UK forms. Equally, alliancing agreements have been drafted as stand-alone documents specifically for a particular project. Agreements drafted for specific projects or where the partnering and alliancing principles are an integral part of the contract are often drafted to share risk more or less equally between the parties with a cost reimbursement mechanism and incentive payments. Further, some of these contracts, particularly those developed outside the United Kingdom, purport to contain “no dispute” provisions (Hall 2009).

Alliance agreements often contain “agree to agree” clauses (all cases except the Hooggelegen case where this clause was purely voluntary). The Australian Government recognizes that agree to agree agreements are not legally enforceable (ADIT 2011). Participants need to uphold the ideals of an alliance and act in agreement with the alliance principles. If there is no clear documentation of measurable behavior, willful default is hard to prove. It advises that alliance agreements need to include as many of the terms between participants as possible, while not impeding the flexibility of the alliance. This will strengthen the case of the argument that the participants intended to be bound by the agreement. However, if a party is unable to come to an agreement, it may be held that agreement between the parties is (partly) unenforceable.

All of this discussion leads to the conclusion that alliancing does not alter post-award construction administration procedures in a significant manner. Its impact is primarily on open books accounting and internal dispute resolution without resort to litigation during the construction process.

APPLYING ALLIANCING WITHIN EXISTING U.S. AGENCY CONSTRAINTS

The U.S. construction industry has been characterized as adversarial (Johnson et al. 2013); however, so are construction industries in Australia, New Zealand, and the Netherlands

(van den Berg et al. 2006; Raisbeck et al. 2010). For example, in 2001 there was an investigation in the Netherlands followed by a Parliamentary Hearing of the major construction companies. The contractors were found guilty of price-fixing government projects for which they were fined. Still, despite the bad publicity generated by that incident, within five years the Dutch Ministry of Transport had started its first alliance project.

Developing the U.S. Business Case

From the cases and the literature search, it appears that alliances are most appropriate for large, complex projects with high-risk profiles and ill-defined scopes at the time the alliance is formed. However, alliancing is a model that is not best suited for all projects. If a project has few unknowns and a predictable outcome, the agency can award a contract to a low bidder by utilizing traditional procurement models such as DBB. Both parties, the agency, and the contractors build their own risk assessment into their price and stand to win or lose if the risk outcome is higher or lower than predicted for each (ADIT 2011). The resulting contract encompasses both the project requirements and the tender documents, allowing variations to be made to the scope as the work progresses.

Where projects are more complex, with more unknowns, and the parties have less ability to confidently predict the outcome using traditional contracting, the parties will allow for higher levels of risk which will mean a higher tendered price, and/or they will have significant variations as the work progresses. This can lead to highly complex risk-allocation models and commercial frameworks with significant time and effort spent negotiating variations to the original agreement. Resolving these variations can be time consuming and costly. (ADIT 2011)

The alliance approach provides an alternate route. The client and NOPs collaborate to develop the project requirements and the TOC. Their combined knowledge, experience, and resources are used to address complexities and unknowns. In this way the TOC, schedule, and other deliverables are fully integrated giving an increased confidence in the outcome. The parties of an alliance share exposure to the project outcome, which forms the basis of the commercial framework. Both the agency and the NOPs are therefore aligned in decreasing the life-cycle cost to the owner and maximizing profit to the NOPs (ADIT 2011).

Comparing Alliancing with Current Project Delivery Methods

Although conducting a direct comparison of currently authorized project delivery methods requires some conjecture as well as a few far-reaching assumptions, the comparison can be made in a very broad sense. One such assumption is that U.S. public agencies would be opposed to unanimous decision making with its consultants and contractors. Table 1 in chapter one contained a number of operational features of the alliance concept. Using that list as the basis for a broad

comparative analysis of project delivery methods in use in the United States in the context of alliancing's operational features leads one to infer that CMGC is the U.S. delivery method that best embodies the operational features of alliance contracting. While IPD may embody most of the alliancing philosophy, it was developed for architectural projects and as such is ill-suited for use on infrastructure projects where the number of participants is much smaller and the scale of the work is much greater. Thus, it can be concluded that CMGC with its early contractor involvement in the preconstruction phase appears to bring the most alliance-like benefits in terms of the ability to collaborate in a meaningful manner before the project's target cost is established.

Agencies with CMGC statutory authority that are interested in implementing alliancing could gain some of alliancing's benefits by selecting the CMGC contractor as early as practical in the project development process. Thus, the CMGC contractor could assist in planning and preliminary engineering rather than typically waiting until final design as is the current practice (West et al. 2012). If the agency outsources design services, the same timing could be used to retain the engineering design consultant, which would bring the three primary stakeholders together at the earliest possible opportunity and permit the preferred alternative to be developed jointly during the NEPA process.

A second option for smaller repetitive projects would be to award indefinite delivery/indefinite quantity (IDIQ) contracts for planning and design services and for CMGC delivery of the resulting construction work orders (Scheepbouwer and Gransberg 2014). In this scenario, the three stakeholders would collaborate on a series of similar projects over a period of years, and if the arrangement worked well it could potentially create the gainshare/painshare environment found in alliance contracts.

CONCLUSIONS

The analysis conducted in this chapter arrived at the following three conclusions:

1. Alliancing does not alter post-award design administration procedures in a substantial manner. Its impact is primarily on enhanced information flow between all members during the design process.
2. Alliancing does not alter post-award construction administration procedures in a substantial manner. Its impact is primarily on open books accounting and internal dispute resolution without resort to litigation during the construction process.
3. CMGC may bring the most alliance-like benefits to an infrastructure project in terms of the ability to collaborate in a meaningful manner before the project's target cost is established.

CHAPTER FIVE

ALLIANCE CONTRACTING LEGAL ISSUES**INTRODUCTION**

There are a number of legal issues that are unique to public sector alliance contracts, and they fall into two categories. The first category arises from the notion that the duties, relationships, and risk-reward allocations among the signatories to the contract are much different than those associated with other contracting approaches. Consequently, the terms and conditions of an alliance agreement stand in sharp contrast with those found in the typical design and construction contracts used on DBB, DB, and CMGC projects. The second category of unique legal issues arises from the limitations public agencies have in entering into new contracting approaches, particularly when they involve risk sharing arrangements such as those contemplated by alliance contracts. This means that an agency, before even considering the use of alliance contracting, would have to first confirm its legislative and regulatory authority to procure an alliance contractor, and then determine the extent to which it could truly share risks. This chapter will provide an overview of each of these categories of legal issues.

UNIQUE CONTRACT TERMS AND CONDITIONS

Because no public sector alliance contract has yet been performed in the United States, it is beyond the scope of this synthesis to discuss in detail the contract provisions of a typical alliance contract. However, because the principles of alliance contracting are so intertwined with the alliance agreement itself, it is appropriate to briefly identify key terms and conditions that a federal, state, or local U.S. public agency might have to consider if it were to use an alliance contracting approach.

Before reviewing specific terms and conditions it is important to consider how different the general tone and style of an alliance agreement is compared with traditional contracts. The key is that these agreements are written to reflect the partnering and collaborative principles discussed in chapter one. For example, the parties are often referred to in the first party rather than the third person—that is, “we will” rather than “the parties will.” They also establish broad, behavioral commitments, as illustrated by the following example:

- 1.1 We will work together in an innovative, cooperative, and open book manner so as to produce outstanding results in delivering the Alliance Works (in accordance with the Scope and Design Brief set out in Schedule 2).

- 1.2 We acknowledge that a key purpose of our alliance is to avoid disputation and we commit to notify each other of perceived or real differences of opinion or conflicts of interest immediately [as] they arise and to strive to promptly resolve those differences or conflicts (VDTF 2006).

In addition, many of the general principles and features of an alliance contracting arrangement become key components of the alliance agreement. Consider the following topics discussed in Table 2:

- **Governance and Management.** The agreement will ordinarily establish a collective leadership model, whereby decisions will be made jointly and unanimously, and information will be shared fully and transparently. Many of the procedural and administrative requirements normally included in a typical design and construction contract are either not included at all or are expressed in terms of joint processes and procedures (VDTF 2006).
- **Principles of Conduct.** The agreement will discuss how decisions will be made in the best interest of the project and describe the project’s objectives.
- **Compensation Model.** The compensation model will reflect a comprehensive framework for sharing risks and rewards, as evident by the case studies set forth in chapter two.
- **No-Fault and No-Blame Culture.** Because the principles of the alliance are project-focused and preclude liability between/among the parties, the agreement will reflect this philosophy and describe the limited circumstances where liability may arise.

Stated simply, the collaborative nature of a typical alliance agreement will make it unfamiliar to many of those working in the U.S. public sector construction community. The sections that follow, which address some of the most unique substantive aspects of an alliance agreement, will also highlight concepts that will be unfamiliar to those working in a typical public sector agency.

Governance and Decision Making

Even though an alliance agreement is not a joint venture (JV) agreement, it has some features that look similar to those one would ordinarily find in a JV agreement—particularly in the area of governance and decision making.

As with JVs, alliance members often create both a senior leadership team and a project management team to run the project. The senior leadership team's primary responsibility is to operate at a high level and ensure that the alliance members and the project management team think of the collective interests of the project and not act in their own self-interest. Consistent with this, the alliance agreement will typically establish a list of responsibilities for the leadership team, including requiring that the team: (1) act as champions for the principles and objectives of the alliance; (2) set policy; (3) give philosophical and strategic direction for the alliance; (4) provide high-level leadership; (5) monitor the performance of the alliance; and (6) resolve differences that might arise between the parties. Importantly, it will also generally require that all decisions be made unanimously, subject to certain "owner-reserved" powers identified in the agreement that enable the owner to act unilaterally under certain circumstances—often associated with a legislative requirement.

Unlike the leadership team, there is often more flexibility afforded to how decisions are made at the project management level. The project management team will typically be led by an alliance manager, who is authorized by the leadership team and the agreement to make decisions and give directions. Because of the pragmatic issues involved in this process, this individual need not gain unanimity in making decisions, although clearly it is important that he or she be making reasonable efforts to arrive at a consensus. The power of the manager, and the standards by which he or she will consult with other members of the management team, will be set forth in the alliance agreement.

This governance and decision-making process stands in contrast to a typical design or construction contract (including those found under DB, CMGC, and P3 relationships). Under these contracts there are clear hierarchies and chains of command, establishing not only who is to report to whom, but also which party has the authority to require another party to perform, even if it disagrees with the decision.

No Blame and No Disputes

Because collaboration and a "project first" mentality are inherent in an alliance contracting philosophy, the alliance agreement specifically reinforces and elaborates upon the concept that the parties will adopt a "no blame" and "no disputes" approach to their relationship. As observed in chapter one, these concepts are the ones that are the farthest away from current North American project procurement culture.

In articulating these concepts, the typical alliance agreement will include a number of provisions including the commitment to:

- Work cooperatively to identify and resolve issues to the mutual satisfaction of the parties so as to avoid all forms of dispute.

- Promptly notify the other party of any dispute or potential dispute when it arises and, if the issue cannot be resolved at the management level, elevating the dispute to the leadership team.
- Have the leadership team take whatever action is necessary to reach a unanimous resolution of the dispute, which might include the retention of a neutral third party (e.g., mediator).

The agreement may also specifically state that if an alliance member is professionally negligent in performing its duties and remedial work is required, that the members will work together to carry out the remedial work, and that the costs will be considered an alliance cost, subject to the gainshare/painshare provisions of the agreement. This means that the owner will have no remedy under the agreement against the other alliance members for losses suffered as a result of these members doing something wrong.

Even though the concept of no blame and no disputes is a major part of the alliance framework, there are exceptions routinely put into the agreement. The two most common are: (1) the insolvency of one of the alliance members; and (2) willful default by one of the parties. The term "willful default" can mean different things to different people and this is frequently addressed in the agreement. Some examples of willful default that are contained in alliance agreements found in the literature include:

- Deliberate or reckless conduct that the member knew or should have known would cause problems for another member;
- Failure to honor an indemnity;
- Failure to make a payment that is due under the agreement;
- Material failure to effect required insurance;
- Intentional failure to honor open book audit obligations;
- Intentional breach of obligations to third parties relative to intellectual property; and
- Fraudulent conduct (VDTF 2006).

Indemnity

As suggested by the above-referenced definition of willful default, an alliance agreement will typically have indemnity provisions. Unlike many contracts found under DBB, DB, CMGC, and P3 relationships the indemnity clauses focus on third-party claims—not claims arising between the alliance members. Typical third-party indemnities might address intellectual property rights, tax liabilities, and personal injury and property damage. Needless to say, the major challenge with drafting this clause is that it has to be in harmony with the no blame alliance culture. This is particularly true with personal injury and property damage claims that might arise from work performed on the project site and the issue of whether a simple "accident" results in one of the parties bearing responsibility outside of the gainshare/painshare structure.

Compensation and Payment

The key commercial provisions of the alliance agreement are tied to the compensation structure and gainshare and painshare formula. Because this is discussed in detail elsewhere in the synthesis it will not be elaborated upon in this chapter. Suffice it to say that, given the no blame and no disputes provisions, these provisions are the subject of considerable attention by the parties negotiating the agreement.

Other Notable Provisions

The alliance agreement will have a number of provisions that are familiar to construction participants under other delivery systems, such as (1) termination rights, (2) division of responsibility charts, (3) insurance requirements, and (4) a delineation of how intellectual property will be handled.

INTEGRATED PROJECT DELIVERY CONTRACTS

There are two standard form industry contracts that promote the use of IPD on U.S. projects: (1) ConsensusDOCS 300, *Standard Form of Tri-Party Agreement for Collaborative Project Delivery*; and (2) AIA Document C191, *Standard Form Multi-Party Agreement for Integrated Project Delivery*. These documents assume that the owner, architect, and contractor will be signatories to the contract, and AIA's document allows for other parties to be signatories as well. Based on the literature search undertaken as part of this synthesis, as well as the collective experience of the authors, the IPD (and hence the aforementioned contracts) has only been used to date on private sector projects, principally in the health care arena.

Each of these contracts has provisions addressing: (1) joint decision making, (2) shared risk, (3) budget development and management, (4) gainshare and painshare, and (5) dispute resolution processes. Despite the topical similarities to provisions in the international alliancing agreements discussed in this synthesis, IPD standard form contracts differ substantially from alliance contracts—particularly in terms of the level of risk that is assumed by the owner. The risk sharing process in both the AIA and ConsensusDOCS forms more closely resembles the guaranteed maximum price contracts used in DB and CMGC than those contracts used in a pure alliancing relationship. This is in large part because they require the non-owner team members to ultimately provide a price certain to the owner, and there are financial consequences to the team members that go beyond a typical gainshare/painshare formula. They also have provisions calling for arbitration of disputes, which is contrary to the pure alliancing agreement approach of no disputes.

In addition to these industry contracts, the literature discusses other forms of IPD contracts in use on healthcare projects, including Sutter Health's Integrated Form of Agreement

(Miller et al. 2009). Given that the IPD contracts have not been used on any public sector projects, and that the literature is rich with scholarly articles on IPD contracts and their relationships (O'Connor 2009), it is beyond the scope of this synthesis to delve into the details of these contracts.

Contracts That Use Alliancing Principles

As discussed earlier in this synthesis, other project delivery systems, notably DB and CMGC, are structured to take advantage of the principles of collaboration in alliance contracting. Consequently, some DB, CMGC, and P3 contracts will have provisions that, among other things: (1) reference the intent of the parties to partner with each and act in the best interests of the project; (2) establish executive board meetings between the parties to proactively address the relationship of the parties and obtain early notice of problems; and (3) contain informal dispute resolution processes that strive to resolve any problems early and without resort to litigation or arbitration.

Likewise, delivery systems other than alliance contracting can have broad and creative ways to balance the risk-reward profile of those working for the owner. Depending on how the owner procures the design-builder and CMGC contractor, this risk-reward discussion can start in negotiating the contract and having an open-book process of assessing the "price" of risk that will be included in the underlying contract. Similarly, public owners have been willing to use contract incentives—such as shared savings and performance bonuses—to further their project goals.

Notwithstanding how collaborative these DB, CMGC, or P3 contracts are, or how creatively and equitably risks-rewards are balanced, they do not represent the type of "pure" international alliancing contracts discussed in this synthesis—similar to the IPD contracts that were discussed earlier. The principle reasons for this are:

- Alliancing contracts are often entered into among three or more parties, as opposed to the two-party contracts found in DB, CMGC, and P3 relationships.
- Alliancing contracts use joint decision making, whereas other delivery systems place the owner in the ultimate decision-making role and have defined hierarchies of structure as to who reports to whom.
- Alliancing contracts do not limit the amount of money that an owner will pay for the project, given the compensation structure and gainshare/painshare formula, whereas DB, CMGC, and P3 contracts, unless they are performed on a pure cost-reimbursable basis, have guaranteed maximum price and fixed-price contracting approaches.
- The no blame and no disputes process in alliancing contracts is not used under contracts from other delivery systems.

CHALLENGES TO USING ALLIANCE CONTRACTING ON U.S. PUBLIC SECTOR CONSTRUCTION PROJECTS

There are many factors that public owners consider in determining the project delivery approach for a given project, including their statutory authority, procurement and contracting limitations, and overall project goals. Critical thought is particularly necessary if the agency is contemplating alliancing contracting, where the relationships between the parties, the gainshare/painshare structure, and the no disputes process involve concepts far different from other public sector delivery alternatives.

Although there are public projects that have used collaboration techniques and creative risk sharing, the literature search did not uncover any U.S. public sector construction projects that used alliance contracting. Consequently, there are no case studies that elaborate upon why the public owner made the decision to use alliancing and how they addressed their procurement and contracting challenges. Notwithstanding this, there are several important issues that could influence the likelihood that U.S. public agencies will use alliancing and these are discussed here.

Enforceability of “No Disputes” and “No Blame” Contract Provisions

The typical alliancing agreement puts teeth in the principle of collaboration through a combination of no blame and no disputes contract language and compensation principles aside from “painshare” contributions, where the owner will ultimately pay its alliance members for their costs in performing the work. A fundamental legal issue is whether the concept of no blame and no disputes is enforceable under U.S. law, regardless of whether the owner is public or private.

This issue raises a number of unanswered questions, such as the following.

- Can either party to a contract, particularly a public owner, agree at the time of contract—before any issues and conflicts have arisen—to give up its constitutional right to seek redress in the courts?
- Can a party that is clearly negligent stand behind this clause and be paid for fixing its own work?
- Would U.S. courts find this against public policy?
- What happens if there are latent defects in the work discovered years later?
- Will a contractual waiver of the parties’ rights to claim be more enforceable than a no disputes provision, and can a public agency do this?

The literature search did not reveal any examples where parties to an alliance contract actually had a dispute and tried to test these issues. One comprehensive legal study of the Australian alliancing experience, found “no documented

case of alliance or leadership team deadlock or frustration” (Gallagher 2008). However, there are many examples of U.S. construction cases where courts found that liability clauses that tried to limit a party’s liability for negligence were not enforceable and against public policy. Likewise, there are cases where indemnity agreements that purported to absolve a party’s liability when it did something wrong were found to be unenforceable. Contractual waivers of claims have not fared any better under U.S. law, as courts are reluctant to let a party give away its rights without knowing how badly damaged it might be. Add to this that most states (as well as the federal government) have statutes that grant the ability of contractors to sue or arbitrate against agencies, and agencies to have recourse against their contractors if something goes wrong. All of this makes it difficult to imagine that a U.S. public agency could implement the no blame and no dispute feature of alliance contracting without having statutory authority that expressly says how all of this would work.

Insurance

There is a significant insurance challenge in using alliance contracting, regardless of whether the process is expressed in terms of the no blame and no disputes concept or the IPD approach, where waivers of claims are used. The key challenge is that liability insurance is fault-based, with liability based on the insured having done something wrong. This does not pose a problem in dealing with claims by third parties, such as those arising from bodily injury and property damage. As in a traditional project, these third-party claims should be coverable under commercial general liability policies or professional liability policies if the claim arises out of deficient design or other professional services.

The challenge arises in addressing claims by the alliance partner who believes that it has a professional liability claim against another partner—as might be the case of a contractor or owner being impacted by the designer’s negligence. Professional liability insurance are “claims-made” policies that are triggered by someone other than the insured (i.e., the designer) making a claim against the insured for a loss arising out its negligent act, error, or omission. In the case of an alliance agreement, where each party’s claims against the other parties are limited to insolvency or willful default, and there is a no dispute process in the agreement, there is no right to sue the designer for its negligence.

Consider the situation where the alliancing parties use contingency funds, lost profits, or painshare expenses to cover the costs of correcting design errors. This is, in effect, self-insuring the negligence of the designer. If the contractors were working under another delivery system, they could sue the designer and expect that its professional liability policy would respond. However, in alliance contracting they would be precluded from suing the designer to trigger the coverage, or face a waiver of claims argument if the contract did not have a no disputes clause in the contract.

Although the insurance industry has attempted to respond to this, one of the problems is that, to date, there are limited opportunities for alliance-type contracts. The literature did not specifically describe how professional liability insurance is handled in Australia and New Zealand, but did indicate that some of the larger carriers are offering rectification coverage for IPD projects in the United States. “This coverage provides funds to rectify a mistake caused by professional negligence during the design and construction phases, but this coverage is available only for the largest projects under project-specific IPD policies” (Harness 2014). Rectification insurance covers losses caused by the negligence of all parties named as insureds in the policy, which could be all or most members of an alliance team.

The literature makes it clear that assessing the insurance ramifications on alliancing agreements is complicated and that there are changes taking place in the industry to respond to the markets (VDTF 2006). However, from a U.S. public owner’s perspective, the implementation complications and uncertainties, coupled with the potential loss of coverage against a designer’s professional liability policy, could negatively affect the agency’s interest in using an alliancing arrangement.

Antideficiency Act and the Impact of Cost-reimbursable Contracts

The federal Antideficiency Act prohibits federal agencies from obligating or expending federal funds in advance or in excess of an appropriation, apportionment, or certain administrative subdivisions of those funds (31 U.S.C. §§ 1341, 1517(a)). Stated differently, the Antideficiency Act prohibits the federal government from entering into a contract that is not “fully funded,” because doing so would obligate the government in the absence of an appropriation adequate to the needs of the contract. States and other government agencies have similar requirements.

There have been questions about the impact of the federal Antideficiency Act in terms of indemnification—that is, would the federal government be violating the Antideficiency Act if it indemnified a contractor for damages, costs, or fees, or any other loss or liability? In 2013, the Federal Acquisition Regulatory Council published a new interim rule that precluded the government from entering into open-ended, unrestricted indemnification clauses because they violated the Antideficiency Act (Covington and Burling 2013). Although there are some exceptions to this, the interim rule and its accompanying legislative record makes it clear that there are consequences to having unbounded financial obligations in any contract that the federal government enters.

The application of the Antideficiency Act and its similar state-specific laws to an alliancing contract is unclear, but potentially challenging. Governments do sometimes agree to cost reimbursement relationships, although they are highly constrained. One of the most significant constraints is that

there be a determination and findings that (1) this contract type is likely to be less costly than any other type; or (2) it is impractical to obtain supplies or services of a kind or quality required without the use of this contract type. Most construction projects will not meet these requirements and they are infrequently used. However, the coupling of the Antideficiency Act and this constraint may hinder an agency from going down the path of considering an alliance arrangement.

Joint Management and Unanimous Decision Making

Another cornerstone of alliance contracting—joint management and unanimous decision making—is challenged in the public sector. Agencies generally have contracting officers, and there are major questions as to whether they can operate in an environment where decisions are made unanimously by those who would ordinarily be independent contracting parties with the government.

Mitigating/Overcoming the Challenges

Although the above-referenced challenges suggest that pure alliancing contracting is not practical for the U.S. public sector construction market, there are several strategies that an agency can use to mitigate or overcome these challenges. The most effective way is for a state to promulgate specific enabling legislation that addresses all of the nuances associated with alliance contracting. This has been done for DB and CMGC, and most recently with P3. In the early 1990s, each of these delivery systems posed virtually insurmountable procurement and contracting obstacles for both federal and state agencies. However, as legislators eventually recognized that these delivery systems provided some major benefits over the status quo, they passed legislation and regulations were implemented to facilitate their use. There is no reason to believe that the same would not take place with the use of alliancing if and/or when someone in leadership at the federal or state level decides that this is a delivery system that needs to be placed into an agency’s “tool-belt.” To overcome the concept that this approach is far different than the fixed price and blame models prevalent in most public sector construction programs, an interested agency might advocate for creating a pilot program to test out the use of alliancing on a specific set of projects and then evaluate the outcomes in an analytical manner.

While special legislation is the most effective solution, state DOTs may be able to use some form of alliancing under either Special Experimental Project No. 14 Alternative Contracting (SEP-14) or Special Experimental Project No. 15 (SEP-15) to Explore Alternate and Innovative Approaches to General Project Development Process. There is no indication that this has been attempted as of the date of this Synthesis. However, it is reasonable to believe that the fundamental purpose of both SEP-14 and SEP-15 would be served by allowing an agency to use alliancing for a particular project.

Strategy for Harmonizing Alliancing with the Antideficiency Act

Regardless of whether special legislation is passed or SEP-14/SEP-15 is used, an agency will have to deal with the issue of the relevant Antideficiency Act legislation. One possible strategy for mitigating this challenge is for the sponsoring agency to appropriate funding for the project that is based on a budget that has appropriate contingencies. If done so, it is then reasonable to conclude that Antideficiency Act considerations have been met because of the following:

1. Alliancing contracts require all parties to manage to the budget;
2. The contract can be executed in phases (for, among other reasons, to allow the owner to make informed decisions on how to proceed vis-à-vis the budget); and
3. The contract will have a termination for convenience clause.

As for using an open-ended indemnity arrangement, it may be that the agency and its alliancing parties will simply have to leave this provision out of the contract, as it poses Antideficiency Act obstacles. Finally, one must keep in mind that it is also not absolutely essential to making the alliancing arrangement work exactly as it does overseas. Given the complexities of the U.S. legal issues, interested agencies are advised to obtain opinions from their chief legal official as to whether what is being proposed complies with applicable law.

CONCLUSIONS

The results of this chapter revealed the following four conclusions:

1. Alliancing agreements contain provisions that are unusual to typical public sector construction contracting in that they advocate:
 - Joint management and unanimous decision making,
 - No blame and no disputes, and
 - Payment to the alliance team members on a cost-reimbursable basis, with gainshare/painshare relationships that limit the potential exposure of the members to the project's owner.
2. There are some significant challenges that U.S. transportation agencies will face in using alliance contracting, including the authority to contract on a cost-reimbursable basis with limited recourse against the design and construction teams.
3. The no dispute aspects of alliance contracting create insurance and legal challenges, particularly in relation to whether parties can negotiate away their rights to seek legal recourse if they have been wronged.
4. An agency will have to deal with the issue of the relevant Antideficiency Act legislation. Various mitigating strategies seem possible; however, interested agencies are advised to obtain opinions from their chief legal official as to whether what is being proposed complies with applicable law.

CHAPTER SIX

CONCLUSIONS, EFFECTIVE PRACTICES, AND SUGGESTIONS FOR FUTURE RESEARCH

INTRODUCTION

This chapter consolidates the conclusions and effective practices developed in accordance with the chapter one protocols. The most significant finding is:

Alliancing appears to be an excellent choice to deliver complex projects that require innovative solutions to the challenges presented in their scopes of work.

In addition, it was found that the primary motivation for implementing alliance project delivery was to leverage the interrelationships necessary to manage complex projects and benefit from the innovation produced by chaos by building a highly integrated and highly collaborative project execution environment where decisions are made using “best for project” as the default decision criterion.

Put another way, if the agency’s primary motivation is to compress the schedule or minimize costs they should use other authorized project delivery with which they are familiar. Alliancing is best reserved for extremely complex, high-risk projects where the sheer number of external stakeholders requires a highly integrated and highly collaborative project delivery team.

CONCLUSIONS

The following conclusions can be drawn from this synthesis report:

- There are three separate and distinct models for alliance contracting:
 - Pure alliance,
 - Competitive alliance, and
 - Collaborative alliance.
- Once they are granted enabling authority, North American transportation agencies could most likely use alliance contracting to enhance the level of integration and collaboration on the same types of projects that they delivered before with public-private partnerships (P3), design-build (DB), or construction manager/general contractor (CMGC).
- Alliance project partners could in most cases be selected using a form of the U.S. qualification-based selection procurement method currently used by agencies to select engineering design consultants and CMGC contractors.
- Implementing alliancing will require agencies to develop an education and outreach strategy to overcome internal and construction industry resistance to change.
- Washington State Department of Transportation’s one attempt to experiment with alliancing leads to the conclusion that implementing alliance contract project delivery may appear to be feasible in the United States under most of the current statutory constraints on procurement.
- The findings of the Federal Acquisition Regulation analysis shown in Table 14 shows that implementing alliance contracting will be complex but not impossible. As with most alternative delivery methods, it may require an agency to specifically seek enabling legislation.
- Projects that are good candidates for alliance contracting delivery are highly complex projects worth AU\$50 million (~U.S. \$47 million) or more. They have high-risk profiles with a “potential for a substantial change in project scope” and therefore require flexibility to make decisions and change plans in an expeditious and agile manner. The risk profile is complicated by a large number of external stakeholders and often an aggressive schedule.
- Alliance contracting procurement demands that a significant amount of weight be placed on the compatibility of the personalities of the key personnel, unlike other alternative project delivery methods where the emphasis on key personnel focuses on their experience and credentials.
- Implementing alliance contracting will require North American agencies to shift their risk management programs away from risk shedding and risk allocating to real risk sharing to benefit from alliance delivery.
- Alliancing does not significantly alter post-award design or construction administration procedures.
- Alliancing agreements contain provisions that are unusual in typical U.S. public sector construction contracting in that they advocate:
 - Joint management and unanimous decision making,
 - No blame and no disputes, and
 - Payment to the alliance team members on a cost-reimbursable basis, with gainshare/painshare relationships that limit the potential exposure of the members to the project’s owner.
- There are some significant challenges that U.S. transportation agencies will face in using alliance contracting,

including the authority to contract on a cost-reimbursable basis with limited recourse against the design and construction teams.

- The “no dispute” aspects of alliance contracting create insurance and legal challenges, particularly in relation to whether parties can negotiate away their rights to seek legal recourse if they believe they have been wronged.

EFFECTIVE PRACTICES

The case example projects described in chapter two were the source of most of the effective practices identified in the synthesis. The following is a list of those practices:

- Holding industry outreach meetings prior to advertising for alliance partners provides a forum for interested firms to engage the agency in meaningful dialog that can gain insight on the agency’s objectives in using alliancing to deliver the project.
- It is also effective to engage in public information planning to inform external stakeholders and the general public of the alliance’s performance throughout the course of the project.
- Emphasis on the personalities of each alliance members’ key personnel is the primary issue in qualifying individuals to participate in given alliance team roles and leads to the practice of using scenario testing during the selection process to gauge individuals’ abilities to fully collaborate with people from outside their own company or agency.
- Creating sub-alliances for specific features of work that require specialists to design and build allows limited participation in the gainshare/painshare scheme without exposing the specialty subcontractors to the entire project risk.
- For features of work that are limited in scale and routine in nature, the alliance can let separate sub-contracts to entities that do not join the alliance or take part in the incentive/disincentive schemes.
- The 3-Limb pricing structure has proven itself to be a useful method for establishing the alliance compensation scheme.
- Retaining an independent cost estimator to independently validate the target outturn cost (TOC) before signing the Project Alliance Agreement encourages all parties to the agreement to have more confidence in the TOC’s reasonableness and reality.

FUTURE RESEARCH

Two potential future research projects are identified to fill gaps in the body of knowledge on alliance contracting. The first effort addresses the various legal issues that need to be resolved before the second effort, producing a guidebook for implementing alliancing, can be produced.

1. The procurement culture shift in the relationship between the U.S. public agency owner and its private industry partners in alliance contracting is considerable. Not only do the public employees have to become highly collaborative, they have to accomplish the shift without violating any of the federal and state statutes that were enacted in the procurement culture of supreme distrust to regulate design-bid-build delivery of all public projects. Many of those legal barriers to implementation have been removed in recent years, but there are still several that could present barriers to U.S. agencies that would like to experiment with alliancing to expedite project delivery. The synthesis identified three legal impediments that could create significant potential problems: (1) the Anti-Deficiency Act, (2) the use of open-ended indemnity arrangements, and (3) the liability for design errors and omissions. The proposed research would make an in-depth analysis of alliancing contracts in use overseas and evaluate each major component in the context of appropriate U.S. and state law. Such an analysis would furnish a point-by-point roadmap of the necessary changes that would need to be made for a typical state department of transportation to implement alliance contracting. The final deliverable would be a guidebook to building the legal/statutory/regulatory foundation for the engineers to deliver projects using an alliancing model tailored to the agency’s own statutory environment.
2. AASHTO and NCHRP have a long history of assisting public transportation agencies by adding new tools to their procurement toolbox through the development and dissemination of guidance documents. Therefore, a more thorough research project is proposed to develop a guidebook for implementing alliance contracting in North American transportation agencies. This synthesis found that CMGC project delivery appeared to offer most of alliancing’s benefits and fit the integrated collaboration model around which alliancing revolves. Therefore, research would extend the information developed in this synthesis and the final products of NCHRP 10-85, Guidebook for CMGC Contracting, and produce a guidebook for implementing alliancing.

GLOSSARY OF TERMS AND ACRONYMS

GLOSSARY

- Actual outturn cost (AOC)—“The sum of actual direct project costs and overhead and profit fees.” (ADIT 2011)
- Actual project cost—The sum of the contract amount plus the cost of changes authorized and agreed during the project.
- Alliance—“A delivery model where the owner(s), contractor(s) and consultant(s) work collaboratively as an integrated team and their commercial interests are aligned with actual project outcomes.” (ADIT 2011)
- Capital Improvement Program—The agency’s future work load. The state transportation improvement program (STIP) is an example.
- Client—The entity that owns the completed infrastructure. May be either a public or private entity.
- Collaborative Alliance—An alliance where work is allocated to NOPs recognizing that “[the] relative performance between delivery teams fluctuates. The system allows for poorer performing delivery teams to improve their performance and increase their share of work accordingly. Likewise, high-performing delivery teams must continue to improve or risk being outperformed by another delivery team and losing their share of work.” (NZTA 2012)
- Commercial Framework—“This sets out the structure and principles that govern the NOPs’ remuneration for the project.” (ADIT 2011)
- Competitive alliance—“An alliance where tenderers are selected primarily on the basis of price competition. Typically two tenderers are funded by the alliance owner to develop a design, target cost, and schedule for a project. The [TOC] . . . is used for the selection of the preferred tenderer after which an alliance is entered into for the delivery of the project.” (Queensland 2008)
- Construction manager/general contractor (CMGC)—“. . . the contractor is selected during design and furnishes preconstruction services” (DBIA 2009). The CMGC contractor is normally selected later in the project design process than it is in ECI. Also called CM-at-Risk.
- Design-bid-build (DBB)—“The ‘traditional’ project delivery approach where the owner commissions a designer to prepare drawings and specifications under a design services contract, and separately contracts for construction by engaging a contractor through competitive bidding or negotiation.” (DBIA 2009)
- Design-build (DB)—“The system of contracting under which one entity performs both architecture/engineering and construction under a single contract with the owner.” (DBIA 2009)
- Early Contractor Involvement (ECI)—“A two-stage relationship-style delivery model, generally structured to resemble a project alliance model during the first stage and a D&C [DB] model during the second.” (Casey and Bamford 2014)
- Forward Works—A program can be sub-divided into a number of projects after which contractors can be selected. (VDTF 2006)
- Gainshare/Painshare—“. . . the profit of the parties would be reduced in the case that the Project Target Cost is exceeded and increased in the case where the actual costs are less than Project Target Cost, in accordance with agreed formulae.” (ACA 1999)
- Guaranteed maximum price (GMP)—Same as international term. However, if the owner chooses to change the scope of work the GMP will also change to match it.
- Incentive/Disincentive (I/D) scheme—“. . . a contract provision which compensates the contractor a certain amount of money for each day identified critical work is completed ahead of schedule and assesses a deduction for each day the contractor overruns the I/D time.” (FHWA 1989)
- Independent Cost Estimator (ICE)—“A peer reviewer that must be independent of the organization and the project, unless otherwise formally agreed with the NZTA.” (NZTA 2012)
- Industry parties to the contract—Those entities that are signatories to the given contract and with whom privity is established with the public owner/agency.
- Integrated Project Delivery—“a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, . . .” (AIA 2007)
- Key performance indicators (KPI)—“Jointly developed and agreed performance scores measured on a scale between –100 and +100, with zero designated as the neutral performance score, and +100 representing an outstanding performance outcome for a NOP. KPIs measure specific and defined aspects of performance within KRAs.” (ADIT 2011)
- Key result area (KRA)—“A performance-related bonus or penalty payment based on actual performance outcomes achieved by the NOP, compared with pre-agreed performance targets. There are cost and non-cost KRAs; e.g., timely completion, safety, quality, environmental outcomes, community outcomes, and traffic management.” (ADIT 2011)
- Non-owner participants (NOP)—“Non-owner participants that form part of the direct project stakeholders who represent the commercial/legal framework of the project organization. Generally, the owner is a government backed enterprise and the NOPs comprise one or more private sector service provider delivering the capital works project.” (ADIT 2011)

Partnering—“. . . long-term agreements between companies to cooperate to an unusually high degree to achieve separate yet complementary objectives” (CII 1991). Similar to international definition but not considered a project delivery method in the U.S.

Performance specifications or performance criteria—Standards or goals that are established in the contract to describe the required outcomes. These are measured in qualitative terms more often than quantitative terms. They are also less formally controlled than KPIs.

Procurement—The combined functions of purchasing, inventory control, traffic and transportation, receiving, inspection, store keeping, and salvage and disposal operations. (Minnesota 2011)

Project Partnering—Project delivery system that differs from project alliancing in that it is both a relationship management system and a project-delivery system but where partnering encourages closer relationships and shared goals, alliancing mandates them. (Casey and Bamford 2014)

Risk allocation—In traditional methods of project delivery, specific risks are allocated to participants who are individually responsible for best managing the risk and bearing the risk outcome. (Casey and Bamford 2014)

Risk management—“. . . an ongoing, continuous process of monitoring and managing all kinds of risks.” (FHWA 2012)

Risk sharing in alliances—In alliancing, all the parties either benefit together or not at all; parties consent to their level of contribution and risk and jointly incur rewards or losses. This may be the most significant difference between traditional contracting methods and alliance contracting. (Casey and Bamford 2014)

Shared savings incentive—In projects where a GMP is used as a pricing structure, some contracts contain a clause where the owner and the contractor split any savings if the actual cost is less than the GMP. There is no known sharing of cost overruns in the U.S. system.

Strategic or Program Alliance—“A long-term business strategy linking together client, contractor and supply chain. Establishment of inter-organisational relations and to engage in collaborative behaviour for a specific purpose.” (Queensland 2008)

Target outturn cost (TOC)—“The agreed target cost set at the start of the project. In the project the AOC is compared with the TOC to determine cost underrun or overrun. An AOC close to the TOC demonstrates value for money.” (ADIT 2011)

Value for Money (VfM)—AU—“Value-for-Money is a measure of benefits (which covers quality levels, performance standards, and other policy measures such as social and environmental impacts), balanced against the price and risk exposure of achieving those benefits.” (ADIT 2011)

Value for Money (VfM)—U.S.—“A project is said to have positive VfM when, relative to other procurement options, it is forecast to deliver and/or is demonstrated to have delivered the optimum combination of life-cycle costs and service quality that will meet the objectives of the project.” (VDOT 2011)

ACRONYMS AND ABBREVIATIONS

A2	Autobaan 2 (NL, State highway)
AU\$	Australian dollar (~0.93 U.S.D)
ADIT	Australian Department of Infrastructure and Transport
AMA	Auckland Motorway Alliance
AOC	Actual outturn cost
ATC	Alternative technical concepts
AU	Australia
Austrroads	Association of Australian and New Zealand Road Transport and Traffic Authorities
CAN	Canada
CII	Construction Industry Institute
CMGC	Construction manager/general contractor
CMR	Construction manager-at-risk
DB	Design-build
DBB	Design-bid-build
DOD	Department of Defense
DOT	Department of transportation
DPS	Delivery performance score
DTMR	Queensland Department of Transport and Main Roads
€	Euro (~1.38 U.S.D)
FAR	Federal Acquisition Regulation
GDP	Gross domestic product
iAA	Interim alliance agreement
I/D	Incentive/Disincentive
iPAA	Interim Project Alliance Agreement
IRMO	Infrastructure Rebuild Management Office
KPI	Key performance indicator
KRA	Key result area
MHX	Manukau Harbor Crossing
MCOS	Minimum conditions of satisfaction
MOT	Ministry of Transport (CAN)
NGTR	Northern Gateway Toll Road
NOP	Non-owner participant
NL	Netherlands
NZ	New Zealand
NZ\$	New Zealand dollar (~0.86 U.S.D)
NZTA	New Zealand Transport Agency
OAG	Office of Auditor-General (NZ)
P3	Public-private partnership
PAA	Project alliance agreement
QBS	Qualification-based selection
RFP	Request for proposal
SCIRT	Stronger Christchurch Infrastructure Rebuild Team
SH1	State Highway 1
TOC	Target outturn cost
UK	United Kingdom
USACE	U.S. Army Corps of Engineers
VfM	Value for Money
VDTF	Victoria Department of Treasury and Finance (Victoria, AU)
WSDOT	Washington State DOT

REFERENCES

- Actis, C., D. Unkefer, and J. Lewis, *Alternative Contracting Methods: Alternative Technical Concepts*, 2012 [Online]. Available: http://www.fhwa.dot.gov/everydaycounts/edc/two/2012/pdfs/edc_atc.pdf [accessed Apr. 21, 2014].
- Australian Constructors Association (ACA), *Relationship Contracting*, Sydney, NSW, Australia, 1999 [Online]. Available: http://www.constructors.com.au/publications/rc_general/Relationship%20Contracting%20Optimising%20Project%20Outcomes.pdf [accessed Apr. 21, 2014].
- Australian Government, Department of Infrastructure and Transport (ADIT), “Infrastructure Planning and Delivery: Best Practice Case Studies,” ADIT, Canberra, 2010 [Online]. Available: https://www.infrastructure.gov.au/infrastructure/publications/files/Best_Practice_Guide.pdf [accessed Apr. 21, 2014].
- Australian Government, Department of Infrastructure and Transport (ADIT), *National Guide to Alliance Contracting*, ADIT, Canberra, 2011 [Online]. Available: http://www.infrastructure.gov.au/infrastructure/nacg/files/National_Guide_to_Alliance_Contracting04July.pdf [accessed Apr. 21, 2014].
- Austroroads, *Building and Construction Procurement Guide: Principles and Options*, Guide AP-G92-14, Austroroads, Sydney, NSW, Australia, 2014, 65 pp.
- Barlow, J., “Innovation and Learning in Complex Offshore Construction Projects,” *Research Policy*, Vol. 29, 2000, pp. 973–989.
- Blankenburg, E., “The Infrastructure for Avoiding Civil Litigation: Comparing Cultures of Legal Behavior in the Netherlands and West Germany,” *Law and Society Review*, 1994, pp. 789–808.
- Bresnen, M. and N. Marshall, “The Engineering or Evolution of Co-Operation? A Tale of Two Partnering Projects,” *International Journal of Project Management*, Vol. 20, No. 7, 2002, pp. 497–505.
- Broom, J., *Procurement Routes for Partnering: A Practical Guide*, Thomas Telford, London, U.K., 2002.
- California Department of Transportation (Caltrans), *Construction Manual*, Caltrans, Sacramento, 2013, pp. 5-4.4–5-4.5 [Online]. Available: <http://www.dot.ca.gov/hq/construc/manual2001/mct13-7.pdf> [accessed Apr. 21, 2014].
- Casey, E. and P. Bamford, *Building and Construction Procurement Guide—Principles and Options*, Austroroads AP-G92-14, Sydney, Australia, 2014, 56 pp. [Online]. Available: http://www.austroroads.com.au/images/stories/Building_and_Construction_Procurement_Guide_Consultation_draft.pdf [accessed Apr. 21, 2014].
- Chen, G., G. Zhang, Y. Xie, and X. Jin, “Overview of Alliances Research and Practice in the Construction Industry,” *Architectural Engineering and Design Management*, Vol. 8, No. 2, 2012, pp. 103–119.
- Cheung, Y.K., F. Ki, S. Rowlinson, R.H. Simons, and A. Rafferty, “Alliancing in Australia—No-litigation Contracts: A Tautology?” *Journal of Professional Issues in Engineering Education and Practice*, Vol. 132, No. 1, 2006, pp. 77–81.
- Clegg, S.R., T.S. Pitsis, T. Aura-Polley, and M. Marosszky, “Governmentality Matters: Designing an Alliance Culture of Inter-Organizational Collaboration for Managing Projects,” *Organization Studies*, Vol. 23, No. 3, 2002, pp. 317–337.
- ConsensusDOCS, *Standard Form of Tri-Party Agreement for Collaborative Project Delivery*, ConsensusDOCS, Arlington, Va., 2007.
- Construction Industry Institute (CII), *In Search of Partnering Excellence*, CII Report SP17-1, CII, Austin, Tex., 1991, 62 pp.
- Cornes, D.L., “The Second Edition of the New Engineering Contract,” *International Construction Law Review*, Vol. 13, No. 1, 1996, pp. 97–119.
- Covington and Burling, LLP, E-Alert, “FAR Council Issues Interim Rule to Make Open-Ended Indemnity Clauses Unenforceable,” June 21, 2013 [Online]. Available: http://www.cov.com/files/Publication/00a258ac-2d1e-4e70-9bd2-49669a6dd5c8/Presentation/PublicationAttachment/0193bb6d-2b08-4cd7-bd2e-528e8daf7083/FAR_Council_Issues_Rule_to_Make_Open-Ended_Indemnity_Classes_Unenforceable.pdf [accessed Apr. 8, 2014].
- Cox, A. and I. Thompson, “Is the NEC Going to Succeed?” *International Construction Law Review*, Vol. 13, No. 3, 1996, pp. 327–337.
- Design-Build Institute of America (DBIA), *Design-build Manual of Practice*, DBIA, Washington, D.C., 2009, pp. 6–35.
- Duffield, C., D. Young, R. Hadgraft, and R. Foster, *Alliance Contracting—Evolving Alternative Project Delivery*, University of Melbourne, Australia, 2014 [Online]. Available: http://www.commercial.unimelb.edu.au/alliance_contracting [accessed Apr. 1, 2014].
- Egan, J., *Rethinking Construction*, HMSO, London, U.K., 1998.
- Eriksson, P.E., “Partnering: What Is it, When Should it Be Used, and How it Should Be Implemented?” *Construction Management and Economics*, Vol. 28, No. 9, 2010, pp. 905–917.
- Ernzen, J., G. Murdough, and D. Drecksell, “Partnering on a Design-build Project: Making the Three-way Love Affair Work,” *Transportation Research Record 1712*, Transportation Research Board, National Research Council, Washington, D.C., 2000, pp. 202–212.
- Federal Highway Administration (FHWA), *Incentive/Disincentive (I/D) for Early Completion*, Technical Advisory T 5080.10, FHWA, Washington, D.C., 1989 [Online]. Available: <https://www.fhwa.dot.gov/construction/contracts/t508010.cfm> [accessed Apr. 6, 2014].
- Federal Highway Administration (FHWA), *Design-build Effectiveness Study*, FHWA, Washington, D.C., 2006 [Online].

- Available: <http://www.fhwa.dot.gov/reports/designbuild/designbuild.htm> [accessed Nov. 25, 2012].
- Federal Highway Administration (FHWA), *Risk-based Asset Management*, FHWA, Washington, D.C., 2012, p. 3 [Online]. Available: <http://www.fhwa.dot.gov/asset/pubs/hif12050.pdf> [accessed Apr. 6, 2014].
- Fisher, N. and S. Green, "Partnering and the UK Construction Industry the First Ten Years—A Review of the Literature," In *Modernising Construction*, NAO, Ed., National Audit Office, London, U.K., 2001, pp. 58–66.
- Forgues, D. and L. Koskela, "Can Procurement Affect Design Performance?" *Journal of Construction Procurement*, Vol. 14, No. 2, 2008, pp. 130–142.
- Gallagher, J., "Alliance Contracting—Reshaping Australian Infrastructure," Society of Construction Law, London, England, 2008 [Online] Available: http://www.scl.org.uk/files/Alliance_Contracting.ppt [accessed Apr. 6, 2014].
- Gransberg, D.D., L. Reynolds, J. Boyd, and W.D. Dillon, "Quantitative Analysis of Partnered Project Performance," *Journal of Construction Engineering Management*, Vol. 125, No. 3, 1999, pp. 161–166.
- Gransberg, D.D. and R.F. Barton, "Analysis of Federal Design-Build Request for Proposal Evaluation Criteria," *Journal of Management in Engineering*, ASCE, Vol. 23, No. 2, Apr. 2007, pp. 105–111.
- Green, S.D., "Partnering: The Propaganda of Corporatism?" *Journal of Construction Procurement*, Vol. 5, No. 2, 1999, pp. 177–186.
- Hall, P., *Alliancing in the Nuclear Industry in the UK*, 2009 [Online]. Available: <http://www.nortonrosefulbright.com/knowledge/publications/21336/alliancing-in-the-nuclear-industry-in-the-uk> [accessed Apr. 6, 2014].
- Harness, S.H., "Integrated Project Delivery, Tri-Party Agreements, and Other Collaborative Arrangements," In *Construction Subcontracting*, A.P. Silberman et al., Eds., American Bar Association, Chicago, Ill., 2014, pp. 378–387.
- Hauck, A.J., D.H.T. Walker, K.D. Hampson, and R. Peters, "Project Alliancing at National Museum of Australia: The Collaborative Process," *Journal of Construction Engineering and Management*, Vol. 130, No. 1, 2004, pp. 143–152.
- Highways Agency (HA), *Guidance—The Highways Agency: Tendering for Projects*, 2012 [Online]. Available: <https://www.gov.uk/the-highways-agency-tendering-for-projects> [accessed Apr. 16, 2014].
- Holt, G.D., P.E.D. Love, and H. Li, "The Learning Organisation: Toward a Paradigm for Mutually Beneficial Strategic Construction Alliances," *International Journal of Project Management*, Vol. 18, 2000, pp. 415–421.
- Lahdenperä, P., "Making Sense of the Multi-Party Contractual Arrangements of Project Partnering, Project Alliancing, and Integrated Project Delivery," *Construction Management and Economics*, Vol. 30, No. 1, 2012, pp. 57–79.
- Larson, E., "Project Partnering: Results of Study of 280 Construction Projects," *Journal of Management in Engineering*, Vol. 11, No. 2, 1995, pp. 30–35.
- Latham, M.L., "Constructing the Team," HMSO, London, U.K., 1994.
- Le Masurier, J., *Motivating Performance Improvement in the New Zealand Construction Industry*, 2006, Academia.edu [Online]. Available: https://www.academia.edu/3551481/Motivating_performance_improvement_in_the_New_Zealand_construction_industry [accessed Mar. 6, 2014].
- Li, H., E.W.L. Cheng, and P.E.D. Love, "Partnering Research in Construction," *Engineering Construction, Architectural Management*, Vol. 7, No. 1, 2000, pp. 76–92.
- Lipscombe, P., *Bridges on the Northern Gateway Motorway*, CMNZL [Online]. Available: <http://www.cmnzl.co.nz/assets/sm/3620/61/0087-E84Lipscombe.pdf> [accessed Mar. 6, 2014].
- Lopez del Puerto, C., D.D. Gransberg, and J.S. Shane "Comparative Analysis of Owner Goals for Design/Build Projects," *Journal of Management in Engineering*, Vol. 24, No. 1, 2008, pp. 29–32.
- Love, P.E.D., P.R. Davis, R. Chevis, and D.J. Edwards, "Risk/Reward Compensation Model for Civil Engineering Infrastructure Alliance Projects," *Journal of Construction Engineering and Management*, Vol. 137, No. 2, 2011, pp. 127–136.
- McLain, K., D.D. Gransberg, and M.A. Loulakis, "Design-Build Geotechnical Risk Mitigation Tools," *Australasian Journal of Construction Economics and Building*, Vol. 14, No. 12, 2014, pp. 1–19.
- Miller, R., D. Strombom, M. Lammarino, and B. Black, *The Commercial Real Estate Revolution*, 2009, p. 233.
- Molenaar, K., J. Vanegas, and H. Martinez, "Appropriate Risk Allocation in Design-Build RFPs," Construction Congress VI: Building Together for a Better Tomorrow in an Increasingly Complex World, *Proceedings of the Congress*, Orlando, Fla., Feb. 20–22, 2000, pp. 1083–1092.
- Mosey, D., *Early Contractor Involvement in Building Procurement: Contracts, Partnering and Project Management*, 2009 [Online]. Available: <http://onlinelibrary.wiley.com/book/10.1002/9781444309867> [accessed Mar. 9, 2014].
- Murdough, G., D. Drechsel, G. Sharp, and J. Ernzen, "Performance in the Project Trailer: A Partnering Evaluation Tool," *Transportation Research Record: Journal of the Transportation Research Board*, No. 1994, Transportation Research Board of the National Academies, Washington, D.C., 2007, pp. 26–34.
- Naoum, S., "An Overview into the Concept of Partnering," *International Journal of Project Management*, Vol. 211, 2003, pp. 71–76.
- National Association of State Facilities, *Integrated Project Delivery for Public and Private Owners*, National Association of State Facilities Administrators (NASFA), Construction Owners Association of America (COAA), The Association of Higher Education Facilities Officers (APPA), Associated General Contractors of America (AGC), and American Institute of Architects (AIA), 2010, 39 pp. [Online]. Available: <http://www.agc.org/galleries/projectd/IPD%20for%20Public%20and%20Private%20Owners.pdf> [accessed Apr. 13, 2014].

- New South Wales (NSW), *Procurement Methodology Guidelines for Construction*, Version 1, Sydney, NSW, Australia, 2005, 138 pp.
- New Zealand Transport Agency (NZTA), *Procurement Manual*, NZTA, Wellington, 2009 [Online]. Available: <http://www.nzta.govt.nz/resources/procurement-manual/> [accessed Mar. 6, 2014].
- New Zealand Transport Agency (NZTA), *Contract Procedures Manual SM021*, NZTA, Wellington, 2012 [Online]. Available: <http://www.nzta.govt.nz/resources/contract-procedures-manual/> [accessed Mar. 5, 2014].
- O'Connor, P.J., "Integrated Project Delivery: Collaboration Through New Contract Forms," 2009, pp. 27–55.
- Office of the Auditor-General (OAG), *Achieving Public Sector Outcomes with Private Sector Partners*, OAG, New Zealand, 2006 [Online]. Available: <http://www.oag.govt.nz/2006/public-private/docs/partnerships.pdf>.
- Office of the Auditor-General (OAG), *New Zealand Transport Agency: Delivering Maintenance and Renewal Work on the State Highway*, 2011 [Online]. Available: <http://www.oag.govt.nz/2011/nzta/docs/maintenance-and-renewal-work.pdf> [accessed Mar. 15, 2014].
- Queensland Government, *Relational Procurement Options—Alliance and Early Contractor Involvement Contracts*, Queensland Government Chief Procurement Office, Brisbane, Australia, 2008, pp. 1–25.
- Raisbeck, P., M. Ramsay, and A. Maher, "Assessing Integrated Project Delivery: A Comparative Analysis of IPD and Alliance Contracting Procurement Routes," *Management*, 2010, pp. 1019–1028.
- Ray, R., "Reaping the Benefits of Alliance Contracts," *Power Engineering*, Mar. 25, 2013 [Online]. Available: <http://www.power-eng.com/articles/2013/03/reaping-the-benefits-of-alliance-contracts.html> [accessed Mar. 2, 2014].
- Remington, K. and J. Pollack, *Tools for Complex Projects*, Gower Publishing, Aldershot, U.K., 2007.
- Rezvani, S., *An Introduction to Organizational Maturity Assessment: Measuring Organizational Capabilities*, International Public Management Council, Alexandria, Va., 2008, 19 pp., Unpublished presentation.
- Ross, J., *Introduction to Alliancing*, 2003 [Online]. Available: <http://www.exner.com.au/News/images/Complete%20Project%20Alliance%20Guide.pdf> [accessed Mar. 23, 2014].
- Ross, J., *Project Alliancing—Practitioners Guide*, Department of Treasury and Finance, Victoria, Melbourne, Australia, 2006.
- Scheepbouwer, E. and D.D. Gransberg, "Comparative Analysis of New Zealand Alliance Contracting and U.S. Delivery Models," 93rd Annual Meeting of the Transportation Research Board Compendium of Papers, 2014, 10 pp.
- Shane, J., K. Strong, and D. Gransberg, *Guidebook for Managing Complex Projects; Strategic Highway Research Program 2 Project R-10*, Transportation Research Board of the National Academies, Washington, D.C., 2011.
- Song, L., Y. Mohamed, and S.M. AbouRizk, "Valuating Contractor's Early Involvement in Design," *AACE International Transactions*, 2006.
- Stacey, R. and C. Nicholson, "It's Good to Be King: The Idaho Tort Claims Act," *Idaho Business Insider*, 2010, pp. 1–2 [Online]. Available: <http://www.lawidaho.com/attorney-articles> [accessed Mar. 30, 2014].
- SCIRT, *The Value of SCIRT* (Interim Report), Jan. 2014, 83 pp. [Online]. Available: http://strongerchristchurch.govt.nz/sites/strongerchristchurch.govt.nz/files/2013-12-11%20The%20Value%20of%20SCIRT%20Abridged_0.pdf [accessed June 26, 2014].
- Touran, A., D.D. Gransberg, K.R. Molenaar, and K. Ghavamifar, "A Decision Support System for Project Delivery Method Selection in Transit," *Transportation Research Record: Journal of the Transportation Research Board*, No. 2111, Transportation Research Board of the National Academies, Washington, D.C., 2009, pp. 148–157.
- van den Berg, M. and P. Kamminga, "Optimising Contracting for Alliances in Infrastructure Projects," *International Construction Law Review*, Vol. 23, 2006, pp. 59–77.
- Victoria Department of Treasury and Finance (VDTF), *Project Alliancing Practitioners Guide*, VDTF, Melbourne, Victoria, Australia, 2006.
- Victoria Department of Treasury and Finance (VDTF), *The Practitioners' Guide to Alliance Contracting*, VDTF, Melbourne, Victoria, Australia, 2010.
- Virginia Department of Transportation (VDOT), *Value for Money Guidance*, Office of Transportation Public Private Partnerships, VDOT, Richmond, Apr. 2011, p. 39 [Online]. Available: http://www.vappta.org/resources/VDOT%20VfM%20guidance%20document_final_20110404.pdf [accessed Apr. 13, 2014].
- West, N.J.N., D.D. Gransberg, and J. McMinimee, "Effective Tools for Projects Delivered Using the Construction Manager/General Contractor," *Transportation Research Record: Journal of the Transportation Research Board*, No. 2268, Transportation Research Board of the National Academies, Washington, D.C., 2012, pp. 33–42.
- Weston, D.C. and G.E. Gibson, "Partnering-Project Performance in U.S. Army Corps of Engineers," *Journal of Management in Engineering*, Vol. 9, No. 4, 1993, pp. 410–425.
- Yeung, J.F.Y., A.P.C. Chan, and D.W.M. Chan, "Defining Relational Contracting from the Wittgenstein Family-Resemblance Philosophy," *International Journal of Project Management*, Vol. 30, No. 2, 2012, pp. 225–239.

APPENDIX A

Australian Commercial Framework and Gainshare/Painshare Examples

The following pages have been extracted from:

Australian Government, Department of Infrastructure and Transport, *National Guide to Alliance Contracting*, 2011 [Online]. Available: http://www.infrastructure.gov.au/infrastructure/nacg/files/National_Guide_to_Alliance_Contracting04July.pdf.

For more information please access the basic document at the URL shown.

This appendix presents examples of calculating the Risk or Reward on project completion.

In order to illustrate the underlying principles these examples are presented in simplified conceptual form rather than the complexity that could be expected in an actual alliance.

Thus:

- **The non-government participant's (NOP) fee** is presented as an aggregate single figure that is fixed as a lump sum once the TOC is agreed.
- **The non-cost risk or reward** is treated as a performance score from a single KRA (recognizing that in practice there may be several KRAs).
- **There are no adjustments** to the initial TOC due to Owner changes.
- **The calculation and distribution** of the Risk or Reward amongst individual NOPs is not presented.

Model 1a) Cost and Non-Cost Performance Not Linked

Base data a) TOC Components

Reimbursable Costs		\$ 88 m
NOP (Aggregate) Fee		\$ 12 m
	TOC	\$100 m

b) Cost Gainshare/Painshare Split

50:50, no caps

c) Non-Cost Reward/Penalty

A separate pool of funds has been established by the Owner as reward/penalty for non-cost performance that is not linked to cost performance.

Alliance Performance on Non-Cost KRA	Score	Reward/Penalty to NOP
Achieve Stretch Target	100	\$2 m
Business as Usual	0	nil
Poor	-50	<\$2 m>

Risk or Reward Calculations:			
Model 1a)	Scenarios		
	1 Very good cost and non-cost performance	2 Mixed—Very good cost and poor non-cost performance	3 Very poor cost and non-cost performance
TOC	\$100 m	\$100 m	\$100 m
AOC	\$90 m	\$90 m	\$125 m
Under (Overrun) to TOC	\$10 m	\$10 m	<\$25 m>
Non-Cost Performance Score	100	-50	-50
Cost Gainshare/<Painshare>			
Owner 50%	\$5 m gain	\$5 m gain	<\$125 m> pain
NOPs 50%	\$5 m gain	\$5 m gain	<\$125 m> pain
Non-Cost Reward/Penalty to NOP	\$2 m reward	<\$2 m> penalty	<\$2 m> penalty
Total Gainshare/<Painshare>			
Owner	\$5 m	\$5 m	<\$125 m>
NOP	\$7 m	\$3 m	<\$14.5 m>

Model 1b) Cost and Non-Cost Performance Not Linked—Cap on NOPs’ Painshare

The Base data for Model 1b) is similar to Model 1a) except that the Commercial Framework now includes a Cap of \$12 m on the NOPs’ painshare.

Model 1b)	Scenarios		
	1 Very good cost and non-cost performance	2 Mixed—Very good cost and poor non-cost performance	3 Poor cost and non-cost performance
TOC	\$100 m	\$100 m	\$100 m
AOC	\$90 m	\$90 m	\$125 m
Under (Overrun) to TOC	\$10 m	\$10 m	<\$25 m>
Non-Cost Performance Score	100	-50	-50
Cost Gainshare/<Painshare> (pre-cap)			
Owner 50%	\$5 m gain	\$5 m gain	<\$12.5 m> pain
NOPs 50%	\$5 m gain	\$5 m gain	<\$12.5 m> pain
Non-Cost Reward/Penalty to NOP	\$2 m reward	<\$2 m> penalty	<\$2 m> penalty
Total Gainshare/<Painshare> (pre-cap)			
Owner	\$5 m	\$5 m	<\$12.5 m>
NOP	\$7 m	\$3 m	<\$14.5 m>
Cap on NOP Painshare	\$12 m	\$12 m	\$12 m
Total Gainshare/<Painshare> (after applying cap)			
Owner	\$5 m	\$5 m	<\$13 m>
NOP	\$7 m	\$3 m	<\$12 m>

Model 2a) Cost and Non-Cost Performance Linked

Base data a) TOC Components

Reimbursable Costs		\$ 88 m
NOP (Aggregate) Fee		\$ 12 m
	TOC	\$100 m

b) Cost Gainshare/Painshare Split

50:50, no caps

c) Non-Cost Reward/Penalty

NOP performance on non-cost KRAs is reflected in an increase (or decrease) in their share of cost under/overruns. There is no separate pool of funds and any reward can only be funded by cost underruns.

Alliance Performance on Non-Cost KRA	Score	Reward/Penalty to NOP (Cost Gain/Pain split)
Achieve Stretch Target	100	75:25
Business-as-Usual	0	50:50
Poor	-50	25:75

Model 2a)	Scenarios		
	1 Very good cost and non-cost performance	2 Mixed—Very good cost and poor non-cost performance	3 Poor cost and non-cost performance
TOC	\$100 m	\$100 m	\$100 m
AOC	\$90 m	\$90 m	\$125 m
Under (Overrun) to TOC	\$10 m	\$10 m	<\$25 m>
Non-Cost Performance Score	100	-50	-50
Cost Gainshare/<Painshare>			
Owner	\$5 m gain	\$5 m gain	<\$12.5 m> pain
NOPs	\$5 m gain	\$5 m gain	<\$12.5 m> pain
Non-Cost Reward/Penalty to NOP	Reflected in gain/pain split		
Total Gainshare/<Painshare>			
Owner	\$2.5 m	\$7.5 m	<\$6.25 m>
NOP	\$7.5 m	\$2.5 m	<\$18.75 m>

Model 2b) Cost and Non-Cost Performance Linked—Cap on NOPs’ Painshare

The base data for Model 2b) is similar to Model 2a) except that the Commercial Framework now includes a Cap of \$12 m on the NOPs’ painshare.

Model 2b)	Scenarios		
	1 Very good cost and non-cost performance	2 Mixed—Very good cost and poor non-cost performance	3 Very Poor cost and non-cost performance
TOC	\$100 m	\$100 m	\$100 m
AOC	\$90 m	\$90 m	\$125 m
Under (Overrun) to TOC	\$10 m	\$10 m	<\$25 m>
Non-Cost Performance Score	100	-50	-50
Cost Gainshare/<Painshare> (pre-cap)			
Owner	25% gain	75% gain	25% pain
NOPs	75% gain	25% gain	75% pain
Non-Cost Reward/Penalty to NOP	Reflected in gain/pain split		
Total Gainshare/<Painshare> (pre-cap)			
Owner	\$2.5 m	\$7.5 m	<\$6.25 m>
NOP	\$7.5 m	\$2.5 m	<\$18.75 m>
Cap on NOP Painshare	\$12 m	\$12 m	\$12 m
Total Gainshare/<Painshare> (after applying cap)			
Owner	\$2.5 m	\$7.5 m	<\$13 m>
NOP	\$7.5 m	\$2.5 m	<\$12 m>

Abbreviations used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI-NA	Airports Council International-North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation