A Code of Practice for Risk Management of Tunneling Works

IMIA Presentation 20th Sept 2005

The WHY WHAT & HOW

in relation to a Code of Practice

WHY

The background

Background

- Insurance Market Concerns
- Claims Examples
- Issues for Insurers
- Options for Insurers
- Key Insurer Objectives for a Code

Nicoll Highway Singapore

Insurance Market Concerns

- Frequency and Size of Claims
  - UK & Overseas
- Unprofitable sector
  - Tunnelling > 500% Loss Ratio

Major tunnel Losses Source Munich Re

• 1994 Great Belt Link Denmark	Fire	US$ 33 mio
• 1994 Munich Metro Germany	Collapse	US$ 4 mio
• 1994 Heathrow Express Link, UK	Collapse	US$141 mio
• 1994 Metro Taipei	Collapse	US $12 mio
• 1995 Metro Los Angeles	Collapse	US$ 9 mio
• 1995 Metro Taipei	Collapse	US$ 12 mio
• 1999 Hull Yorkshire UK	Collapse	US$ 55 mio
• 1999 TAV Bologna-Florence Italy	Collapse	US$ 9 mio
• 1999 Anatolia Motorway Turkey	Earthquake	US$ 115 mio
• 2000 Metro Taegu, Korea	Collapse	US$ 24 mio
• 2000 TAV Bologna-Florence Italy	Collapse	US$ 12 mio
• 2002 Taiwan High Speed Railway	Collapse	US$ 30 mio
• 2002 SOCATOP Paris France	Collapse	US$ 8 mio
• 2003 Shanghai Metro China	Collapse	US$ 60 mio
• 2004 Singapore Metro	Collapse	US$ tba

- **15 major Losses Amount above $500 mio**

Claims Analysis Issues for Insurers

- Size of losses against premium volume
- Size of loss against Contract Value (eg Hull)

Example Claim – Hull

- Cost of Original Contract – £60m for 10km of tunnel
  - £6,000 per metre
- Length of collapse = 150m therefore approximate construction cost for this length is £900,000
- Insurance claim for reinstatement
  - **IN EXCESS OF £42,000,000**
- or reinstatement cost 4667% of original cost

Issues for Insurers

- Reinstatement Cost against original construction cost
- Size of Insured Claim against Insurer's Possible Maximum Loss
- Extent of Cover Provided
- Quality Control Issues,
  - Tunnelling industry has had an inconsistent approach to Risk Management to which to-date the insurance industry has not queried

Recent Trends

- High risk type construction methods
- Trend towards design+build contracts
- Tight construction time schedules
- Low financial budgets
- fierce competition in construction industries

Options for Insurers

- Stop offering Insurance in tunnelling sector
  - Still an option for many insurers
- Increase terms, excesses, restrict cover
  - Potentially becoming price prohibitive
- Try to tackle issues and perceptions with a Code of Practice
  - Success of “Joint Code of Practice for prevention of fire on building sites” – the “Fire Code”
  - Work with Industry in UK to develop and then expand overseas

Key Insurer Objectives

- Agree appropriate Risk Assessment and on-going Risk Management procedures for tunnelling sector to-
  - Reduce the probability of a loss happening
  - Reduce the size of a claim when it happens
  - Give Insurers a better picture of the risks during underwriting process
  - Increased Certainty on financial exposure

Key Insurer Objectives

- Create an ‘Auditable’ trail for Insurers to ensure compliance
- Increase Underwriters confidence in this segment
- Export ‘best practice’ overseas

WHAT

The outcome

The outcome

THE JOINT CODE OF PRACTICE FOR
RISK MANAGEMENT
OF
TUNNEL WORKS
IN THE UK

The outcome

- Prepared by a Working Group (formed in November 2001) comprising representatives from the Association of British Insurers (ABI) representing Insurers and Re-Insurers on the London-based Insurance Market and the British Tunnelling Society (BTS) - published in September 2003

- The UK Code is being used by Insurers for tunnel works in the UK

The outcome

- The UK Code is also being used by Insurers and Re-Insurers for projects outside the UK in terms of the application of the framework and fundamental principles embodied within the UK Code

eg Singapore
Hong Kong
Australia
Korea

USA
Canada
Spain
France

The Objective

To promote and secure ‘best practice’ for the minimisation and management of risks associated with the design and construction of tunnels .

The Theme

- Competence of all parties
- Risk Assessments at each stage
- Transparency
- Risk allocation to the most appropriate party.

The framework

The Code is based on a ‘project stage’ basis rather than a task basis with four identified stages –

1) the Project Development Stage which includes:
   - project feasibility studies;
   - site and ground investigations;
   - assessment and evaluation of project options and the identification of a preferred project option and Form of Contract for construction (for example design and construct or design-construct);
   - project design studies appropriate to the Form of Contract for construction

The framework

2) the Construction Contract Procurement Stage which includes:
   - the preparation and issue of adequate contract documentation for issue for tendering purposes;
   - the selection or pre-qualification of contractors for tendering;
   - tender assessment.
   - preparation of Ground Reference Conditions by the client or the contractor

The framework

3)the Design Stage or Stages which include –

- Design Stage Risk Assessments
- Design Checks to appropriate level of risk
- Risk of failure to be extremely remote
- Design to be constructable

The framework

d) the Construction Stage

- Management systems including Risk Management Plan
- Project Risk Register
- Procedures for Value Engineering and Changes in design or risk

(The Code excludes the operational performance of tunnels and underground structures other than that included within any stipulated maintenance period.)

Risk Management

b) Hazard identification is required during each of the four stages of a project (as outlined in above) on a project-specific basis

c) Associated risks are to be identified through formalised risk assessment procedures

HOW

- The Risk Management Process

Risk Management

Risks are to be managed to ensure their reduction to a level “as low as reasonably practicable”

Risk assessments are to be recorded and summarised in risk registers at each stage of a project which include the identification of the party responsible for the control and management of an identified risk

The Risk Management process

Risk Management is defined in the Code as the systematic process of:

a) identifying hazards and associated risks, through Risk Assessments, that impact on a project's outcome in terms of costs and programme, including those to third parties;

b) quantifying risks including their programme and cost implications;

c) identifying pro-active actions planned to eliminate or mitigate the risks

d) identifying methods to be utilised for the control of risks

e) allocating risks to the various parties to the contract

The Risk Management process

Stage 1 – Risk Assessments

Stage 2 – Risk Registers

Stage 3 – Manage the risks

Risk Assessments

- identify hazards (sources of risks)
- identify causes of hazards
- identify consequences of hazards
- identify likelihood/probability of hazards
- identify severity of hazards
- rank the risks

The Risk Management process

Example – Risk Assessment Matrix

		Severity Score				
		1	2	3	4	5
Likeli- hood Score	1	L	L	L	M	H
	2	L	L	M	M	H
	3	L	M	M	H	H
	4	M	M	H	H	H
	5	M	H	H	H	H

The Risk Management process

- Ultimately end with ‘Construction Stage Risk Register’
- Active risks cascaded from previous Stages (Project Development Stage, Construction Contract Procurement Stage and Design Stage(s)
- Risks associated with hazards identified in relation to specific construction methodology

The Risk Management process

Example – Construction Stage Risk Register (simple)

Work area/activity

Hazard & Status	Causes	Conseq's	Inherent Ranking			Control Measures		Residual Ranking			Owner	Owner Control Rating	Upgrade Action	Date by
			L	S		Cause Controls	Conseq' Controls	L	S					
A														
(active)														
B														
C														
(closed)														

The Risk Management process

Management of risks

- Risk registers to be ‘live’ documents
- Prepare risk registers for management of risks at Construction Stage appropriate to work areas/activities
- Hold regular/frequent risk review workshops

The Risk Management process

Risk review workshops are required during the works to –

- Confirm that identified control measures (for cause or consequence) are in place
- Confirm that control measures are adequate/sufficient in relation to experience gained
- Assess whether additional control measures are required in relation to experience gained (actions)
- Identify any new hazards as a result of experience gained and carry out appropriate risk assessment and hence identify control measures – add to Risk Register
- Agree ‘corporately’ that the risk register is appropriate at the time of the workshop.

International Reaction to the UK Code

- Client Role responsibility for information provided by him
- British Codes BS 5930,BS1377,BS6164
- British Leglislation
- CDM regulations
- Geotechnical Baseline Reports
- Compliance
- Interference by Insurers

Summary

- Principles embedded in the UK code welcomed by most stakeholders
- The Risk Management System is already being widely used in industry
- Requirements for competence and transparency improve the project
- Cascading and managing risk through the project stages

THE WAY AHEAD

The way Ahead

- International Tunnelling Insurance Group (ITIG) Formed
- Members Allianz,Generali,Munich re,RSA,SCOR,Swiss Re,Zurich
- BTS(Terry Mellors & Bill Grose)
- ITA (International Tunnelling Association) Arnold Dix
- IMIA

The way ahead

A draft ‘international’ version of the Code has been prepared and is currently under review by Insurers and Re-Insurers and the ITA

The ‘international’ version of the Code (as currently drafted) –

- follows the same framework and fundamental principles as the UK Code
- Refers to Local National Legislation and Local National Standards and Codes rather than UK Legislation and British Standards

The way ahead

The ‘international code will provide for the inclusion of ‘Schedules’ appropriate to countries and/or projects

Compliance

- The international code will not include a model compliance endorsement.
- ITIG recommendation is to reserve the right to suspend or cancel cover if the insurers become aware of what they consider a breach
- The code can not be used to decline a claim or modify a claim adjustment
- Consequent Risk Engineering implications

Implementation of the International Code

- UK code being used in many countries but on mega projects
- International code should encourage better use
- Compliance conditions have been accepted worldwide

Future

- Adoption of a code for heavy civil engineering
- Wet Works

Role of the IMIA and National Associations

- To get the message to our Clients Contractors/Owner
- To encourage the Clients that the Code is a way of differentiating their clients BEST PRACTICE
- To use the code as a guide for gathering information