

**The New Economic Reality:
Implications for the Construction Industry in Hong Kong**

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**Paper on Unforeseen Ground Conditions for HKCA-CEC Conference on
28 Oct 09**

Russell Black, Projects Director of MTR Corporation Ltd.

Synopsis

MTR Corporation Ltd. has a major rail expansion projects cascade underway. The Corporation implements a structured risk management approach to all aspects of project delivery. A key principle is the allocation of risk to the party best able to manage the risk and this is applied to unforeseen ground conditions risk.

MTR practice is addressed, including the insurance dimension, reference is made to the European Tunnel Code of Practice, and MTR's implementation of Geotechnical Baseline Reports as a contractual baseline as well as a construction risk management tool.

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Paper on Unforeseen Ground Conditions for HKCA-CEC Conference on 28 Oct 09

Author : Russell Black, Projects Director of MTR Corporation Ltd.

This paper focuses on MTR's current contractual approach to unforeseen ground conditions as we embark on our biggest-ever Hong Kong railway expansion programme.

In recent years MTR has developed a much more structured approach to the management of risk across the whole of our business. This discussion on ground condition risk exemplifies our philosophy on project delivery management across all risks, not just the traditional debating point of unforeseen ground conditions.

So we have a formal risk management plan, launched right from the earliest planning stages of the project. The plan requires active management, on-going risk identification, risk allocation, and review of management and mitigation.

We do not hide risks. They are out on the table for all the project delivery stakeholders to debate and contribute to risk management.

For our major project works we consult the industry for their views and advice, we undertake pre-tender investigation to an appropriate level of detail to allow us to design, programme and plan to give us confidence the work is constructible, safely, to an acceptable budget and programme.

The key issue of who should own the risk, comes up for debate at regular intervals. We see three options, but for us the key question is who can best manage the risk and its consequences.

Our longstanding position is that MTR is in the best position to own the consequence of unforeseen physical conditions and obstructions. A high level rationale is that where a large and well informed client is undertaking an on-going programme of major civil works it should be more cost effective for the client to be the banker, or insurer if you like, on unforeseen physical conditions risk.

This is based on the logic that if the contractor carries the risk the risk provision in his tender is paid to him whether the risk eventuates in additional cost or not.

At a more pragmatic level we also need to consider the financial capacity of our contractors to take risk. It is seldom conducive to efficient project delivery to have a contractor under severe financial duress because he made inadequate risk provision, or the unforeseen condition grossly exceeded his or anyone else's expectation.

Even if we provide the tenderers with all the data that MTR has obtained pre-tender, I suggest we probably still have a better understanding of the risks at the time of tender award than the contractor under our normal procurement process, having had much longer to study the

challenges.

Our on-going development of competitively bid target cost contracts provides the option of sharing risk, and the substantial pre-award joint development of the target cost bids enables the tenderers to have a much more informed understanding of the risks in the work at the point of award.

In fact, an observer of the process cannot fail to recognize the target cost Stage 2 bid preparation period as being a risk identification and mitigation planning and costing exercise. Both the tenderer and the client arrive at contract award with the best possible joint understanding of the risks inherent in the delivery plan, and how they are to be allocated; to the client, to the contractor, or shared in the Target Cost incentivization which takes the form of pain share/gain share on the outturn cost.

Where we procure on the more traditional MTR lump sum contract, which is still the case for the majority of our works, we also follow a practice of providing tenderers with all of the information we have available, including our assessment of the risks, to maximize their ability to accurately assess the challenges in the work.

There have been developments on the unforeseen ground condition scene, particularly with regard to bored tunnelling. This has been driven in large measure by the project insurance market. Most of you will be aware that MTR follows a practice of taking out project-wide All Risks and Third Party Insurance, rather than passing this responsibility to the contractors. Another example of our allocation of tasks to the party who is best able to handle the task. It is no coincidence that we save a lot of money doing this with insurance.

The insurance market, which for us is almost entirely European based, has been concerned for a long time over escalating levels of claim and payout, with the markets capacity and appetite shrinking even while premiums rise. Tunnel construction has been one of the hardest hit in this regard.

The response has been for the insurers to be more demanding and selective in who they do business with.

There is now an insurance driven Tunnel Code of Practice in Europe, which is a required component in demonstrating that a competent level of ground risk management will be applied. A subset is the introduction of Geotechnical Baseline Reports.

MTR's very good track record with our insurers has enabled us to convince them that our management processes achieve the objectives of the European Code of Practice, without us having to formally adopt that Code. However, we have introduced a Risk Manager role on all contracts, established an International Expert Panel that can be called upon to review and advise on specific issues, and set up technical consultation meetings with Buildings Department and the Geotechnical Engineering Office.

We have an internal Good Practice Note and, perhaps most significantly on the contractual front, included the tool of Geotechnical Baseline Reports.

We are also piloting our own home-grown process to incorporate safety and constructability disciplines into the design process and we have crisis management procedures and training throughout our corporate business.

Geotechnical Baseline Reports are a tool not only for pricing and allocation of contractual risk but also substantially for safety management and construction method selection. As is always the case they need to be properly prepared, and will then provide the foundation for determining additional investigation, design development and construction methodology selection.

We pursue all available avenues to source the input to the preparation of the Geotechnical Baseline Reports.

We do this as early in the planning and design process as possible, normally starting the process at the feasibility stage and progressively adding to the sophistication of the search for data as a project progresses.

The Geotechnical Baseline Report, and its input raw data, is shared with tenderers for their review, comment and use. An agreed Geotechnical Baseline Report is bound into the contract at award as the benchmark reference for contractual consideration of unforeseen physical conditions.

It is also used, separately, as a live developing technical document for risk management as the work progresses. This is significantly different from the traditional practice of leaving the contractor to do his own interpretation of the raw data.

Our first major target cost contract for West Island Line (Contract 703 - Sheung Wan to Sai Ying Pun Tunnels) has incorporated a Geotechnical Baseline Report, prepared by MTR, and used by MTR to develop the permanent works design and the assumed construction methods, assumed temporary works requirements and the programme.

It was provided to the tenderers at the start of the Stage 2 tender process together with all of the MTR design and planning arising from it, for their review and adjustment as they saw fit, and development of their risk register bid logic. The resulting bid technical submissions were in much more detail and provided a more comparative basis for assessment of the tenderers proposals.

Not surprisingly, using the same raw data, we ended up with three Geotechnical Baseline Reports (MTR + two tenderers) indicating minor differing anticipated rock profiles in the tunnel face and at critical sections. However, there was remarkable correlation in general, giving confidence that interpretations of ground condition based on available data were robust.

Clearly the understanding of the risk benefits from the application of more expertise.

So our approach to the use of Geotechnical Baseline Reports is to have an agreed

Geotechnical Baseline Report at contract award, compiled using all the information and expertise available, to be used for assessment of the costs and time consequences of unforeseen physical conditions. In fact, in our latest target cost Contract 704 (University and Sai Ying Pun Stations and Kennedy Town to Sai Ying Pun Tunnels), we have started the process of agreeing the Geotechnical Baseline Report with tenderers at Stage 1 of the tender.

Separately, as a risk management tool the Geotechnical Baseline Report continues to evolve throughout the construction as more knowledge is gained.

An immediate consequence is that we have placed the West Island Line insurance at premium rates well within our expectation and MTR continues to achieve amongst the lowest premiums in the world market for this type of work.

So far, so good.

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