Construct for Excellence

Report of the Construction Industry Review Committee

January 2001

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建造業檢討委員會
Construction Industry Review Committee

18 January 2001

The Honourable TUNG Chee Hwa
Chief Executive
Hong Kong Special Administrative Region
Central Government Offices
Lower Albert Road
Hong Kong

Dear Chief Executive,

I have pleasure in submitting the report of the Construction Industry Review Committee on its findings and recommendations.

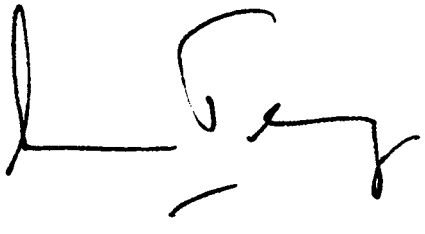
The report has distilled the findings of the Committee over nine months of intensive and wide-ranging consultation both with industry and with concerned Government bureaux and departments. Our conclusions are that we need a modern, safe, innovative, efficient, environmentally responsible and client-oriented construction industry that strives to deliver quality products in order to support the further development of our economy in the 21st century and to provide a better living environment for the population. The industry must enhance its competitiveness through continuous improvement.

In the report, we have put forward a package of recommended measures that aim to substantially lift the quality and cost-effectiveness of the construction industry. We have laid particular emphasis on building up the strengths of the industry, thereby enhancing its competitiveness in the long run with a lower cost base and better built quality.

In order to achieve the envisaged results, radical improvements are called for in the way construction projects are delivered, the way risks are shared, the way industry participants interact with one another and the ethical standards within the industry. We have attempted in this report to set strategic directions for a change programme that encompasses all sectors of the industry. However, our efforts represent but the initial steps of a major reform process for the construction industry. The successful transformation of the industry will hinge critically on strong leadership and commitment from both the Government and industry in implementing the change programme.

As a major client of local construction, the Government has an overriding interest in ensuring that the construction industry delivers better value. We urge the Government to commit itself to becoming a best practice client and a facilitating regulator in order to drive the change programme forward. At the same time, we urge industry participants to develop a culture of continuous improvement and always to seek to surpass clients' expectations.

The construction industry is now at the crossroads of change. There is wide acceptance within the industry and in the community at large of the need for prompt action. The climate for change is here, and this unique opportunity should be seized. A reformed construction industry that strives for excellence will provide firm support to our efforts in making Hong Kong a world class city.



(Henry Tang)
Chairman of the
Construction Industry Review Committee

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Executive Summary

Background

The construction industry has over the years produced numerous examples of outstanding architecture and engineering excellence. It has collectively contributed to the remarkable social and economic transformation of our society. But there is room for improvement in its overall performance in terms of quality, efficiency, productivity, site safety, environmental sustainability and customer satisfaction. The recent spate of non-compliant construction incidents has prompted widespread public concern about the need for reforming the industry. In April 2000, the Chief Executive of the Hong Kong Special Administrative Region appointed the Construction Industry Review Committee to comprehensively review the current state of the industry and to recommend improvement measures.

The construction industry today

2. The construction industry is one of the main pillars of Hong Kong's economy. In 1999, it accounted for 5.6% of the GDP and 40% of gross domestic fixed capital formation. 9.2% of our workforce was employed by the construction industry in that year. There are, however, a number of shortcomings in the industry's operations and in the quality of its products. Local construction activities are labour-intensive, dangerous and polluting. Built products are seldom defect-free. Construction costs are comparatively high. The industry is very fragmented and is beset with an adversarial culture. Many industry participants adopt a short-term view on business development, with little interest in enhancing their long-term competitiveness. There is a tendency to award contracts to the lowest bidders and delivery programmes are often unrealistically compressed. Accountability is undermined by the prevalence of non-value adding multi-layered subcontracting and lax supervision. An inadequately trained workforce also impairs the industry's ability to adopt new technologies and to cope with new challenges.

Vision for growth and development

3. To achieve a step improvement in its overall performance, the construction industry needs to develop a new culture that focuses on delivering better value to the customers on a continuous basis. We have a vision of ***an integrated construction industry that is capable of continuous improvement towards excellence in a market-driven environment.***

4. We advocate an integrated approach to construction with an emphasis on teamwork in order to achieve the best project outcomes. Thorough consideration must be given to all relevant factors, such as buildability, site safety and environmental performance, at the planning and design stages to facilitate downstream activities. In support of this development, it is necessary for construction personnel at all levels to acquire a broader knowledge base and for service providers to improve their technical and management capabilities.

5. We urge the construction industry to seek continuous performance improvement instead of just meeting the minimum requirements set by the clients and regulatory authorities. To this end, the construction workforce will need to build up its expertise and keep abreast of the latest developments in the industry through continuous education and development. Industry participants will need to foster strategic relationships with their business partners to enable the team to achieve improved efficiency and productivity over time. Sharing of learning and knowledge within the industry should also be encouraged. We feel strongly that the change programme for the construction industry should be driven by market forces as far as possible. In this regard, clients, in particular public sector clients, play a critical role in driving the construction industry to improve its operations through quality-oriented procurement strategies and contractual requirements.

6. In addition to advocating greater integration across disciplines and processes along the construction value chain, we recommend a package of improvement measures covering the following areas to transform the construction industry –

- fostering a quality culture;
- achieving value in construction procurement;
- nurturing a professional workforce;
- developing an efficient, innovative and productive industry;
- improving safety and environmental performance; and
- devising a new institutional framework to drive the implementation of the change programme for the industry.

Fostering a quality culture

7. The uplifting of construction quality requires a change of mindset among all industry participants. Knowledgeable clients who remain closely involved during project implementation and who demand quality output are an important driving force of this culture change. Efforts should be made to secure more integrated input from different disciplines at the outset and to allow sufficient time for all stages of project development and implementation. It is also important that regulators, clients, professional institutions and industry bodies all assist in establishing a clear accountability structure. Legislation should be kept to a minimum compatible with public interest, and should allocate responsibilities fairly. Professional institutions and other industry bodies can help to instill a greater sense of accountability among industry participants by stipulating acceptable standards of behaviour and establishing an effective disciplinary mechanism.

8. To improve construction quality, non-value adding multi-layered subcontracting must be eradicated. We propose a registration scheme, to be administered by the industry and initially to be implemented on a voluntary basis,

to raise the standards of subcontractors. Clients can give impetus to this development by requiring their contractors to engage registered subcontractors only. The Government should review in due course the need for introducing a mandatory registration scheme in the light of practical experience in implementing the voluntary scheme. Total subletting of contracts must be prohibited and strictly enforced. Training will need to be provided to those subcontractors who are committed to improving themselves.

9. Site supervision will also need to be substantially strengthened. We recommend that the arrangements introduced by the Buildings Department for the supervision of foundation works and ground investigation field works should be extended to cover superstructure work as appropriate. The Hong Kong Housing Authority (the Housing Authority) and the works departments should similarly set up a structured site supervision system for their projects to safeguard built quality. Emphasis should be placed on site inspections instead of paperwork. In addition, we propose more stringent control measures to safeguard the integrity of quality control testing. Independent technical audits should be carried out on a regular basis during project implementation to guard against substandard work. To uphold the quality standards of public housing, we support the Housing Authority's intention of bringing its building projects within the ambit of the Buildings Ordinance.

10. In view of widespread public concern about the quality and performance of renovation contractors and decorators, especially those engaged in home decoration business, we recommend the introduction of a voluntary registration scheme for such companies to assist customers in identifying reputable contractors.

Achieving value in construction procurement

11. Best value does not necessarily equate with the lowest initial tender price; it also encompasses various quality considerations as well as longer-term benefits. In obtaining construction services, the client should adopt a

procurement arrangement that maximises the ability of all parties in the construction supply chain to add value to the project. To encourage consultants and contractors to continuously improve their performance and to offer better value, clients should give balanced consideration to both price and quality in tender evaluation. The quality attributes may include technical capability, past performance, workmanship, site safety records and environmental performance, etc. As past performance will become one of the key quality criteria to be taken into account, an objective and transparent system for assessing the performance of consultants and contractors during project implementation is necessary. We further propose that clients should offer debriefings to unsuccessful bidders and carry out post-completion reviews with consultants and contractors to provide feedback on their performance.

12. Risks and uncertainty with potentially damaging consequences are inherent in all construction projects. We should limit their potential damage through proactive and systematic risk management. Robust control should be exercised over project variations. It is also necessary to allocate risks in an equitable manner between the employer and the contractor to ensure successful project delivery. In view of the industry's widespread concern about the current allocation of risks under the General Conditions of Contract for Public Works Projects, we recommend that the Government should urgently reconsider the recommendations arising from an earlier consultancy study on this subject in the light of best international practice. Similarly, we recommend that the proposed industry co-ordinating body should urgently lead a review on the Standard Form of Building Contract commonly used for local private building projects.

13. The resolution of disputes can be expensive and time-consuming. We urge employers, consultants and contractors to adopt a proactive approach to resolving claims and disputes as they arise. Where appropriate, alternative dispute resolution techniques (such as the use of a dispute resolution adviser or dispute review board) should be used instead of formal and binding adjudication means, which will remain as a last resort.

14. We advocate the wider adoption of a partnering arrangement in local construction so that all project participants will work as a team to achieve shared project objectives rather than in competition with one other. For partnering to work, the interests, needs, expectations, constraints and risks of every stakeholder must be given fair consideration. To achieve better project outcomes, we further propose that clients should motivate their consultants and contractors to provide better value by aligning the latter's financial objectives with the project objectives. Consideration should be given to the wider adoption of milestone payments, improved security of project payments to project team members and the adoption of a target cost contracting approach.

Nurturing a professional workforce

15. Manpower is the most valuable asset in the construction industry. We need to nurture a quality construction workforce through competence-based manpower development at all levels, fostering an ethical culture and promoting stable employment for construction workers.

16. For construction professionals, we recommend that undergraduates should receive more soft skill training and practical exposure. They should also be equipped with a broader knowledge base to facilitate future co-operation with professionals from other disciplines. To encourage a culture of lifelong learning among construction professionals, participation in continuing professional development programmes should be made a pre-requisite for renewal of membership with professional institutions.

17. Construction technicians and supervisors play an important role in ensuring compliance of construction works with specifications and other statutory or contractual requirements. To raise the standards of site supervisors, a structured training framework should be drawn up, setting out the academic and practical training required for different types of supervisory responsibilities. To foster a sense of belonging to the industry and to retain talent, we urge professional institutions and concerned industry bodies to actively consider the

creation of new membership categories for site supervisors and technicians.

18. As for construction workers, we support in principle the Construction Advisory Board's proposal to implement a construction worker registration scheme. We also support the initiative of public sector clients to contractually require contractors to engage trade-tested workers. To enhance worker training, we recommend that the Construction Industry Training Authority (CITA) should strengthen the scope and content of its basic craft courses by incorporating generic skills training, modules on the operations of the industry and site exposure. A more flexible apprenticeship scheme, to be administered by CITA, should be introduced to enable junior trainees to perfect their craft skills. We further suggest the development of a more refined, modular, competence-based qualification framework to encourage the nurturing of a multi-skilled workforce and to motivate workers to acquire higher qualifications up to master craftsman level.

19. It is crucial to inculcate an ethical culture in the construction industry in order to eradicate corruption and dishonest acts. To complement the Independent Commission Against Corruption's efforts in combating corruption, we recommend specific measures to foster a responsible attitude towards work among construction personnel and to promote probity in the industry through corruption prevention and promulgation of codes of practice and guidelines.

20. The daily wage system of employment, which is very common in local construction, is not conducive to the development of a quality culture or talent retention. The industry must invest in improving the quality of its workforce. We urge the industry to provide more stable employment for construction workers by widening the use of direct labour, starting with the core trades. Clients can assist in this development by contractually requiring their contractors to engage direct labour.

An efficient, innovative and productive industry

21. Construction costs in Hong Kong are relatively high. The industry must improve its efficiency and productivity substantially to stay competitive. Our recommendations on better integration across the entire construction value chain, more realistic project programming and more thorough planning at the outset of a construction project will help to eliminate waste and inefficiencies during project delivery. We have identified a number of additional measures to enable the industry to become more efficient and productive.

22. We consider that the construction industry should make more extensive use of modern construction methods and techniques as well as information technology (IT). Prefabrication, coupled with the use of standardised and modular components, will contribute to improved buildability and should be widely promoted, with public sector clients taking the lead. Processes and practices in project development and implementation should be rationalised as far as possible to shorten the learning curve and to provide greater predictability over outcomes. We also support better co-ordination in the development and application of construction standards in Hong Kong through the establishment of a dedicated standardisation office.

23. IT will help to improve construction efficiency through better information flow among project participants, improved design capability and enhanced project logistics management. To harness this potential, we need to secure the commitment of senior management to invest in IT and to build up a critical mass of IT users within the industry. The industry and the Government should work together to set common standards and develop a common data infrastructure to facilitate seamless electronic communication among industry participants. We also encourage the development of software applications that meet specific local needs.

24. Research is a key driver to steadily improve the overall performance of the construction industry through technology upgrading. Investment in

construction research should be significantly increased to promote an innovation culture in the industry. The industry and the local research community should work in collaboration to set clear objectives, directions and priorities for local construction research, to raise awareness of research results and to facilitate their practical application.

25. A robust and comprehensive regulatory framework is necessary to ensure effective performance of the construction industry. But care should be taken that regulatory controls do not become an impediment to the industry's drive towards excellence. We urge regulators to substitute prescriptive provisions with performance-based ones, streamline procedures, minimise conflicting requirements set by different regulatory authorities and develop a service culture. The ongoing review of the Buildings Ordinance and its subsidiary legislation, which seeks to modernise the legislation and to encourage building innovation, has our full support. We encourage other regulators to similarly facilitate the construction industry's operations.

26. The lack of accurate as-built records of some underground utilities and the prolonged process for obtaining excavation permits have an adverse impact on project delivery. We recommend that the Highways Department should take a lead in developing an efficient information system on underground utilities and streamlining the existing procedures for processing excavation permits. In view of the sharp demand-driven increases in the prices of ready-mixed concrete in Hong Kong in the mid- to late nineties, we recommend that the Government should, in consultation with industry stakeholders, consider possible alternative supply and other measures to ensure that our needs for concrete are met at competitive prices.

27. The construction industry has a proven record in the development and implementation of large-scale infrastructure and building projects. The successful implementation of our recommended improvement measures will significantly enhance the construction industry's competitiveness, enabling it to look beyond Hong Kong to find new business opportunities. We support recent

efforts made by the Works Bureau and the Hong Kong Trade Development Council in promoting the export of Hong Kong's construction services to other markets, in particular the Mainland market. Leveraging on our expertise in accounting, financing and legal services, Hong Kong has strong potential to develop into an infrastructure service integrator for the Mainland market and elsewhere. We recommend that stakeholders should critically examine the strategy and action plan for proactive promotion of our construction services in other markets.

A safer workplace

28. Hong Kong has a high site accident rate. But the current methodology for collating this rate has a number of shortcomings. It needs to be improved in order to provide a reliable management tool for monitoring the safety performance of local construction and for benchmarking with other economies.

29. Site safety is a shared responsibility of the regulator, employers and employees. To improve safety performance, we need to foster a safety culture within the industry. We advocate the wide adoption of a preventive approach founded on improved hazard management by all key project participants in a co-ordinated fashion. Public sector clients should take a lead in adopting practicable features of the UK's Construction (Design and Management) Regulations, requiring the project team to plan and design for safe construction and maintenance. The need for enacting legislation similar to the UK Regulations should be reviewed in five years.

30. Safety promotion and training for construction personnel at all levels should be stepped up. Industry participants should assume greater responsibility over their personal safety and the safety of others, and be suitably empowered through training to tackle site safety in a proactive manner. We look to major public and private sector clients to drive improvements in safety performance through procurement and contractual arrangements. We also urge

the Labour Department to explore with the construction industry and the insurance industry the possibility of pegging the construction insurance premium to safety performance as an incentive to encourage contractors to improve their site safety performance.

31. While the existing statutory framework for site safety is fairly comprehensive, enforcement action should be stepped up to strengthen the deterrent effect. We recommend that the Labour Department should target enforcement against blatant offenders of statutory safety requirements and amend the law to enable prosecution to be brought against offending subcontractors for breaches in operations under their direct control. The Buildings Department should also consider initiating disciplinary action against Registered General Building Contractors and Registered Specialist Contractors for poor site safety performance.

An environmentally responsible industry

32. The construction industry is among the worst polluters. To improve the environmental performance of local construction and to improve the quality of life for the community, we should widely promote the concept of sustainable construction with an emphasis on life-cycle benefits rather than short-term efficiency. We urge major clients to take a lead in practising the concept of life-cycle costing, which refers to the systematic evaluation of all relevant costs associated with the acquisition and ownership of a built structure. The proposals recently put forward by the Task Force on Building Safety and Preventive Maintenance on defect liability warranty will help to promote more durable and maintainable buildings and have our support.

33. To encourage the industry to adopt greener and more energy efficient designs, we need a supportive regulatory framework, market demand as well as access to information on the environmental performance of different construction technologies and materials. We support the Buildings Department's initiatives to promote excellence in the environmental performance of the

construction industry, and recommend the provision of incentives to create market momentum in the construction of green buildings and upgrading of existing buildings. Education of the end-users is important to create market demand for environmentally friendly construction. Major developers, including the Housing Authority, can lead the market by using green designs in their developments. We also look to regulators, industry stakeholders and the local research community to build up a knowledge base for industry participants with the necessary guidelines, design tools and databases.

34. We need to motivate the industry to comply with the regulatory requirements by making environmental performance a factor for consideration in tender evaluation and ongoing performance assessment. Contractors should be encouraged to employ dedicated personnel on site to assist line managers in managing the environmental aspects of construction activities. We also urge the Government to conduct a regulatory impact assessment on the cumulative impact of environmental legislation on the construction industry vis-à-vis the community.

35. We support the Government's efforts in addressing the problem of construction waste management. In addition, we recommend the wider use of recycled materials and modern construction methods (such as use of system formwork and prefabrication) to reduce construction waste. The Government should also identify suitable sites for off-site sorting facilities, "fill" banks and recycling or prefabrication facilities. Incentives should be provided to encourage the upgrading of existing buildings and urban renewal through private initiatives. Environmental assessment schemes and environmental management systems provide a systematic basis for tackling various environmental issues arising from construction. We support their wider adoption within the industry on a voluntary basis.

Institutional framework for implementing the change programme

36. Currently, construction-related responsibilities within the

Government are dispersed among several bureaux and departments. The absence of a co-ordination mechanism has sometimes led to conflicting regulatory requirements and ineffective communication between the Government and the industry. We recommend that the Government should appoint the Works Bureau as a lead agency to maintain an overview of all matters concerning local construction and to foster close collaboration among bureaux and departments on construction-related issues.

37. To provide a focus for the construction industry's reform efforts and to foster better co-ordination within the industry, we recommend the establishment of an industry co-ordinating body in the form of a statutory body to deliberate and generate consensus on pan-industry strategic issues, and to communicate the industry's needs and aspirations to the Government. In addition, it will carry out executive functions that are beneficial to the industry's development, e.g. carrying out self-regulatory functions, administering registration schemes for construction personnel and organisations, promoting good practices and innovative technologies, co-ordinating construction-related research, overseeing manpower development and training arrangements, and devising incentive schemes to encourage continuous improvement towards excellence. The proposed body will be led by eminent members of the industry and will have a broad membership base involving all industry stakeholders and independent members. The Government as a client will be represented on this body. The industry body will be supported by a permanent secretariat and funded by industry levy.

Priorities of implementation

38. The successful implementation of the Committee's recommended improvement measures will result in a lower cost base for local construction over time. At the same time, the quality of built products will be significantly improved. The Committee's recommendations are summarised in Chapter 10 with the suggested implementation timeframe. To ensure that the proposed change programme proceeds on track and to consider any need for refining the

Committee's recommendations in the light of practical experience, we recommend that the Government should review implementation progress in three years' time.

Chapter 1

Introduction

Background

1.1 Hong Kong's cityscape has been transformed beyond recognition during the past few decades as a result of a massive infrastructure development programme driven by the public sector and substantial investments by the private sector in residential and commercial developments. Our rapidly changing skyline is a constant reminder of the vitality and energy of our construction industry. Examples of excellent architecture and outstanding engineering feats abound. The output of local construction has also made possible the remarkable social and economic transformation of our society by providing a better living environment and stimulating economic activities in other sectors. At its best, our construction industry has enviable achievements, not only winning accolades for itself, but also making notable contributions to the advancement of the community as a whole.

1.2 Despite the industry's many successes, there exist a number of inherent problems which detract from its overall performance. It is amongst the most dangerous of all industries. Labour-intensive construction methods are still used extensively. There is, on the whole, a low level of both interest and investment in technological upgrading among local construction organisations. Our building cost is comparatively high and is vulnerable to sharp rises in the wages of skilled workers during construction peaks. Little emphasis is placed on buildability and life-cycle cost considerations during design development. Construction sites are typically a source of environmental nuisance and are unwelcome neighbours. To the general public, construction is frequently associated with poor workmanship, budget over-runs and programme delays. Above all, the industry is highly fragmented with an ingrained adversarial culture. The image of the industry has been dealt a further blow recently when a number

of serious construction incidents were uncovered in the public housing sector and the private building sector, exposing deficiencies in certain practices in the local construction industry.

Establishment of the Construction Industry Review Committee

1.3 There have been strong calls, among industry stakeholders and in the community, for a critical examination of the current business practices and processes of the construction industry with a view to identifying ways to address the more fundamental shortcomings that exist at the industry level. In April 2000, the Chief Executive of the Hong Kong Special Administrative Region appointed the Construction Industry Review Committee (CIRC) to comprehensively review the current state of the construction industry and to recommend improvement measures to uplift its quality and performance. The Committee was requested to complete its work within nine months. The terms of reference and the membership of the CIRC are at Annexes A and B of the report respectively. The Committee held 10 meetings in the course of the review exercise.

1.4 In view of the broad scope of the review, the Committee set up three Sub-committees, namely the Construction Quality and Safety Sub-committee, the Manpower and Modernisation Sub-committee and the Construction Cost and Environment Sub-committee, to facilitate detailed deliberations on relevant issues. In addition, a Working Group on Use of Information Technology (IT) in Construction was established to consider how best to harness the potential of IT to improve construction efficiency and productivity. The membership of these Sub-committees and the Working Group is at Annex C. A total of 33 meetings were held at the Sub-committee and Working Group levels.

1.5 The Committee has conducted extensive consultation with industry stakeholders to gain insights into the present operation of the construction industry and to solicit views on the directions of the industry's future developments. This process was facilitated by the presence of industry participants on the main Committee, its Sub-committees and the IT Working

Group. We have also sought the active participation of the concerned Government bureaux and departments, in addition to those represented on the main Committee, in our work in order to obtain feedback on their experience as construction clients as well as their perspectives as regulators.

1.6 In July 2000, the Committee organised a seminar to invite industry input to the building of a new vision for the construction industry in the 21st century. Numerous exchange sessions and informal discussions were held with stakeholders as the review progressed to enable us to seek feedback from the industry on various issues under consideration. We also took into account written views submitted by the industry and members of the public in drawing up the recommendations included in this report. In addition to visits to local construction sites and construction-related organisations, the Committee visited Australia, Singapore and the UK in October and November 2000 to study the experience of those places in reforming their construction industries and the best practices adopted by them.

An integrated framework for future development

1.7 The delivery of a construction project is a highly complex process, involving multi-disciplinary inputs provided by a vast number of participants from tradesmen, technicians, supervisors, professionals, consultants, contractors and subcontractors, to client organisations and the regulatory authorities. The successful completion of a project from the conceptual design stage through construction to commissioning normally spans several years. In the great majority of cases, the undertaking of a construction project involves a substantial financial commitment.

1.8 Notwithstanding the varying nature and complexity of construction projects, project participants share a common objective, which is to produce a quality product that fully meets the requirements of the client and to deliver it on time and within budget. The Committee has examined how the entire construction delivery process from planning and design, to tendering,

construction, commissioning, maintenance and demolition could be improved to facilitate this outcome on a project basis. In addition, we have set strategic directions for the long-term healthy development of the construction industry as a whole. In drawing up a blueprint for raising the quality and performance of local construction, we have covered both public sector construction and private sector construction.

1.9 The realisation of our vision for excellence calls for a major culture change in the construction industry, committed leadership, firm determination to achieve and the concerted efforts of all stakeholders. To obtain the promised benefits, the construction industry must take ownership of the change programme and demonstrate commitment to its successful implementation.

1.10 The Committee is much encouraged by the collaborative spirit in which industry stakeholders have approached the review exercise and the enthusiasm they have displayed in sharing their views on a broad range of issues on which the future of the industry depends. There is wide acceptance among stakeholders that the construction industry needs a fundamental reform in order to improve its performance and to build a solid foundation for its sustainable development in the long run. The climate for change is here. The momentum for reform is building up. The construction industry should seize this opportunity to start the transformation process. It is our sincere hope that the rapport which has been built up among stakeholders in the course of the review exercise will spread and be sustained in this pursuit of excellence.

1.11 There is a huge challenge lying ahead. But many of the problems which our construction industry faces today are neither unique nor insurmountable. The success with which the construction industries in places such as New South Wales, Australia and the UK have set about re-inventing themselves illustrates well that these problems can be overcome and that there is a better approach to construction if only all industry stakeholders work together. We urge our construction industry to take this bold step forward without delay.

Chapter 2

The Construction Industry Today

Economic performance of the industry

2.1 The construction industry plays an important role in meeting the expanding needs of the community for more and better physical infrastructure arising from population expansion and growing economic prosperity. Over the past decade, public and private sector investment in infrastructure development amounted to about $400 billion[1]. These infrastructure projects have not only contributed to improvements in the quality of life and our living environment, they have also provided adequate formed land and well-developed facilities to match the growth of the economy. Over the same period, a total of 650 000 new housing units (in the public and the private sectors) have been built to cater for the needs of an expanding population and the growing affluence of the people. In the coming five years, public and private infrastructure development projects worth about $320 billion will be under way.

2.2 The construction industry[2] is one of the main pillars of our economy. The level of construction output closely correlates with overall GDP performance. Since 1990, the industry's contribution to GDP in percentage terms has been in the range of 4.9% to 6%, indicating the sustained importance of the construction industry as a backbone of the local economy. Chart 2.1 shows the contribution of the construction industry to GDP from 1990 to 1999. Of the total fixed asset investment in 1999 (as measured by gross domestic fixed capital formation in GDP), about two-fifths was attributable to building and construction.

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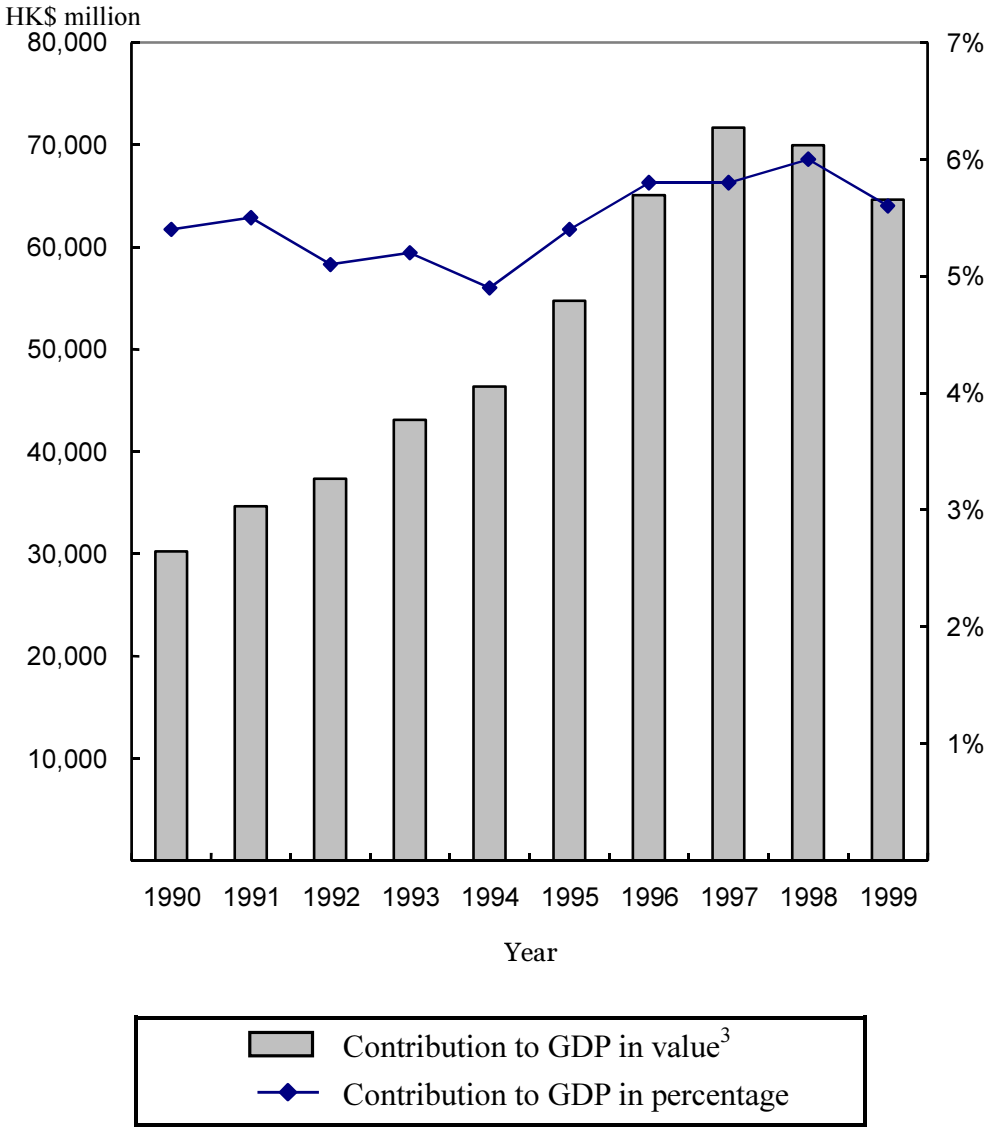
[1] This figure represents the total actual expenditure on major infrastructure projects undertaken by both the public and the private sectors during the period from 1990-91 to 1999-2000.

[2] For statistical purpose, the construction industry covers new engineering and building projects, maintenance and renovation works as well as decoration activities unless otherwise stated. The scope of this report covers primarily new engineering and building works.

Chart 2.1 : Contribution of the construction industry to GDP in percentage and value terms (1990-1999)



Source : Census and Statistics Department

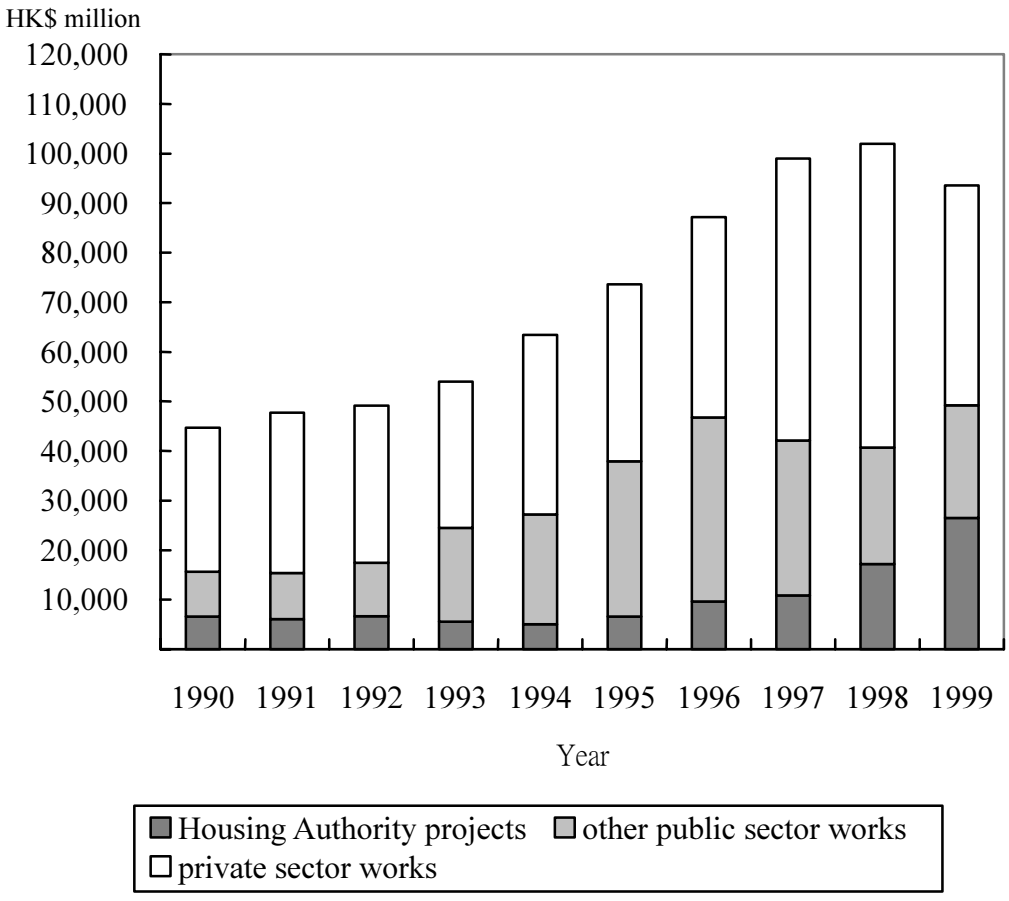
[3] The contribution of the construction industry to GDP is a measurement of the value added of the industry which is derived from the gross output less intermediate consumption (including the value of subcontract work rendered by fee subcontractors, consumption of materials, rent and rates, machinery rental, etc.).

2.3 The gross value of construction work performed by main contractors at construction sites[4] increased from $44.7 billion to $102 billion between 1990 and 1998. The year 1999 saw a 8.3% drop to $93.6 billion, reflecting the impact of the economic downturn which hit Asian economies in late 1997 and the completion of the Airport Core Programme. Construction activity is expected to pick up in the next few years with the recovery of the economy and the implementation of a number of major infrastructure projects.

2.4 Construction activities can be broadly divided into three areas, namely, public housing projects undertaken by the Housing Authority; other public sector works commissioned by the Government of the Hong Kong Special Administrative Region, the Airport Authority, the Kowloon-Canton Railway Corporation (KCRC) and the Mass Transit Railway Corporation (MTRC); and private sector construction projects undertaken by property developers. Public housing projects and public sector works projects (including works projects undertaken by the Government, the Airport Authority, KCRC and MTRC) combined accounted for slightly over half of the gross value of construction works in 1999. Chart 2.2 shows the value of construction works performed by main contractors at construction sites from 1990 to 1999 by sector.

[4] Construction work at construction sites covers primarily new engineering and building projects. Maintenance, renovation and decoration activities are excluded.

Chart 2.2 : Gross value of construction works performed by main contractors at construction sites by sector (1990-1999)



Note 1 : Other public sector works include construction projects undertaken by the Government of the Hong Kong Special Administrative Region, the Airport Authority, KCRC and MTRC.

Note 2 : Private sector works cover construction works undertaken by private sector developers, subvented organisations and the Hong Kong Housing Society.

Source : Census and Statistics Department

2.5 The construction industry is a large employer in our economy. The construction workforce comprises a vast diversity of personnel from different disciplines at managerial, professional, technician and tradesman levels. The

number of employed persons in the construction industry[5] has increased since 1995, reaching a peak of 309 500 in 1998. The construction workforce fell to 289 200 in 1999 as a result of the reduction in construction workload subsequent to the downturn of the property market. In 1999, 9.2% of the local workforce was engaged in the construction industry.

Problems besetting the industry

2.6 Despite the considerable contributions made by the construction industry to Hong Kong's overall economic development, the industry's overall performance is far from satisfactory. The key problem areas commonly identified as affecting local construction are discussed in paragraphs 2.7-2.19.

Poor site safety record

2.7 The construction industry is a notoriously dangerous industry with a higher level of injuries and fatalities than any other local industry. In the past ten years, there were about 200 000 injuries and 608 fatalities. In 1999, the industry recorded a total of some 14 000 site accidents, representing about 39% of all industrial accidents. 47 people lost their lives. The site accident rate for the industry as a whole[6] in 1999 was significantly higher than that in other advanced economies.

Unsatisfactory environmental performance

2.8 Construction activities are inherently disturbing to the environment.

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[5] The number of employed persons in the construction industry is collated by reference to the General Household Survey. It covers persons employed by construction, maintenance, renovation and decoration establishments at all levels, including managers and administrators, professionals, associate professionals, craft workers, support staff and unskilled labourers.

[6] The site accident rate for the construction industry as a whole in 1999 was 198 per thousand workers. But we note that the current methodology for compiling the industry-wide site accident rate has a number of shortcomings and may have over-stated the gravity of the problem. Please refer to paragraph 8.7 in Chapter 8 of this report for further details. We should also point out that because of differences in the definition of reportable accidents and the calculation methodology, it is difficult to make a direct comparison of the site accident statistics of different places and to draw any definitive conclusions from such comparison.

They generate environmental nuisance in the form of noise, dust, muddy runoffs, and improper disposal of chemical waste. In 1999, the number of complaints against the construction industry for non-compliance with environmental protection requirements increased by 9% over 1998 to 3 660 cases. Convictions increased by about 40% over the previous year to 633 cases.

2.9 The disposal of construction and demolition (C&D) material[7] presents another major problem. Despite the economic slowdown in 1999, the construction industry produced 7.52 million cubic metres of C&D material, a 14.3% increase over 1998. In 1999, about 21% of the total C&D material produced was disposed of at landfills. This accounted for about 44% of the total waste disposed of at landfills.

2.10 From a design perspective, the project owner and the project team generally place little emphasis on the environmental performance of the built facilities while in service (e.g. in terms of indoor air quality, energy efficiency, users' health and comfort, etc.). In the case of private sector developments, in particular, high land costs have driven developers and designers to maximise the plot ratio and the gross floor area without giving adequate consideration to the above-mentioned environmental concerns.

Need for a more client-focused approach

2.11 The industry is rife with examples of substandard work, shoddy workmanship, cost overruns and project delays. The piling problems and other malpractices that have been uncovered in a number of building projects recently are extreme cases of substandard work in local construction. There are also frequent complaints about the poor quality of fittings and finishes of newly completed residential buildings in both the public and the private sectors.

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[7] C&D material is a mixture of inert and organic material arising from site clearance, excavation, construction, refurbishment, renovation, demolition and road works. The inert material, called public fill, is suitable for reuse in reclamation and site formation works. Some of it can also be used for recycling into material for construction. Ideally, only the organic material called C&D waste should be disposed of at landfills.

2.12 The less than satisfactory performance of the construction industry has generated a widespread expectation among clients that construction products will not be completed on time and within budget. Defects and remedial work are commonplace and have become an accepted phenomenon. The relatively low expectation of construction clients has in turn led to a complacent attitude among many industry participants. The industry also lacks a culture of continuously improving on its products to meet the needs of the end-users. This contrasts sharply with the situation in other industries which, when left to market forces, are only too eager to satisfy their customers by offering them better products at increasingly competitive prices and are constantly improving the production process in order to deliver better value to customers. The construction industry must improve its operations and its products to better meet the requirements of its clients and the needs of the end-users.

Extensive use of traditional and labour-intensive construction methods

2.13 While advanced construction technologies are frequently used on major infrastructure projects, local construction is on the whole heavily reliant on labour-intensive, in-situ construction methods. This is especially the case for building projects. Except in public housing, the use of prefabrication and modular components is not common. While in-situ construction methods (i.e. construction work carried out on site) are proven and can be more economical when there is a sufficient labour supply, the output quality hinges on the workmanship of construction workers. As the site environment is less conducive to the consistently good outputs possible in an established indoor production facility, close supervision is required. In the event of a shortage of skilled labour, construction cost will be subject to rapid increases. There are other indirect costs arising from material wastage, disposal of wastes and extra effort in organising trade interfaces.

An inadequately trained workforce

2.14 The skill levels of local construction workers vary significantly, but

are not easy to ascertain unless the workers have undergone skill-testing. Due to the prevalence of subcontracting and the daily wage system of employment for workers, most employers are not keen to engage direct labour or to invest in training. In the absence of a clear career path, there is also little incentive for workers to upgrade their skills. The industry faces a lot of difficulty in attracting new blood and retaining quality people as a result of unstable employment and the poor conditions of the industry.

Tendency to award contracts to the lowest bidders

2.15 Construction contracts are commonly awarded to the lowest bidders throughout the construction value chain. Cut-throat competition has sometimes led to unrealistically low bids which fail to make adequate provisions for meeting all the statutory and tender requirements. Many industry participants aim to meet only the minimum requirements set by clients. To cut costs, consultants may resort to producing conventional design solutions, reducing senior professional input or exporting work offshore. Contractors, on the other hand, may seek to increase their profit margins through variations and claims and some may try to reduce their losses by cutting corners.

Short-term attitude to business development

2.16 As a result of low profitability, most industry participants adopt a short-term view on business development. Investment in construction-related research and development across the industry is low, and there is little proactive interest in building up the industry's long-term competitiveness through the use of innovative technologies and more efficient work processes.

Non value-adding multi-layered subcontracting

2.17 Subcontracting of construction works is a long-established practice in local construction. The delivery of a construction project involves different skills at different stages of the construction process. Coupled with the fluctuating

construction volume from year to year, there are sound economic reasons for the existence of such a practice to avoid an excessive demand on the main contractor's own in-house resources. However, in the absence of adequate control and supervision by the main contractor over the subcontractor's work, construction quality can suffer. In particular, where non-value-adding subcontracting layers exist in the project delivery chain and where contract prices are very competitive, the profit margin of the party carrying out the actual work can become so small that the concerned subcontractors may resort to corner-cutting.

Declining productivity growth and high building cost

2.18 Building cost in Hong Kong is among the highest in advanced economies. According to a study commissioned by the Hong Kong Construction Association in 1999, there has also been a slight year-on-year decrease, as a long-term average, in the growth of the total factor productivity of the local construction industry[8] since 1972. A number of factors have affected the efficiency and productivity of local construction, including segregated delivery processes, non-value-adding multi-layered subcontracting, prevalence of labour-intensive in-situ construction methods, too many small organisations in the industry without the requisite capabilities, and relatively low investment in the use of new technologies.

Fragmentation and adversarial culture within the industry

2.19 The construction industry is characterised by a high degree of fragmentation, with numerous individual participants each pursuing his singular interests on a project-by-project basis. Co-operation on an industry wide basis is very limited. This state of segregation is reinforced during project implementation. Under the conventional approach to project delivery, which is still the most widely used approach in local construction, the various processes

[8] The total factor productivity of the local construction industry is measured by the industry's total construction output compared to all the resources required to produce such output.

from design to commissioning proceed in sequence with little interaction with one another. For instance, the design process often takes place without the benefit of any input from contractors. Fragmentation within the industry and in the project delivery process has impeded proper consideration of issues that have a direct bearing on the industry's performance, e.g. buildability, adoption of innovative construction and information technologies, construction safety, environmental performance and life-cycle costs. Poor logistics co-ordination has led to time and material wastage. It is further observed that the multiple parties involved in the construction supply chain often adopt an adversarial approach in dealing with one another. The absence of a teamwork culture in the industry and the lack of a common purpose among stakeholders have inhibited concerted efforts in driving for better overall performance of the industry as a whole.

2.20 The problems encountered by the local construction industry today demand immediate attention. Many of these problems stem from long-established practices and processes. We need a change of culture and mindset among stakeholders in order to bring substantial improvements to the image and operation of the industry.

Chapter 3

Vision for Growth and Development

3.1 The construction industry needs a step improvement in its overall performance in order to maintain its long-term viability and competitiveness. From its current state as a fragmented industry with a multitude of players in different sectors each pursuing his own self-interest in a project-based relationship, the industry will have to develop a new culture that focuses on delivering better value to the customers on a continuous basis. We have a vision of ***an integrated construction industry that is capable of continuous improvement towards excellence in a market-driven environment.***

Towards integration

3.2 To enable the industry to deliver a total quality product to the client's satisfaction and generally to operate more cost-efficiently, industry participants will need to break down the boundaries that have hitherto separated them and work together to achieve the best results for the project. Adversarial relationships will have to give way to a positive business culture founded on honesty, fairness, mutual trust and respect. Members of the same project team, and by extension different sectors of the construction industry, should come to a better appreciation of their complementary strengths and create an environment in which every party is motivated to make a contribution to the best of its ability.

3.3 In advocating a more integrated approach to construction, we emphasise at the same time the need to clearly delineate responsibilities and establish accountability. We should aim for a system which encourages every project participant to contribute his expertise towards meeting the shared project objectives while holding him accountable for his own actions and performance. A clear accountability structure is needed so that good performance will be recognised and poor performers duly sanctioned.

3.4 There is a need for more integrated project delivery processes. In particular, more attention should be paid to the early stages of project development so as to forestall problems which may otherwise emerge further downstream. Greater emphasis on the buildability of designs at the start of the project will lead to wider adoption of cost-saving and labour-saving construction technologies and minimise material wastage at the same time. Considerations given to safety and environmental issues at the design stage will be rewarded with a lower accident rate, less environmental nuisance during construction and a more sustainable built environment in the long term. This call for better co-ordination and a broadened outlook also extends to project management and site management. The traditional segregated approach to management reinforces the divide between the building disciplines and inhibits all-round assessment of management decisions. This has to change. Management personnel should adopt a total systems approach in carrying out their management responsibilities from conception to project completion, and be empowered with the necessary authority to do so effectively.

3.5 Industry participants will need to develop a broader set of skills and competencies to support the new integrated approach to construction. At the worker level, we need to build up a flexible, multi-skilled and productive workforce through more stable employment and better career development opportunities. Professionals, including architects, engineers or surveyors, will need to continuously update themselves on the latest technology, know-how and management practices, and develop a better understanding of the other building disciplines so that they can work in closer collaboration effectively. They should also look for appropriate opportunities to innovate. Above all, we need to nurture a performance-oriented culture among our construction personnel and encourage them to develop a sense of pride in their output.

3.6 At the organisation level, service providers (including consultants, contractors, subcontractors and suppliers) will need to become more professional and better managed in order to offer quality service to customers. Industry participants, especially small and medium sized enterprises, must shift from their

traditional mode of operation which is characterised by low capitalisation and the absence of any long-term strategic planning. Instead, they should adopt a forward-looking approach to business development and aim to exceed customers' expectations through improving their own technical and management capabilities. More emphasis will need to be placed on forging strategic relationships with key business partners and better management of the supply chain.

Continuous improvement towards excellence

3.7 There is scope for significant improvement in the operation and performance of the construction industry. Whether such improvement can be realised will depend to a large extent on the commitment of industry participants to make a success of the change programme recommended in this report and the resources devoted to this task. It is also crucial that the industry attaches importance to seeking continuous performance breakthroughs beyond the requirements stipulated in statutes or clients' requirements. To this end, a fair system of rewards and sanctions should be put in place so that the more progressive and better-performing members of the industry will set the pace for the rest of the industry to move forward.

3.8 To enable the industry to constantly surpass its achievements, the construction workforce at all levels will need to upgrade its skill set and competencies on an ongoing basis through continuous education and development. Industry participants along the construction value chain should also be encouraged to develop their relationships in a way that would maximise the learning capability of the team, thus enabling the team to achieve improved efficiency and productivity over time.

3.9 We should also encourage open communication at the industry level so that industry participants from different organisations will come together to exchange views on matters of common concern as well as to share knowledge and learning. The objective of this process is to spread good practices throughout the industry, to shorten the learning curve for industry participants and to enable

the industry to make collective efforts to improve its overall performance. Co-operation at the industry level is also needed to facilitate more co-ordinated research efforts and to achieve the necessary economy of scale for the introduction of new construction techniques and technologies (such as prefabrication).

Improved performance driven by the market

3.10 In drawing up the recommended improvement measures, we keep firmly in view the importance of building up the strengths of the construction industry so that industry participants will be able to compete successfully not only in the local market, but also overseas. We take the view that the Government should provide a conducive regulatory environment to enable the industry to thrive and that as far as possible, we should rely on market forces to drive the necessary changes in the practices and processes in local construction. In this connection, we consider that clients play a pivotal role in reshaping the construction industry.

3.11 All projects start with the client. Clients set in motion the project implementation process and the industry is challenged to meet their requirements. Acting together and through appropriate procurement and contract strategies, clients can help modify the behaviour of the industry in a way that brings mutual benefits in terms of better value for the client and enhanced performance and productivity for the industry. We feel strongly that public sector clients should take a lead in implementing our recommended improvement measures and in adopting good practices in construction procurement and project implementation. At present, public sector works projects and public housing projects account for about half of the total volume of local construction activities[9]. This collective market power is too substantial to be ignored by the industry. The experience of New South Wales, Australia and the UK clearly demonstrates that public sector clients form a key driving force in the successful transformation of their

[9] In this context, the total volume of local construction activities refers to the gross value of construction work performed by main contractors at construction sites.

respective construction industries. We strongly urge our public sector clients to lead the change process for local construction.

3.12 In the following chapters, we shall elaborate on a comprehensive package of specific measures to improve the quality and performance of local construction under the following headings –

(a) Fostering a quality culture;

(b) Achieving value in construction procurement;

(c) Nurturing a professional workforce;

(d) An efficient, innovative and productive industry; and

(e) A safer workplace and an environmentally responsible industry.

The implementation of the reform programme is a major undertaking on the part of the Government and the industry. To facilitate this change process, we have put forward proposals for a new co-ordination framework.

Chapter 4

Fostering a Quality Culture

4.1 The uplifting of construction quality requires a change of mindset among all industry participants so that everybody is committed to achieving excellence rather than merely meeting the minimum acceptable standards. The entire project team should aim to deliver a total quality product that not only meets the client's and end-users' requirements in all respects, but is also completed on time, at a reasonable cost, and in a safe and environmentally responsible manner. To drive towards excellence, all sectors of the construction industry must develop a performance-oriented culture with an emphasis on seeking continuous improvement rather than adopting a short-term, project-based approach.

4.2 In subsequent chapters, we shall examine in detail how appropriate procurement strategies, investment in manpower development, and greater attention to safety and environmental issues arising from the project delivery process will contribute towards better construction quality. In this chapter, we shall focus on the following issues –

(a) a knowledgeable and involved client;

(b) importance of the planning and design stages;

(c) realistic project programming;

(d) clear accountability;

(e) subcontracting;

(f) site supervision and quality assurance; and

(g) raising the quality standard of renovation contractors and decorators.

A knowledgeable and involved client

4.3 Informed clients who demand quality and are prepared to commit resources to enable the project team to deliver quality play a pivotal role in fostering a quality culture in local construction. In particular, we need discerning clients who are able to distinguish between short-term gains and long-term benefits, and who seek to maximise overall value rather than just minimising the initial capital cost of construction. Clients with a sound understanding of what a construction project entails and remaining involved throughout the delivery process stand a better chance of achieving the objectives set for the project.

4.4 Whether the delivered project fully meets the expectations and functional requirements of the client and the users depends to a large extent on how clearly and adequately the objectives defined by the client at the outset of the project reflect their needs and expectations. A comprehensive and clear project brief lays a sound foundation for project implementation and a knowledgeable client is instrumental to the formulation of a good project brief.

4.5 We note, however, that not infrequently the client has limited knowledge of, and experience in, implementing construction projects. To an extent, the client may rely on his professional team for advice. But it is crucial that the client, as the investment decision-maker and the project owner, also develops an understanding of the different facets related to construction project delivery (e.g. contract strategies, risk management, basics of the construction process and the construction industry, value for money issues, project planning and programming to achieve the optimal timescale, etc.) in order to ensure that realistic objectives and targets are set for the project.

4.6 Effective communication with the project team and close involvement of the client throughout the project delivery process facilitate

smooth project implementation. Regular feedback between the client and the project team throughout the development and delivery of the project enables the client's requirements to be clarified as and when necessary. This would minimise possible gaps between the client's expectations and the project outcome. The client and his agent should, in addition, be vigilant in supervising the delivery process, paying particular attention to quality assurance measures (such as quality control testing, strict adherence to acceptance standards, etc.) We shall address the subjects of site supervision and quality assurance in greater detail in paragraphs 4.32-4.42 below.

4.7 In the light of the foregoing, we recommend that clients, in particular occasional clients, should, assisted by professionals, develop a better understanding of the different facets of the construction delivery process so that they can play a more effective role in project development and implementation. They should set out the requirements of their projects clearly, systematically and comprehensively. In addition, clients and their agents should maintain close involvement with the project team throughout project implementation to ensure that the team has a good appreciation of their requirements and to secure satisfactory delivery of the project through adequate site supervision and stringent quality assurance measures. We further recommend that project managers should see it as part of their professional duty to promote clients' knowledge of the project delivery process through regular feedback on implementation progress.

Importance of the planning and design stages

4.8 The construction project delivery process typically involves many activities and inputs from different parties, from project inception, planning, design to tendering and construction. Detailed planning at the start of a project and a design that takes full account of practical issues arising from other downstream activities, such as buildability, site safety and environmental concerns, lay a firm foundation for smooth project delivery subsequently.

4.9 The key objectives of the various activities at the planning and design stages generally include –

(a) to define clearly the project scope and the client's requirement;

(b) to assess and confirm engineering and financial feasibility and identify probable risks;

(c) to produce a design that satisfies the client's and users' functional and other requirements, at least meets the required quality and standards while striving to make advances, takes account of the latest available technologies, and achieves value-for-money within a reasonable budget;

(d) to plan resources and the programme of implementation;

(e) to complete other necessary administrative and statutory procedures; and

(f) to formulate a suitable procurement strategy and prepare the necessary documentation.

4.10 As further elaborated in subsequent chapters of this report, many of the manifest problems in local construction, such as poor buildability, high site accident rate, unsatisfactory environmental performance and high construction cost, could have been avoided or ameliorated with more thorough consideration at the planning and design stages. We recommend that clients should ensure more integrated input from different disciplines at the outset of a project in order to safeguard the efficient implementation of downstream activities and the achievement of quality construction. In connection with this, we recommend that value management techniques should be used more widely in local construction.

4.11 Using value management techniques, the client and other concerned

stakeholders work together to clarify project objectives, improve project specifications, compare design options, evaluate construction methods, select sites, etc. The aim of the process is to define and address the client's needs in simple but precise terms. The improved communication among concerned parties at the initial stage of project development helps to ensure that identified design criteria and solutions will better satisfy the client's requirements and priorities. Value management studies, which may also be conducted any time throughout the implementation of a project for a particular task or function, help the client as well as the project team to focus on the objectives and needs of the project and all stakeholders, both long and short term. There are some local examples of the use of value management techniques, e.g. in some building projects undertaken by the Architectural Services Department, apparently with good results. We recommend that public sector clients should continue to take a lead in the wider adoption of these techniques.

Realistic project programming

4.12 We observe that local construction projects are commonly required to be completed within a very tight timeframe. For private sector projects, especially during a boom period, because of the relatively high land costs and interest charges, developers are keen to see their projects completed and put on the market quickly so that they can recoup their substantial investments as soon as possible. Public sector projects, on the other hand, are also often subject to considerable time pressure because of the need to meet certain policy objectives and the rising expectations of the community for better infrastructure and services.

4.13 Based on industry feedback, we note that because of a fragmented approach to construction, poor planning and interfacing, inadequate logistics management and lax site supervision, accelerated project delivery has frequently resulted in considerable inefficiencies in the delivery process, poor workmanship, cost overruns and an end-product that fails to fully meet the client's requirement.

4.14 To improve on the current situation, we recommend that clients should allow sufficient time for the project team to give proper consideration to all relevant factors and to mobilise the necessary resources to deliver projects to a good standard. We recognise, though, that for private sector projects, for as long as land cost and interest charges take up a significant portion of the total development cost far in excess of construction cost, developers would be strongly tempted to accelerate the construction programme despite the possible adverse impact on construction quality. We recommend that the Government should further look into this issue to see if there are any practical means of addressing the effect of high land cost on construction quality.

Clear accountability

4.15 The satisfactory delivery of a project depends on the commitment of all stakeholders to perform to the best of their abilities in full alignment with the objectives of the project. We look to all members of the project team (including client organisations, designers, engineers, contractors, subcontractors, site supervisors, workers and others) to take a responsible attitude to their work and to perform their duties to a high standard. To facilitate the development of a performance-oriented culture in the construction industry, we need to clearly define the roles and responsibilities of the various parties involved in the project delivery process and the expected standards of their performance. At the same time, we need to put in place a fair system of sanctions so that when things go wrong, the responsible parties are brought to account. Regulators, clients, professional institutions and industry bodies can all assist in establishing a clear accountability structure in the industry.

4.16 Consistent with our philosophy that the construction industry should be motivated to strive for excellence through market forces as far as possible, we take the view that construction legislation should be kept to a minimum that is necessary for the protection of worker safety or other wider public interest. Where regulations are necessary, they should clearly and fairly set out the responsibilities of the concerned parties and put in place appropriate sanctions

proportional to the seriousness of the offence. Taking site safety as an example, we note that under the existing regulatory framework, the main contractor is held liable for safety offences committed on his site. Given the prevalence of subcontracting in local construction, this approach means that where the offence is actually committed by a subcontractor, the sanction fails to target the party that is at fault (see also paragraph 8.22 in Chapter 8). This should be rectified in order to bring the full force of the regulation to bear on those who abuse the system.

4.17 Legislation will lose its sting without effective enforcement. Given resource constraints, all regulators face the same challenge of how best to target their enforcement action. We recommend that our regulators should explore with the industry, whenever appropriate, ways for industry participants to assume a greater responsibility over their behaviour through a degree of self-regulation. The regulator will continue to police the system, but with greater emphasis on those particularly at risk and with appropriately raised stakes for those who attempt to abuse the regulator's trust.

4.18 On a project basis, the client plays a key role in allocating responsibilities to members of the project team by his choice of procurement strategy. In making a choice over the procurement strategy for a particular project, the client should consider carefully whether the way responsibilities are shared under a particular procurement arrangement will suit the needs of the project in hand and will best ensure the delivery of the project to his satisfaction. The client should at the same time see to it that a clear accountability structure is set up within his organisation and that it is enforced rigorously. The importance of this is well illustrated by a number of recent non-compliant construction incidents.

4.19 Once the procurement strategy is decided, the client will need to devise an appropriate mechanism to select the project team members that are best able to take up the identified responsibilities in the delivery of the project, to monitor their performance and to sanction non-performance. We shall examine these issues in detail in Chapter 5. Suffice to say here that the client has a

powerful sanction at his disposal: control over the future tendering opportunities and the opportunities for successful bidding of consultants and contractors engaged in his projects. He should make full use of this to ensure that members of his project team discharge their responsibilities in a satisfactory manner.

4.20 The client should also insist that consultants and contractors who work directly for him will in turn demand responsible behaviour from those under their charge. A case in point is the management of subcontractors by the main contractor. While accepting that there is a practical need for subcontracting and notwithstanding the fact that the main contractor is held responsible for satisfactory performance of all the tasks stipulated in the contract, the client should consider carefully whether additional safeguards should be put in place (e.g. requiring transparency of the main contractor's subcontracting arrangements, assessing the main contractor's performance in the management of subcontractors as part of his overall performance, etc.) to keep possible abuses in check.

4.21 The professional institutions and other industry bodies can help to instill a greater sense of accountability among industry participants and uphold professional integrity by stipulating acceptable standards of behaviour (e.g. in the form of codes of conduct). In support of these standards of conduct, the professional institutions and other industry bodies will also need to rigorously enforce an effective disciplinary mechanism to sanction those members who have fallen short of the required standards and have brought the profession/trade into disrepute. This is already the case among construction professionals. We recommend that the other sectors within the industry (e.g. contractors and subcontractors, consultants, site supervisors, etc) should follow suit and that the industry should seek to raise its professionalism by voluntary self-regulation. We envisage that the industry co-ordinating body proposed to be set up in Chapter 9 of this report will play an important role in this regard. We urge that in taking forward this task, the proposed industry co-ordinating body should seek to uphold public interest while promoting the interests of the professionals and the trades.

Subcontracting

4.22 Multi-layered subcontracting has frequently been cited as a key factor contributing to substandard work in local construction. We note that because of the different skills involved at different stages of the construction process, the increasingly complex nature of construction projects and the fluctuating construction workload, the engagement of subcontractors for the provision of labour, specialist service and construction plant and equipment is an economically efficient means to deliver construction projects. But in the absence of proper safeguards, subcontracting has led to the following problems –

(a) Many subcontractors, especially those at the lower tiers in a multi-layered subcontracting chain, do not enter into formal subcontracts with the main contractor. As a result, the main contractor does not exercise adequate direct control and supervision over the subcontractor's work. This makes it difficult to identify the party responsible for defects and to bring the defaulting subcontractor to account;

(b) Broker-type subcontracting creates multiple, non value-adding layers in the project delivery team, complicates communication and reduces the profit margin of the party carrying out the actual work. With a much reduced profit margin, subcontractors at the bottom tier may be induced to take chances by cutting corners in order to save cost, at the expense of quality; and

(c) The problem of multi-layered subcontracting is further aggravated by inadequate site supervision.

4.23 We also observe that in the absence of any industry-wide registration or licensing scheme, there is no minimum requirement on the capital, managerial and technical competence and the employment of direct labour for those wishing to engage in subcontracting activities. There is no sanction for non-performers

and those subcontractors producing substandard work may continue their business with impunity.

4.24 In pursuit of our objective of quality construction, we consider it important to raise the standard of subcontractors, including trade subcontractors taking on part of a building or engineering development (such as plastering, concreting, air-conditioning, plumbing etc.). We must build up a pool of capable and responsible subcontractors with specialised skills in the concerned trades and a high standard of professional ethics. To this end, we recommend that initially a voluntary registration scheme for such trade subcontractors should be set up. Only those subcontractors meeting the stipulated criteria in terms of, for instance, capital, managerial and technical expertise, and direct labour employed, may be registered. Sanctions will be applied to those registered subcontractors who fail to meet the stipulated standards of conduct. Once the registration scheme is set up, it would be up to clients to require their main contractors through contractual means to engage only registered subcontractors.

4.25 In view of the large number of construction companies and the diversity of trades involved, we are mindful of the resource implications arising from this recommendation and hesitate to suggest that such a registration scheme be administered by the Government. We are in favour of a lead taken by industry and we consider the proposed industry co-ordinating body (see Chapter 9) a suitable organisation to take forward this initiative. In drawing up the registration criteria for subcontractors, the industry co-ordinating body should consult widely with concerned stakeholders, including the relevant Government departments. We take the view that consistent with our philosophy to rely on market forces as far as possible to drive the construction industry to reform itself, we should let the industry administer the proposed subcontractor registration scheme in the first instance. The Government should review in due course the need for introducing a mandatory registration scheme in the light of practical experience in implementing the voluntary scheme.

4.26 We note the efforts made by the industry in recent years to promote

the Organized Specialist Subcontractors System, albeit primarily to encourage long-term employment of construction workers. Organized specialist subcontractors are required to have in-depth knowledge in the trade of their specialty. They are also required to engage qualified supervisors and a certain portion of their workers with certified skills on a long-term basis. We recommend that the industry should build on this initiative to implement the recommended subcontractor registration scheme.

4.27 In parallel with the establishment of the subcontractor registration scheme, appropriate training should be provided to those subcontractors who are committed to upgrading themselves. We observe that subcontractors need, in particular, to enhance their skills and competence in the areas of contract administration, supply chain management, project financial control, quality control, interface co-ordination and manpower management.

4.28 To eradicate the practice of non-productive multi-layered subcontracting, we further recommend that clients should prohibit their main contractors from subletting the entire contract to another party. In addition, clients and the main contractors should play a more proactive role in setting their requirements over the performance and management of subcontractors. Some clients, e.g. the MTRC and starting recently the Housing Authority with regard to its piling contracts, have introduced measures to facilitate effective management of subcontractors engaged for their contracts. We urge other clients to follow suit.

4.29 Specifically, we recommend that for public works projects, the Works Bureau and the works departments should exercise more effective control over subcontractors working on their contracts in the following manner –

(a) Government clients should assume greater control over the main contractors' selection and management of subcontractors. Contractors' competence and capability in these respects should be thoroughly considered for the purpose of list management, tender

selection and ongoing performance assessment;

(b) Standard provision in public works contracts on prohibition of total subletting should be strictly enforced and contractors in breach of such contractual provision should be penalised by, for example, withholding interim payments as appropriate;

(c) For specialist work, contractors should be required to employ, as subcontractors, only those on the approved list of specialist contractors;

(d) Subcontractors should be prohibited from further subcontracting the whole of the work assigned to them;

(e) Contractors should be required to disclose details of all subcontracting as a condition precedent to payment of any amount due under monthly interim accounts; and

(f) Contractors should be required to pledge for probity, promulgate a code of conduct, provide probity training for their staff and filter these practices through to their subcontractors.

4.30 For public housing projects, in addition to the control measures introduced recently over subcontracting in piling contracts, we urge the Housing Authority to tighten control over subcontracting activities in other areas of construction works as a matter of priority.

4.31 We further recommend that contractors should assist in raising the performance standards of subcontractors through the following measures –

(a) incorporating quality considerations in selecting subcontractors;

(b) nurturing stable partnerships with subcontractors of a good standing

through feedback and review in the pre-contract and post-contract stages;

(c) enhancing the transparency of the subcontracting process by means of written contracts with each subcontractor, clearly setting out the mutual obligations and responsibilities;

(d) fostering fair dealings with subcontractors; and

(e) improving security of payment to subcontractors. (We shall further address this subject in paragraphs 5.77-5.80 in Chapter 5.)

Site supervision and quality assurance

4.32 Much of the construction process is heavily reliant on the skill and knowledge of site personnel for the structures to be constructed properly to the required quality and standards. Adequate site supervision is, therefore, crucial to ensure the delivery of works to specifications within the stipulated timetable. Otherwise, costly rectification and programme delays would result.

4.33 We observe that the standard of site supervision in local construction is far from satisfactory at present. For illustration, over 45% of construction-related pursuable corruption cases handled by the Independent Commission Against Corruption (ICAC) were related to substandard works and lax supervision. This indicates that quality control on local construction sites is a major problem which needs to be tackled as a matter of urgency. Perceived problems related to site supervision include –

(a) Some employers are reluctant to commit more than the minimum resources to monitor the quality of work. Often the site staff employed are inadequate, both in number and in experience, and are unable to promptly detect fraudulent acts aimed at covering up sub-standard works;

(b) Some site staff are not adequately trained for the supervision of specialist works, e.g. piling and materials testing. In addition, some site supervisors have risen to their current positions from a tradesman background without any formal training to enable them to effectively discharge their supervisory functions;

(c) In some projects, there is insufficient input at professional level at the critical construction stages;

(d) With multi-layered subcontracting, the main contractors do not have direct control over the workers who actually carry out the work. If the intervening layers of subcontractors do not exercise tight supervision to ensure that specifications and special requirements laid down in the contract are strictly adhered to, construction quality will suffer; and

(e) In ensuring compliance of the completed works with contract requirements in terms of quality standard, there are variations among different project teams in the administration of acceptance standards. Such variations, apart from those involving fraud and corruption, may be attributable to subjectivity in the interpretation of contract requirements and varying standards held by the supervisory staff. Some unscrupulous contractors and subcontractors may take advantage of such variations and cut corners wherever they can.

4.34 To improve the current situation, it is crucial to ensure that adequate supervisory provision (especially at professional level) is made for critical stages of construction having regard to the nature and complexity of works. We note that the Buildings Department has taken action to improve site supervision for private sector building projects in this direction. Under the quality supervision requirements for foundation works and ground investigation field works introduced by the Buildings Department in August 2000, the requirements for site

supervision have been refined by clearly stipulating the critical stages of construction to be inspected, the extent and frequency of inspection, and the qualification and experience required of the supervision. Where appropriate, supervision by professional staff is specified to ensure adequate professional input on site at critical stages in the construction process.

4.35 We support the introduction of more structured site supervision requirements by the Buildings Department, and we note that both the works departments and the Housing Authority have similarly strengthened site supervision for foundations works in their projects subsequently. We recommend that the Buildings Department should, in the light of the effectiveness of the quality supervision requirements for foundation works and ground investigation works, consider the merits of introducing similar measures for the supervision of superstructure works. We further recommend that the Housing Authority and the works departments should, in the same spirit of the Buildings Department's recent quality supervision initiative, rationalise their own site supervision arrangements and put in place a more structured site supervision system which specifies the supervision requirements for various stages of construction for different types of works undertaken by them.

4.36 The formulation of a more structured site supervision system by itself would not guarantee construction quality. We need, in addition, to impress on the site management that proper and effective site supervision is an integral part of their responsibilities. They should ensure that any poor quality work is picked up during day-to-day routine inspections and rectified rather than left until the end of the project for rectification. Client organisations can assist in the nurturing of a quality culture in local construction by rejecting substandard work and by ensuring consistent application of transparent acceptance standards. We also urge clients to consider designating site supervision proposals as a critical criterion for tender evaluation. For consultant-managed projects, employers should require consultants to demonstrate that they have satisfactorily carried out their supervisory role in all project activities.

4.37 In addition, we recommend that clients, consultants and contractors should critically examine their site supervision systems with a view to streamlining bureaucratic procedures and minimising paperwork so that supervisory staff will be able to spend time on site inspections, and not just paperwork. Documentation should be maintained at a level sufficient to clearly establish accountability. But excessive documentation would only take the site supervisory staff away from inspection tasks which would make a significant difference to construction quality.

4.38 Independent auditing provides checks and balances to guard against unsatisfactory work. To deter and facilitate early detection of malpractice on site, we recommend that independent technical audits should be carried out on a regular basis as work progresses. Any malpractices identified should be sanctioned as appropriate to deter foul play in the future. We note that the Works Bureau launched the Independent Audit Scheme in 1999 to enhance quality control for public works projects. We recommend that the Works Bureau should at regular intervals review the findings of the audit teams in consultation with the works departments and identify common improvement areas.

4.39 In the case of public housing projects, we note that the Housing Authority has endorsed, as one of 50 initiatives to improve public housing quality[10], the intent of bringing its building projects within the ambit of the Buildings Ordinance. The Government is now studying the proposal, which is assessed to have significant legal, administrative, staffing and financial implications. Meanwhile, to parallel the practices under the Buildings Ordinance, the Housing Department has established a unit, reporting directly to the Director of Housing, to conduct independent checks on piling, structural and building submissions as well as to make site inspections at various stages of projects. We support the Housing Authority's intention. We recommend that the Government and the Housing Authority should pursue the initiative in earnest and as quickly as possible put in place appropriate and practical independent auditing

[10] The Housing Authority conducted a review in 1999 to enhance the building quality of public housing and has started to roll out 50 initiatives under its Quality Housing Reform since April 2000.

arrangements to uphold the quality standards of public housing.

4.40 An area related to site supervision which merits particular attention concerns quality control testing. Examples of such tests include those carried out on the strength of concrete and steel reinforcement, the depth of piles and the quality of the concrete used in piles. Such testing is important in verifying compliance with the work specifications in a construction project. However, it is not unusual that these tests are carried out by a subcontractor or a laboratory appointed by the main contractor, thus creating a conflict of interest situation where the independence of testing could be impaired and the quality of work compromised. The security arrangements for testing samples, including their selection, collection, identification, marking, transportation and despatch of test results, practised in the industry are also often found inadequate.

4.41 To address the identified problems, we recommend that employers should use independent testing laboratories for materials and acceptance tests, and take disciplinary action against non-performing testing laboratories. Project teams should conduct periodic parallel tests to monitor the performance of the testing agents, to detect any irregularities of the testing mechanism and to frustrate any conspiracy in the testing process. Quality control tests and acceptance tests conducted on site should be closely supervised. There should be enhanced security procedures for the sampling and testing of construction materials, including sample identification and stock control, to prevent possible tampering. In addition, the test results should be submitted directly to the Engineer, and not through the contractor.

4.42 There is a broad consensus within the industry that to assure the quality of local construction, we need a sufficient supply of site supervisors of high standards. To that end, it is a matter of urgency that we find ways to enhance the professionalism of site supervisory staff, especially those at the technician level who are not at present subject to the control of any professional code of conduct or professional sanction. We shall address this subject in detail in paragraphs 6.10-6.15 in Chapter 6.

Raising the quality standard of renovation contractors and decorators

4.43 The focus of this chapter is on how to foster a quality culture among those engaged in projects which result in new buildings and engineering structures. We note, however, that to the general public the quality and performance of renovation contractors and decorators, especially those engaged in home decoration business, is a major concern. According to the Consumer Council, complaints relating to domestic home decoration works were mainly concerned with the quality of workmanship and service, price disputes and delayed completion.

4.44 At present, such decoration work is not subject to any regulatory control. The works involved are typically of a small scale and there are a vast number of decorators and renovation contractors locally. To raise the quality standard of decoration and renovation works and to avoid the introduction of a cumbersome regulatory mechanism, we recommend the establishment of a voluntary registration scheme to be administered by the industry itself. The industry co-ordinating body, proposed to be set up in Chapter 9, would be a suitable candidate to pursue this initiative. Having regard to a similar scheme introduced in the UK[11] in early 2000 for builders in the domestic repair, maintenance and improvement sector, we propose that only those decorators and renovation contractors who meet a set of minimum quality and customer standards may be registered. With such a registration scheme, discerning customers would in future be able to identify and select reputable contractors. We hope that in the long run, poor-performing contractors in the decoration business will be weeded out through market forces.

[11] The Quality Mark initiative for builders in the domestic repair, maintenance and improvement sector in the UK aims at raising the standard of workmanship in the domestic repair, maintenance and improvement sector. Under the scheme, consumers will be able to identify reputable builders (including plumbers, electricians, decorators and other specialist trades) who have shown to independent assessors that they possess the skills and competence to complete work to a high standard. In addition, consumers will be safe in the knowledge that all work will be protected by a comprehensive third-party warranty covering them against defects and unfinished work. Builders who meet the criteria will be entered onto a register and will be able to promote themselves as "Quality Marked". This will enable firms to identify themselves as a quality enterprise and differentiate themselves from the "cowboys".

Chapter 5

Achieving Value in Construction Procurement

5.1 The primary objective of construction procurement is to ensure that the built structure or facility fully meets the client's requirements with regard to quality, functionality and performance in a cost-effective and efficient manner. To achieve this outcome, we have addressed in Chapter 4 the importance of having a clear and comprehensive project brief that fully reflects the needs and expectations of the procuring clients at the outset of the project. On top of this, the client needs to identify and adopt the best suited procurement arrangement that maximises the ability of all parties in the construction supply chain to add value to the project in full alignment with his expectations. We must recognise that best value does not necessarily equate with the lowest initial tender price, but also encompasses various quality considerations as well as longer-term benefits such as lower life-cycle costs.

5.2 In this chapter, we shall examine a number of issues relating to cost-effective procurement of construction services, including –

(a) selection of contractors and consultants;

(b) effective risk management and equitable contracting arrangements;

(c) dispute resolution;

(d) a partnering approach; and

(e) incentives for the project team to achieve better value.

Good practices in these areas, having regard to local and overseas practices, are included in this report, in the hope that raised awareness in the industry would

encourage their wider adoption locally, in both the public sector and the private sector. Where appropriate, we have proposed specific measures to improve upon current local practices.

Procurement of consultancy and contractor services

5.3 The method by which construction services are procured has a direct impact on the quality of construction work eventually obtained. Strong concerns have been raised that the local tendency to award a contract at the lowest price has resulted in low profit margins. Thus, consultants and contractors have little incentive to do more than the minimum requirement. Uncertainty over the prospects of a longer-term relationship with the client also encourages service providers to develop a short-term approach to business development, with little interest in making investments to build up their capabilities and competence. From an industry perspective, such practices are short-sighted and impede continuous improvement in the quality and performance of local construction.

5.4 We take the view that clients can arrest this unhealthy development by adopting a quality-led procurement strategy. In the case of consulting services, the qualification and experience of the proposed team members and the merits of the design or technical proposals are relevant quality considerations. In the case of construction services, the quality attributes may include technical capability, site safety records, environmental performance, etc. The relative importance of these quality attributes, compared against price, should be suitably reflected in a transparent marking scheme, with appropriate weightings being given to different assessment criteria.

5.5 To encourage contractors and consultants to take a longer-term view and to seek improvement in their performance continuously, clients should give proper regard to the past performance of the tenderers. Those tenderers with consistently good performance should be duly rewarded with better prospects of winning contracts and those with a poor track record will lose their competitive edge. Applied consistently, such a practice will motivate industry participants to

constantly improve their performance and excel. We should emphasise, however, that care should be taken to allow entry of competent newcomers and to ensure adequate competition among prospective tenderers.

5.6 If past performance is to become an important consideration in tender evaluation, it is crucial that we put in place a comprehensive, objective and transparent system for assessing the performance of consultants and contractors during project implementation. Fair and honest performance assessment, coupled with candid feedback to those being assessed on the extent to which stipulated performance standards have been met, will provide a sound basis for consultants and contractors to focus their efforts on those areas that demand attention.

Selection of consultants

5.7 Having regard to local and overseas good practices, the consultant selection process typically involves three key stages –

(a) drawing up an initial long list of consultants;

(b) shortlisting of consultants to be invited to submit detailed proposals; and

(c) assessment of bids and contract award.

Initial longlisting

5.8 To procure consultancy services, the client normally draws up an initial list of consultants suitable for the concerned project having regard to their past history of employment and their reputation.

Shortlisting

5.9 Shortlisting is essentially a prequalification exercise to screen out unqualified consultants and pick out a manageable number of those who appear to be capable of completing the assignment satisfactorily. The shortlisting criteria normally cover the following aspects although their relative weightings may vary to meet the special requirements of different projects : relevant previous experience, appreciation of the client's requirement and an appropriate approach to the assignment, competence of the consultant team, capacity to undertake the assignment having regard to existing workload, satisfactory past performance, etc. To encourage the submission of bids of a better quality, the number of shortlisted consultants should be suitably limited but without unduly restricting competition. That the bidders will, as a consequence, stand a reasonable chance of success will encourage them to devote more effort to the preparation of their submissions.

Assessment of bids and contract award

5.10 In assessing the submissions from bidders, the objective is to select the best overall proposal against a set of marking criteria and a weighting ratio for the technical and fee scores which have been approved prior to inviting detailed proposals. An outline of the marking criteria and the weighting ratio for combining the technical and fee scores should be made known to the shortlisted consultants in the invitation to submit detailed proposals. The quality criteria for assessing the technical proposals normally include the following, but with different weightings for different projects –

(a) company experience and profile;

(b) proposed staffing and resources;

(c) past performance;

(d) design and engineering/technical aspects; and

(e) other criteria, which may include, e.g. the approach to quality, environmental, health and safety issues in various stages of the project in order to achieve cost-effectiveness, the consultant's approach to life-cycle costing, the proposed consultancy programme and the proposed approach to ensuring a satisfactory implementation programme and project interface.

5.11 The respective weightings for the technical and fee scores are normally established with due regard to the project's nature and complexity. The more complex and technically demanding the project, the higher the weighting for the technical score will be. The bidder with the highest overall score calculated from the technical and fee scores will win the contract.

5.12 We have reviewed the existing mechanisms for consultant selection adopted for public housing projects and public works projects with a view to identifying possible areas of improvement. In doing so, we are mindful of the considerable market power wielded by major public sector clients and we hope that sound procurement practices adopted by these clients would set in motion a process of sustained improvement in the performance of the construction industry. In broad terms, the current practices adopted by the Housing Authority and the works departments are very similar to the framework set out in paragraphs 5.7–5.11 above. For both types of project, consultancy agreements are awarded under established shortlisting and consultant selection procedures, which take into consideration the merits of both the technical and the fee proposals.

5.13 We note that since September 2000 the Housing Authority has revised its quality criteria and the associated weightings for individual quality criteria as well as the split between the technical score and the fee score for selecting consultants. For standard domestic blocks, the split between the technical and fee scores has been revised from 50:50 to 70:30, and for projects demanding a high degree of creativity and innovation in design, the split has been

revised from 70:30 to 80:20. As regards the quality criteria, the weighting for design has recently been increased from 10% to 50%. Past performance, as before, accounts for 30%. We support the thrust of these initiatives and urge the Housing Authority to keep the new arrangements under review to ascertain their effectiveness in promoting better performance among consultants.

5.14 For consultancies on public works projects awarded by the Architectural and Associated Consultants Selection Board[12] (AACSB) and the Engineering and Associated Consultants Selection Board[12] (EACSB), we recommend a number of improvement measures as set out in paragraphs 5.15-5.19 below.

Listing and shortlisting arrangements for the AACSB

5.15 The AACSB for public works projects maintains several lists of consultants for the following types of service : architectural services, building services, structural engineering, quantity surveying, landscaping architectural services and specialist services. The qualification criteria for AACSB's consultant lists are quite stringent[13]. Having regard to the small number of contracts awarded to architectural and associated consultants (10 for all AACSB consultant categories in 1999 and 2 in 2000) and the efforts devoted to list admission and administration, we recommend that the AACSB should consider whether there are particular merits in continuing with the existing listing practice

[12] Both AACSB and EACSB are appointed by the Secretary for the Treasury and operate on the basis of procedures laid down under the policy guidance of the Secretary for Works. AACSB oversees the selection and conditions of appointment of architectural and associated consultants for building projects undertaken by the Architectural Services Department. EACSB oversees the selection and conditions of appointment of consultants for all Government engineering projects. EACSB's jurisdiction covers consultancies in the fields of civil engineering, geotechnical engineering, structural engineering (excluding projects undertaken by the Architectural Services Department), mechanical engineering, electrical engineering and electronics, planning, transportation, water resources, environmental engineering and chemical engineering.

[13] For example, in the case of architectural consultants, a firm must have practised in the relevant profession in Hong Kong for a minimum of five continuous years and have completed at least one Hong Kong Institute of Architects Group I project of a value over HK$200 million in the previous three years. Similarly, for building services consultants and structural engineering consultants, they are required to have completed at least one project of a value over HK$200 million in the previous three years.

for architectural and associated consultants[14], and if so, the admission criteria should be reviewed to ensure that they are not unduly stringent.

5.16 We further recommend that the AACSB should review its practice of shortlisting those consultants who have received the least total fees from AACSB consultancies in the previous three years as this does not seem to encourage good quality submissions or good performance.

Past performance as a key quality criteria

5.17 For public works consultancies, past performance is currently referred to for the purpose of screening out poor performers from participation in the prequalification round and from submitting bids. But in bid evaluation, past performance is not currently given any weight in the quality score. Consultants who have a good track record are not given particular recognition in the process. We recommend that to encourage consultants to seek continuous improvement, AACSB and EACSB should include past performance as one of the quality criteria for prequalification and bid assessment for public works consultancies, and to develop a quantitative means for measuring the past performance of consultants.

Other quality criteria

5.18 The success of a project depends to a large extent on good planning and adequate attention being given to relevant considerations (such as safety, environmental issues, life-cycle costs vis-à-vis the initial project cost, etc.) at the design stage. We recommend that the marking scheme for assessing technical proposals from bidders should adequately reflect those quality aspects that are considered important for a specific project with appropriate weightings which are known to all bidders.

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[14] By comparison, EACSB maintains a directory of around 130 engineers and associated consultants who have expressed an interest in undertaking public works projects. EACSB will, depending on the consultants' indications of their area of expertise, draw up a long list for the purpose of inviting expression of interest. Normally, a two-stage exercise (including a prequalification round) is carried out to select the consultant.

5.19 Provision of adequate project staff with the right calibre is critical to the quality of consultancy work. This factor is already given emphasis in the quality criteria under existing practice. But there is no formal requirement for the consultant to adhere to his staffing proposals made at the prequalification stage in the execution of the contract. We recommend that consultants should be required to adhere to their staffing proposals if their bids are accepted. If the successful bidder fails to provide the specified manpower resources during the course of the assignment without good reason and acceptable replacement, and this has demonstrably led to poor performance, this should be reflected in the performance assessment on the consultant.

Selection of contractors

5.20 Procedures for selecting the right contractor vary according to the procurement approach, but normally incorporate the following steps –

(a) setting a threshold for qualification;

(b) assessing the quality attributes of the contractors and their price bids; and

(c) balancing quality attributes and price.

Setting a threshold for qualification

5.21 This process seeks to ensure that contractors who may submit tenders have the basic competence and capacity to deliver the project, and the ability to add value as required. The basic attributes may include, e.g. financial soundness, good management of health and safety, general capacity to undertake the type and size of project anticipated, and a non-contentious approach to site problems and settlement of account. For major public sector clients, this is usually taken care of through the administration of an approved list of contractors who satisfy and continue to satisfy requirements regarding these attributes.

Assessing the quality attributes of the contractors and their price bids

5.22 The key quality attributes may include technical knowledge and skills, adequate qualified manpower resources, management skills (e.g. skills in managing time, cost, quality, risk, health and safety, and impact on the environment), capability in supply chain management (e.g. relationship with subcontractors and suppliers), financial resources, a client-focused culture, a progressive record of innovation and satisfactory past performance. Appropriate weightings will be given to these quality criteria having regard to the specific objectives and requirements of the project.

5.23 As regards price bids, these may take a variety of forms, depending on whether the contractor is selected early in the project and is fully engaged in the development of the project, or whether he is selected late in the project just before construction. In comparison, there is a greater chance in the latter case, as the project is much better defined, that the contractor will be able to commit to a definitive budget. To achieve value for money, comparison on price bids should, where appropriate, be made on the basis of whole-life costs (including for example capital, maintenance, management, operating and disposal costs) and not just the initial capital cost.

Balancing quality attributes and price

5.24 This normally involves a marking scheme with appropriate weightings being given to the quality attributes and the price. The tenderer with the highest composite score is awarded the contract.

5.25 Bearing in mind the market position of the Housing Authority and the works departments, and the impact which their practices concerning the procurement of contractor services have on the behaviour of contractors, we have reviewed their current arrangements with a view to identifying possible improvement areas.

5.26 In general, the Housing Authority awards contracts having regard to both the quality and price aspects of the contractors' proposals. Past performance is one of the considerations in tender selection. The Housing Authority prequalifies all eligible tenderers on a quarterly basis, rather than a project basis, by ranking companies on its contractor list into three bands by reference to individual contractors' scores over the preceding six-month period under the Performance Assessment Scoring System (PASS). Contractors performing above the lower quartile threshold score are eligible to tender in the coming quarter while those performing below the threshold will be suspended from tendering.

5.27 On tender evaluation, consideration for both quality and price is formalised under the Preferential Tender Award System (PTAS), which adopts a 20:80 split between performance and price for evaluating the tenders for all building contracts. The performance score takes account of the tenderer's latest PASS six-month composite score. The rationale behind this is to reward the better-performing contractors with a better opportunity for tender award. We understand that the Housing Authority has decided to extend PTAS to cover building services and piling contracts in due course.

5.28 We note that the Housing Authority has been taking steps to improve its listing and tendering practices in order to enhance the quality of public housing. The new measures include nurturing a closer partnership with consistent good performers by way of tightening listing requirements and improving the tendering arrangements as well as improving the performance appraisal system for contractors. We support the objectives of the Housing Authority's recent initiatives and recommend that the Housing Authority should proceed quickly with the implementation of the announced improvement measures in close consultation with the industry.

5.29 Except for complex, high value projects, public works contracts are normally awarded to the lowest tenderer provided that he satisfies all other technical requirements. Among eligible tenderers on the list of Approved

Contractors for Public Works who possess the relevant technical competence, meet the financial requirements and have not been suspended from tendering as a result of adverse performance reports, the one offering the lowest conforming tender will normally be selected unless there are sound justifications for not doing so.

5.30 For public works contracts which are of a high value, complex and technically demanding as well as those contracts which are subject to a very rigid completion programme and require a high level of co-ordination, prequalification of tenderers is usually carried out[15]. The use of prequalified tendering and the evaluation criteria require the prior approval of the Secretary for the Treasury on the advice of the Central Tender Board. While a marking scheme is normally used in the prequalification exercise, selection from among tenderers so prequalified is normally based on their price bids. No particular preference or weight is given to the tenderer whose past performance and quality attributes have been rated in the prequalification exercise as superior to the other tenderers.

5.31 In January 2000, the Works Bureau introduced the Public Works Contractors' Performance Index System to provide a ready indication of a contractor's performance trend over the past three years. But procuring departments basically use this index system only to screen out poor performing contractors (i.e. bids from tenderers whose performance score under the index system falls below 55 are not normally considered). Contractors with a good performance rating under the index system do not, however, enjoy any advantage in terms of better tender award opportunity. Under the current arrangement, there is no incentive for contractors to perform above the minimum requirement. Quality suffers as a result.

5.32 Public accountability demands public sector clients to achieve good value for money in construction procurement. This should not, however, be taken

[15] In situations where prequalification is not practicable due to time constraint but where there are sound reasons for getting a more reliable and better performing contractor, the current system allows the adoption of a single-round selection process supported by the use of a marking scheme approved by the Central Tender Board beforehand. The split between quality and price is normally 20:80 and, unless under exceptional circumstances, should not go beyond 30:70. The tender which attains the highest composite score is selected.

rigidly to mean awarding tenders to the lowest bidder. There is clearly merit in rewarding better quality and performance, which will have a significant bearing on other important aspects of the project with resource implications either elsewhere in the construction process or in the subsequent operation and maintenance cost. Aspects like workmanship affect not only a project's finish and visual quality, but also its functional reliability and durability, hence its long-term recurrent costs. Poor workmanship rejected during the construction stage will require re-work which, apart from additional cost to the contractor and subcontractors, will add to construction waste requiring disposal, again at a cost both financially and environmentally. Poor safety performance amounts to other social costs and loss of productivity. Poor progress and delay will deprive clients and the community of timely use of facilities and services with other indirect costs. This demonstrates the need to encourage good performance and to drive for better quality and value through sound procurement practices.

5.33 To promote quality consideration, we recommend that the existing practices for selecting contractors for public works projects should be improved in the following manner –

(a) firmly establish as a policy that both quality and price should be given due consideration in the procurement of construction services;

(b) to give effect to (a), make wider use of marking schemes in tender evaluation;

(c) establish that past performance is an important, though not necessarily the sole, attribute in assessing the quality of tenders; and

(d) improve the existing performance assessment arrangement for contractors to enhance its transparency and objectivity.

5.34 To facilitate consideration of quality in tender selection, there is a need to make wider use of marking schemes in tender evaluation. At present,

approval has to be obtained from the Central Tender Board for proposed marking schemes on a project basis. We recommend that this procedure should be streamlined as far as possible. Where appropriate, template marking schemes with clear guidelines on their use and recommended weighting range for individual quality criteria should be drawn up to facilitate implementation.

5.35 For major projects which have undergone the prequalification process, tender selection from among the prequalified tenderers is at present primarily based on price. In the spirit of the proposed quality-led approach to construction procurement, we recommend that quality attributes should also be taken into account in the tender evaluation process.

5.36 In order to encourage contractors to improve their performance on a continuous basis, contractors' past performance on public works projects should form one of the key quality attributes in tender evaluation. To provide a convenient, quantitative indicator of contractors' past performance in carrying out public works projects, we recommend that the Works Bureau should further refine the Public Works Contractors' Performance Index System to better reflect the contractor's actual performance in key aspects in individual works categories. We should add that while emphasis is placed on the past performance of contractors, and consultants alike (see paragraph 5.17 above), avenues should remain open for deserving new entrants to take part in prequalification exercises and tenders in order to maintain a sufficient degree of competition among existing and prospective service providers.

5.37 In view of the higher standard and quality demanded of the tenderers for major projects, we further recommend that the Works Bureau should consider the merit of introducing a prerequisite condition, perhaps in the longer term, allowing only those with consistently good performance to apply to be prequalified for participation in the tender exercises for such projects.

Improvement to the performance assessment arrangements for consultants and contractors

5.38 For both consultant selection and contractor selection, once past performance is established as an important consideration in tender evaluation, we need to put in place an objective and transparent system for assessing the performance of consultants and contractors during project implementation.

5.39 We note that the Housing Authority has implemented the Performance Assessment Scoring System 2000 for its contractors from April 2000 on a trial basis to enhance its representativeness and coverage. The introduction of assessments by independent teams to supplement daily site inspection records from site staff and monthly reports from project professionals is welcome. We understand that the trial system is being reviewed in the light of actual experience. We recommend that the Housing Authority should further refine the system in the light of industry feedback.

5.40 For public works projects, normally, contractors get only an overall performance index rating without a breakdown of how they have performed in different aspects. Even when they are not performing well, often they are notified only when they get an adverse report. They have little information on how they perform compared with the other contractors working on public works projects. To improve on the current situation and in order that the performance assessment system can serve as a means to drive continuous improvement in the performance of consultants and contractors, we have identified a number of improvement measures as set out in paragraphs 5.41-5.42 below.

5.41 To enhance the transparency of the current arrangements for public works projects, we recommend the following measures –

(a) All public works consultants and contractors, regardless of performance, should be provided individually with the full details of all aspects of the half-yearly/quarterly assessment made by

procuring departments on their performance as well as their consolidated performance index rating over the past rolling three years; and

(b) The Works Bureau should provide the industry regularly with benchmark scores from the Public Works Contractors' Performance Index System (e.g. range of scores attained and median scores) and any other quantitative performance indicators that may be developed in future in respect of different categories of works and for different performance attributes so that consultants and contractors can benchmark their performance against the industry standards.

5.42 To improve the objectivity of the performance assessment system and consistency in the application of evaluation standards for public works projects, we recommend the following measures –

(a) promulgation of clear guidelines for assessors and regular reviews of such guidelines to ensure that they may be practically applied;

(b) training for assessors to ensure that they fully understand the objectives of the assessment system and how the assessment forms should be completed;

(c) the merits of a panel review mechanism and randomly sampled auditing by a central independent unit should be examined to maintain consistency in the application of evaluation standards;

(d) for public works engineering and associated consultants, ongoing performance assessment is carried out at six-monthly intervals unless the performance is rated as adverse whereby the reporting period will be reduced to three months. In view of the short duration of some consultancies, EACSB should consider conducting

performance assessment more frequently where appropriate; and

(e) an appeal mechanism should be established to provide recourse to consultants and contractors who disagree with the performance assessments made on them.

Other measures related to consultant and contractor selection

5.43 Although the recommended measures set out above relate primarily to the practices adopted by the Housing Authority and the works departments, the objectives behind these measures apply equally to private sector projects. We urge clients in the private sector to improve on their practices in line with the spirit of our recommendations. There are a few additional measures which we recommend for industry-wide application. These are set out in paragraphs 5.44-5.47.

5.44 Debriefing will help the concerned consultants and contractors to improve their competitive performance in future procurement exercises. In moving to a new arrangement whereby both price and quality will be taken into consideration in the selection of consultants and contractors, such debriefing will be particularly important in enabling unsuccessful bidders to find out where they have failed and to find ways to improve their performance in future.

5.45 In a similar vein, post-completion reviews enable the service providers to find out how they have performed overall, their successes and areas which can be further improved. At the same time, the procuring party can obtain feedback on the adequacy of the procuring arrangements. Such a process of experience sharing would be conducive to continuous improvement in the performance of all parties involved and the development of long-term partnership. To maximise the benefits of post-completion reviews, participants should approach them with an open mind and a co-operative attitude, rather than using the occasion to apportion blame.

5.46 Debriefing for unsuccessful bidders and post-completion reviews are not at present widely practised locally. We recommend that public sector clients should take a lead in offering debriefing to unsuccessful bidders for their projects. Proper procedures should be put in place to ensure that such debriefing would not lead to any restrictive practices among the bidders in future tender exercises. We further recommend that following a tender exercise, apart from disclosing the winning bid price, the quality score of the winning bidder as well as the highest score attained for each quality attribute in the same exercise should also be made known (but without naming the concerned bidder). Care should, however, be taken to protect any commercially sensitive information provided by individual bidders. In addition, public sector clients should carry out post-completion reviews with their services providers to enable the latter to enhance their performance in future, and to identify improvement areas in their own procurement and contract management arrangements and practices. We note that the Housing Department has proposed recently to arrange debriefing and post-completion review sessions with stakeholders for its building contracts and complex piling contracts for new housing development. We urge the Housing Department to implement these measures as soon as possible.

5.47 To achieve the objective of nurturing consistent good performers, we need to put in place an effective disciplinary mechanism to tackle non-performing consultants and contractors. We note the current measures adopted by major public sector clients. We recommend that to enhance the effectiveness of these measures, public sector clients should consider sharing information among themselves on the performance of non-performing consultants and contractors. We further recommend that the Buildings Department should consider taking disciplinary action under the Buildings Ordinance against those Registered General Building Contractors and Registered Specialist Contractors who perform poorly in public sector projects. In addition, industry bodies and professional institutions should consider sanctioning those members who have committed serious breaches in their conduct.

Effective risk management and equitable contracting arrangements

5.48 Risks and uncertainty with potentially damaging consequences are inherent in all construction projects. Such risks include contractual, environmental, financial, economic, market, logistical, design, construction, and operational risks. Failure to manage risks effectively may lead to serious consequences, such as prolonged contractual disputes, programming delays and budget over-run. Effective risk management and equitable contracting arrangement provide the necessary tools to enable the contracting parties to achieve the project objectives to their satisfaction.

Risk management

5.49 All project managers practise a certain extent of risk management, but such efforts are often unstructured and generally lack focus. A more systematic framework of risk management is, thus, called for to help project managers to –

(a) identify, assess and rank risks, making inherent risks explicit;

(b) make informed decisions on provisions for adversity and develop contingency plans for unavoidable risks;

(c) control and monitor the uncertain aspects of construction projects; and

(d) limit potential damage should a risk materialise.

5.50 A systematic approach to risk management entails risk analyses to be taken at regular intervals during project implementation. This allows continuous monitoring of the risk exposure of the project, allocation of

responsibility to the party best able to manage the identified risk[16] and assessment of the effectiveness of risk control measures. While systematic risk management cannot remove all the uncertainties inherent in a construction project, it improves the chances of completing a project on time, within budget and to the required quality, with proper provision for safety and environmental issues.

5.51 Among local public sector organisations, MTRC is currently developing a systematic structure for establishing and assessing risks in the delivery of projects. For both the Housing Authority and the works departments, there is currently no stand-alone manual for the purpose of construction project risk assessment. We recommend that, in order to improve project performance, public sector clients should take a lead in promoting wider adoption of systematic risk management. They should develop and implement risk assessment and management procedures for their projects. Guidance notes should be compiled to define in broad terms the common risks inherent in construction projects and management procedures should be developed for handling these risks. The opportunity should be taken to put in place a more integrated approach in the assessment and management of all prominent and common project risks (e.g. site safety hazards, environmental risks, etc.) and their potential impacts.

Change control

5.52 While uncertainties in the broader economic and physical environment are beyond the control of project managers and risks relating to these areas can only be provided for, risks arising from project variations are amenable to prevention and abatement. Robust change control is critical to smooth project delivery. Changes to projects arise mainly as a result of unclear project definition or inadequate time spent on project planning, risk analysis and proper management, or due to changing circumstances. We recommend that as a matter of good practice, changes should be minimised by ensuring comprehensive project planning and taking into account potential factors which

[16] We shall address the subject of risk allocation in further detail in paragraphs 5.53-5.59.

may impact on project implementation at the outset. In addition, systematic change control procedures which allow thorough evaluation of the proposed change against value for money considerations should be developed. Public sector clients should take a lead in adopting these good practices and in sharing their experience with the private sector.

Risk allocation in construction contracting

5.53 Construction contracts apportion risks arising out of the construction process between the contracting parties. In general, contractors make an allowance in their tender prices to cover risks. But it is not uncommon that more responsible contractors who have factored in better risk protection do not win the contract as their bids are higher. We observe that when work is scarce, contractors tend not to price the risks and seek instead to submit claims, if the risks materialise, to mitigate their loss.

5.54 Onerous allocation of risks to the contractors in a climate of severe competitive tendering that drives prices down can lead to substandard workmanship and other malpractice to cut corners. This could result in costly and wasteful rectification, or a higher running cost to the user possibly requiring earlier replacement of the defective parts of the works. There are many examples of contracts in which the lowest tender price did not result in a matching outturn price. We recommend that in evaluating tender bids, the client should be clear in his mind the assumed level of risk in the bids and should be prepared to reject exceptionally low bids which have not taken full account of the risks involved. At the same time, tenderers must take their statutory responsibilities and contractual responsibilities as set out in the tender documents seriously, and make adequate provisions in the tender prices to meet these requirements.

5.55 Onerous or unfair allocation of risks can also give rise to claims and disputes which are non-productive and could be costly to both parties. In spite of allocation of risks through the contract, any significant default by the contractor remains the client's risk. It is, therefore, in the interest of both parties to adopt

contracts based on an equitable allocation of risks, having regard to the following principles[17] –

(a) Which party can best control the events that may lead to the risk occurring?

(b) Which party can best manage the risk if it occurs?

(c) Whether or not it is preferable for the employer to retain an involvement in the management of the risk?

(d) Which party should carry the risk if it cannot be controlled?

(e) Whether the premium charged by the transferee is likely to be reasonable and acceptable?

(f) Whether the transferee is likely to be able to sustain the consequences if the risk occurs?

(g) Whether, if the risk is transferred, it leads to the possibility of risks of different nature being transferred back to the employer?

Risk allocation in public works contracts

5.56 The Works Bureau engaged a consultant in March 1998 to carry out a review of the General Conditions of Contract for Public Works Projects, with particular regard to the allocation and management of risks, and to make recommendations on any necessary modifications in the interests of public finance and based on international best practice. The consultant recommends, among others, that the Government should accept the risks associated with unforeseen ground conditions and third party's lawful interference. These two

[17] Source : *Chapter 6, Report on Engineering Construction Risks,* published by the Science and Engineering Research Council, UK

recommendations are of considerable interest and concern to the construction industry. The Government rejects both recommendations. On unforeseen ground conditions, the Government's stance is different from international practice, but the Government expects that by procedural means it could reduce the exposure to the risk substantially. With respect to third party interference, the problem primarily arises from excavation works which always encounter delays because of the numerous buried utility services. A current practice, where justified, is to award the contractor extension of time but not money. The contractor is required to liaise with the utility company to co-ordinate utility diversion within his construction programme. The Government takes the view that in such situations the contractor would have no incentive to mitigate delays if the Government were to accept the risk. Since the consultancy report and the Government's initial response to the consultants' recommendations were released in May 2000, there has been much discussion within the industry on the subject. The Contracts Committee under the Construction Advisory Board is now studying the matter.

Risk allocation in private building contracts

5.57 The Agreement and Schedule of Conditions of Building Contract (Standard Form of Building Contract, Private Edition) is a common form of contract used for local private building projects. It was drawn up almost 30 years ago and its updating is long overdue. The sanctioning organisations[18] initiated the re-writing of this form of contract six years ago. The exercise is not yet completed because the drafting organisations have not yet reached agreement on how risks should be shared.

5.58 In a submission to the Construction Industry Review Committee, the Hong Kong Construction Association points out that while the risks taken up by contractors are already large, almost all clients try to further minimise their own risks and demand contractors to take up more. To achieve this objective, clients

[18] These organisations include the Hong Kong Institute of Architects, the Royal Institution of Chartered Surveyors (Hong Kong Branch) and the Society of Builders. The Royal Institution of Chartered Surveyors (Hong Kong Branch) was dissolved in 1997 and its functions in Hong Kong have been assumed by the Hong Kong Institute of Surveyors.

modify the terms of the Standard Form of Building Contract and add special conditions to the contract documents. The changes take away many of the rights of the contractors, including those to recover additional costs and extension of time. Time-bars for response are imposed on contractors, whilst the time for clients and their consultants to respond is not stipulated. The contracts also require contractors to take responsibility for the actions of other parties (e.g. the clients, their consultants and the nominated subcontractors).

5.59 Equitable allocation of risks between the employer and the contractor is critical to successful project implementation. In view of the concerns of industry participants about the current risk allocation under the General Conditions of Contract for Public Works Projects, we recommend that the Government should seriously reconsider the consultant's recommendations in the light of the principles of risk allocation discussed in paragraph 5.55 above, with the objective of achieving a more equitable allocation of risks between the contracting parties and of arriving at a contract document that –

(a) carries clear definition of risks and their allocations;

(b) is designed for effective contract management of time, cost, safety and quality;

(c) is designed to be simpler to read and understand; and

(d) contains an effective means to settle disputes as risks materialise.

Similarly, we recommend that the industry co-ordinating body proposed to be set up in Chapter 9 should, in consultation with concerned stakeholders, lead a review on the Standard Form of Building Contract, Private Edition with a view to achieving the same objectives.

Resolution of claims and disputes

5.60 While construction contracts apportion risks inherent in construction between the employer and the contractor, it is normal and natural that the contractor may on occasions submit claims for additional costs, time or damages associated with those risks where liability is claimed to rest with the employer. Provisions are included in the contract for handling claims. As a matter of good practice, the contracting parties should address all claims and potential claims as early as possible to prevent them from developing into disputes.

5.61 The resolution of disputes can be expensive and time-consuming. Given the substantial cost and disruption that a dispute may cause to a contract, the contracting parties should avoid disputes as far as possible. If a dispute cannot be avoided, it should be proactively managed and resolved.

5.62 The integrated approach to construction advocated in this report, if followed, will help to inculcate a more constructive attitude among members of the project team in handling problems arising during the project delivery process. As a result of clearer project definition, more equitable risk allocation between the employer and the contractor, and improved procurement and tendering procedures, the causes of conflict will also be reduced.

5.63 In the event that a dispute becomes unavoidable, it is important to manage it actively and positively to encourage early and effective settlement. Different procedures, such as negotiation, alternative dispute resolution (e.g. mediation, the use of a dispute resolution adviser and adjudication), arbitration and litigation, may be resorted to, having regard to the circumstances of a particular dispute.

5.64 Consistent with our overall objective of facilitating project delivery, we recommend that –

(a) Employers, consultants and contractors should be encouraged to adopt a proactive approach, with sufficient high level support and involvement, to resolving claims and disputes as they arise. Training for the project team and other resources should be made available to ensure the effective implementation of this approach; and

(b) Proactive and collaborative ways of dispute resolution should be encouraged through the adoption in contracts of provisions which facilitate the resolution of disputes by means of alternative dispute resolution techniques (such as the use of a dispute resolution adviser and/or dispute review board), in addition to formal and binding adjudication means which will remain a necessary, but last resort, solution.

A partnering approach

5.65 In the previous sections of this chapter, we have made a number of recommendations on how current procurement practices can be improved to facilitate the delivery of construction projects on time, within budget and meeting specified quality standards. However, it is not sufficient merely to improve procedures and practices. We need a change of culture and mindset among stakeholders in order to derive the full benefits of these improvement measures. Key participants in a project, including the employer, the designer, the engineer, the main contractor, subcontractors and suppliers, need to work together more effectively and efficiently to complete the project in a satisfactory manner.

5.66 Experience in Australia, the UK and elsewhere demonstrates that a partnering approach to construction will enable all participants in the project to work together as a team rather than in competition with each other. The following positive outcome has been observed –

(a) reduced costs through increased productivity;

(b) an increased focus on the needs and objectives of the consumer, which translates into consumer satisfaction;

(c) improved quality; and

(d) prompt response and potentially more innovative solutions when problems do arise.

5.67 Broadly speaking, there are two types of partnering –

(a) Strategic partnering, which refers to a long-term relationship between the client and the contractor/service provider covering more than a single project. Instead of calling tenders on a project-by-project basis, the client allocates successive projects to one of a small number of preferred service providers. Commercial pressure is maintained by benchmarking the service provider's performance in a number of identified areas, with agreed targets for improvement. The client and the service provider have a shared objective of achieving continuous improvement in project performance and the delivery processes over time, while maintaining reasonable profit margins. Such strategic partnering may extend down the construction supply chain in the form of long-term partnership between the main contractor and their key subcontractors and material suppliers.

(b) Project partnering, which involves project participants for the duration of a single project. In many cases, the project team is assembled in a conventional manner, on the basis of one-off competitive tendering. But in addition to the legal contract between the concerned parties, some of the practices of strategic partnering (e.g. agreeing mutual objectives, devising ways to resolve disputes expeditiously, commitment to continuous improvement, etc.) are introduced with a view to achieving better project outcomes.

5.68 For the partnering approach to work, project participants must engage in constructive communication and closer collaboration. There must be a firm commitment to partnering at all management levels within each stakeholder's organisation. The interests, needs, expectations, constraints and risks of every stakeholder must be given fair and proper consideration. Above all, there must be mutual trust among all stakeholders. Partnering is not a soft option. In addition to the moral agreement among project participants to work together, a structured and formal management framework should be put in place to enable all stakeholders to act in the best interests of the project. This framework would encompass identification of the shared objectives of the project within the partnering relationship, development of an effective communication structure, definition of the respective roles of the on-site and off-site management teams, formulation of an evaluation procedure for regular monitoring and evaluation of how well the mutual project objectives are being achieved, as well as development of a mutually agreed procedure for prompt resolution of issues or conflicts.

5.69 We recognise that partnering is not a panacea for curing all the problems that may arise from a construction project. There are different reasons why partnering fails, e.g. lack of commitment from project participants, objectives identified in the partnering agreement are not shared, unrealistic expectations of this approach, reluctance to invest time and other resources in the process, etc. Notwithstanding these potential risks, we see merit in the wider adoption of a partnership approach, alongside other good practices recommended in this report, in local construction to bring about performance breakthroughs across the industry. We observe that while local application of the partnering approach in both the public and the private sectors has been fairly limited, experience to date confirms its potential benefits and the effectiveness of structured teamwork in resolving site problems. We, therefore, recommend that public sector clients and progressive clients in the private sector, together with their project teams, should help to foster a new culture in the construction industry through more extensive adoption of a partnering approach in implementing their construction projects.

5.70 In the longer term, to provide a solid foundation for the project partnering process, we recommend that further consideration should be given to the integration of a partnering approach into the contractual relationship by developing a new form of contract that is based on co-operation, client focus and commitment to best practice for application to local construction projects. The C21 Construction Contract developed by the New South Wales Government in Australia and the ACA Standard Form of Contract for Project Partnering (PPC 2000) launched in the UK recently provide useful reference in this regard.

5.71 For other clients and project teams who do not feel ready to adopt the full structured framework of partnering, we recommend that they should seek to secure teamwork, good practice and commitment from all parties at a project level through a jointly developed project pact[19]. In essence, the project pact establishes a framework of common values and expectations. It drives the project team to meet the needs and expectations of the client on the one hand, and the client to take necessary action to facilitate that outcome on the other. The agreed project pact should be distributed throughout the project team and displayed prominently wherever possible to serve as a constant reminder of the commitment of the project team to deliver a successful project.

Incentives for the project team to provide better value

5.72 To achieve value for money in construction procurement, service providers and suppliers should be motivated or given incentives to provide extra "value added" services over those specified originally and which are of material benefit to the users. In this section, we examine a number of means to motivate contractors to provide better value by aligning their financial objectives with the objectives of the project. They are –

(a) milestone payments;

[19] A model project pact developed by the Construction Industry Board in the UK is at Annex D.

(b) improved security of payment to contractors and subcontractors; and

(c) target cost contracting.

Milestone payments

5.73 Conventionally, engineering works contracts require the taking of interim measurements as the basis to effect interim payments, which are intended to reimburse the contractor for the value of works carried out. Such an arrangement has the following shortcomings –

(a) It encourages tactical pricing of payment items on the part of the contractors in order to secure a positive cashflow. But there is no direct correlation between contract payments and the achievement of progress compared to the agreed works programme; and

(b) Such interim measurement of works involves substantial resources, but the efforts spent do not in any material way contribute to the satisfactory delivery of a project. For lump sum contracts, the final payment is already fixed and does not depend on remeasurement. For remeasurement contracts, valuation of partially completed works is a wasteful effort as the final payment is calculated on the basis of the actual quantities of all completed works at the conclusion of a project.

5.74 The milestone payments approach addresses the above-mentioned shortcomings by making interim payments subject to achievement of pre-determined progress milestones. This approach ensures that payment and works progress stay generally consistent, and that the project programme is adhered to. It also allows a better degree of control, through milestones, of the interfacing works. At the same time, unnecessary effort in measurement and valuation can be avoided.

5.75 Under the milestone payments approach, there is an accurate projection of the estimated rate of payment to the contractor at the commencement of the contract to enable both the client and the contractor to have better planning of the cashflow under the contract. With built-in pricing constraints, "front-end loading" of payments can be avoided. The better predictability of payment is also very important for a contractor, especially in helping him to secure better terms of financing. Thus, by judicious payment arrangements, the contractor will be suitably motivated to carry out the works according to the quality standards and project programme.

5.76 The MTRC has been paying its contractors by reference to the achievement of identifiable milestones for many years. The milestone payments approach was also used extensively in the Airport Core Programme contracts and subsequently in a number of major works contracts in the public sector. We recommend that the Government and other major clients should consider the wider adoption of the milestone payments approach so as to motivate contractors to deliver better performance.

Improved security of payment to contractors and subcontractors

5.77 Good cashflow management is essential to the success of contractors and subcontractors. Clients should recognise that contractors' business viability depends more upon cashflow than profit margins. Subcontractors are likewise dependent on cashflow. The prospects of prompt payment for completed work offer a strong incentive to contractors and subcontractors to deliver quality service. We observe, however, that locally "pay-when-paid" and "pay-if-paid" arrangements are common in the industry. There is much room for improvement in the area of security of payment to contractors and subcontractors.

5.78 We note that in New South Wales, Australia and the UK, legislation has been enacted to deal with payment-related issues in construction contracts. For instance, the Building and Construction Industry Security of Payment Act

1999 in New South Wales, Australia provides a right to progress payments through payment claims for completed work. Under law, the following can make progress claims for payment –

(a) contractors against clients;

(b) subcontractors against contractors;

(c) suppliers of materials or building components against purchasers; and

(d) architects, engineers and others providing building advice against clients.

5.79 Other provisions in the legislation include –

(a) banning "pay-when-paid" and "pay-if-paid" clauses;

(b) providing for prompt adjudication of disputes over progress payments;

(c) requiring security for disputed amounts following adjudication; and

(d) allowing suspension of work for non-payment or failure to provide security after adjudication.

5.80 We recommend that further consideration should be given to the merits of, and the need for, enacting security of payment legislation having regard to local circumstances and in the light of overseas experience. In parallel, the following good practices over project payments[20] should be promoted widely in the industry and suitably adopted in contracts and agreements –

[20] Source : *Specialist trade contracting – a review*, published by the Construction Industry Research and Information Association, UK.

(a) project requirements should be clearly defined to reduce payment uncertainty;

(b) adequate rules for measurement and valuation should be agreed and observed;

(c) pre-pricing of variations, wherever practicable;

(d) payments to contractors and subcontractors should be made within the periods stated in the contracts;

(e) retention should be released at the times specified in the contract;

(f) the use of bonds or parent company guarantees should be considered to release retention monies to subcontractors where work is completed well before the completion of the main works;

(g) main contractors should only deduct discount when the contract permits it;

(h) final account preparation should proceed throughout the contract period and not be left until completion. In any case, it should be completed promptly upon the completion of the contract;

(i) settlement of the final account and payment of monies due should be within the period given in the contract;

(j) subcontractors' work schedule and co-ordination obligations should be set having regard to a clear overall programme for the project; and

(k) obligations regarding the protection of work should be reasonable.

Target cost contracting

5.81 In paragraphs 5.65-5.69 above, we have examined how a partnering approach can be applied on a project basis to bring about better project results, without substantially altering the conventional contractual framework. We observe that in other places with a longer history in adopting partnering on a goodwill basis, e.g. New South Wales, Australia and the UK, informed clients have combined the partnership concept with other incentivisation measures to further integrate the construction delivery process and to motivate service providers to seek continuous improvements in project outcomes.

5.82 A common approach adopted in this regard is target cost contracting, where a fixed target cost is set based on given parameters at the outset. If this fixed target is exceeded or undercut, the outcome is split between the contracting parties in a pain/gain sharing fashion. The sharing of extra payments or savings is calculated from a share ratio formula agreed at the start of the contract. The advantage of this approach lies in the incentives to the contractor to be efficient and to achieve savings. By giving the contractor performance-based remuneration, its financial interests and those of the client become more closely aligned and it is in both parties' financial interests to co-operate. At the same time, the contractor is left with enough risk to motivate it to strive for better performance.

5.83 To implement the target cost contracting approach, an open book accounting regime is adopted to –

(a) monitor actual costs incurred against the target cost;

(b) substantiate claims for payment against milestones;

(c) agree changes to the target cost to reflect additions to or deletions from the scope of the contract;

(d) assess the final outturn costs and the final price payable; and

(e) consider the impact of innovation proposals.

5.84 Target cost contracting is not based on altruism. It is a business relationship designed to deliver optimum commercial benefits to all parties involved. Its success hinges on a solid relationship of mutual trust among stakeholders who fully understand the risks involved but are committed to overcoming any obstacles that may arise in the process in order to achieve the shared project objectives.

5.85 We are aware that some clients, such as the MTRC, have been experimenting with the target cost contracting approach. But given the prevailing culture in the construction industry, it will be some time before such a procurement approach will gain wide acceptance by industry participants. For public sector clients, in view of accountability concerns, further considerations would be required to ascertain the feasibility of adopting such an approach and how the implementation process should be managed. We recommend that as a matter of priority, we should focus in the near term on educating stakeholders on the need for partnership and on nurturing a more integrated culture. In the medium to long term, when the partnering culture matures, we should seriously consider the wider adoption of alternative procurement approaches (such as target cost contracting) in order to achieve better value for money in construction procurement. Meanwhile, progressive clients and their like-minded business partners who are prepared to move forward in this direction should be encouraged to lead the change and to share their experience with the rest of the industry.

Chapter 6

Nurturing a Professional Workforce

6.1 Manpower is the most valuable asset in the construction industry. The smooth and effective delivery of a construction project depends on the quality input of different disciplines at professional, supervisory and craftsman levels in all stages from project inception through design and implementation to completion. We need to nurture and retain a workforce capable of, and committed to, delivering high quality construction products if the overall performance of the construction industry is to improve. Looking ahead, the change programme envisioned in this report can only be successfully implemented with a re-alignment of the skills and mindset of the construction workforce.

Manpower development

Manpower development for construction professionals

6.2 Of the eight tertiary institutions funded by the University Grants Committee, five institutions (i.e. the Chinese University of Hong Kong, the City University of Hong Kong, the Hong Kong Polytechnic University, the Hong Kong University of Science and Technology and the University of Hong Kong) offer construction-related degree programmes. These programmes broadly fall under three streams : the architectural stream, the engineering stream and the surveying stream. After completing a degree programme and obtaining the requisite years of practical experience in one of these professional fields, an individual may apply for admission as a member of the relevant professional institution to become a fully qualified professional.

6.3 We note that there are existing mechanisms for local tertiary institutions offering construction-related degree courses to obtain feedback from professional bodies accrediting the courses and from other industry stakeholders on course curricula. This should continue in order to ensure that the graduates will meet the changing needs of the industry.

6.4 As discussed in earlier chapters, a change of culture and mindset in the construction industry is needed to bring about performance breakthroughs. In particular, the traditional approach to construction based on adversarial relationships among stakeholders will need to be transformed into a new holistic approach that lays emphasis on better integration across processes and disciplines. We also consider it important that more thorough consideration should be given to issues such as value management, buildability, safety, environmental protection and life-cycle costing at the project inception and design stages. This radical change in approach will create new demands on the core competencies of our construction professionals.

6.5 To support the envisaged transformation of the construction industry, we need to ensure that professionals under training and practising professionals recognise and accept these new challenges and are provided with opportunities to develop the required core competencies. We recommend that local tertiary institutions, in consultation with the professional institutions and others in the industry, should review and enhance the curricula of construction-related undergraduate and postgraduate courses to facilitate the envisaged culture change in local construction.

6.6 According to industry feedback, most graduates from construction-related undergraduate courses run by local tertiary institutions are technically competent. But there is room for improvement in respect of their understanding of how the construction industry operates and their soft skills, such as communication skills, knowledge of management principles in general and management practices in construction in particular. This should be taken into account in the suggested curriculum review.

6.7 Under existing arrangements, graduates from the architectural, engineering and surveying streams are required to acquire some practical experience before they may sit for professional examinations. In order that prospective new entrants to the construction industry will have a better understanding of their future working environment and the operation of the industry, we recommend that more opportunities should be provided for undergraduates to acquire site experience through summer job placements or sandwich course arrangements. A structured programme drawn up in consultation with the industry would facilitate implementation of this recommendation. We also recommend that the teaching staff should be encouraged to acquire practical experience in the industry from time to time, e.g. by working in the industry on short-term placements and/or during sabbatical years, to enable them to keep abreast of the latest developments in the construction industry and of the issues and opportunities calling for more research and development. With the same objective, we also support the part-time direct involvement of experienced construction professionals in the teaching process, where this is appropriate.

6.8 Given the rapid development in construction technologies and management techniques, it is important for construction professionals to continue to broaden their knowledge base and develop their personal qualities to ensure the satisfactory execution of their professional responsibilities. We consider that mandatory participation in continuing professional development (CPD) programmes would help to ensure that professionals in the construction field meet up-to-date requirements and catch up with technological advancements through ongoing education and training.

6.9 At present, among the major construction-related professional institutions, only the Hong Kong Institute of Planners and the Hong Kong Institute of Surveyors have introduced mandatory CPD requirement for their members. The other institutions adopt a voluntary approach. We recommend that participation in CPD activities should be made a prerequisite for renewal of membership with professional institutions in the construction field. We urge all

the other professional institutions in the construction field to implement our recommendation at an early date. For CPD programmes to serve their intended purpose, the scope and content of these programmes would require careful consideration. We look to the professional institutions to work out the implementation details having regard to the needs of the industry and with a view to cultivating a habit of lifelong learning among construction professionals.

Manpower development for construction technicians and supervisors

6.10 Site supervisors play an important role in ensuring compliance of construction works with specifications and other statutory or contractual requirements. They also provide indispensable support in overseeing day-to-day site management and organising project logistics. According to industry feedback, however, many junior site supervisors who join the industry straight after institutional training lack sufficient site experience to carry out their responsibilities effectively. On the other hand, those site supervisors who have worked their way up from a tradesman background do not possess the requisite technical knowledge to cope with the demands of their job. Due to the low professional status of site supervisors, we observe that the industry has encountered difficulties in attracting quality people to join this stream of construction personnel.

6.11 We need to build up a pool of competent and committed mid-stream personnel on whom project management can rely to achieve satisfactory built quality and effectiveness in other areas of project performance. To this end, we consider it important to enhance the professionalism of site supervisors by strengthening their training arrangements and providing them with professional recognition. Both academic training and practical experience are needed to equip site supervisors with the skills necessary for the effective discharge of their site responsibilities. We recommend that to supplement institutional training, the industry should draw up a structured training framework for site supervisors to enable new entrants to acquire the necessary skill-set through site experience. We envisage that this structured training framework may be run in a manner similar

to the Engineering Graduate Training Scheme 'A' which local trainee engineers have to undergo in order to qualify for Corporate Membership of the Hong Kong Institution of Engineers. By reference to the nature of construction works (e.g. structural and geotechnical works, superstructure works, building services, etc.) and the corresponding supervisory responsibilities, the academic and practical training required for individuals to attain the necessary competencies and experience will be identified and reflected in the training framework.

6.12 In defining the different streams of supervisory responsibilities under the proposed structured training framework, we should avoid being too rigid and should allow room for individuals to build up a broad base of experience. The structured training framework and the consequential modifications to diploma training curricula to align them with the needs and requirements of the industry should be drawn up through a collaborative process involving the industry and the training institutions. In addition, top-up courses should be organised for those site supervisors without formal training to acquire the necessary competencies.

6.13 To build up the professional status of site supervisors and to instill in them a sense of belonging, we further recommend that the professional institutions should actively consider the introduction of affiliated membership for site supervisors. Such membership could be based on attainment of the requisite qualification and experience, having regard to the structured training framework referred to in paragraph 6.11 above. Other industry bodies specifically targeted at site supervisory personnel may also wish to review their membership criteria in the light of the proposed structured training framework. We urge concerned bodies to co-ordinate among themselves with a view to devising a common platform for professional recognition for site supervisors as far as possible. We also urge that such a platform should be used to promote continuing training and development and to foster a higher standard of professional ethics among site supervisors.

6.14 We consider that the measures proposed in paragraphs 6.11-6.13

would go a long way towards raising the professionalism of site supervisors. They should be implemented as a matter of priority. We, therefore, do not recommend the introduction of a mandatory supervisor registration scheme at this stage. The need for such a scheme should, however, be reviewed in three years having regard to the effectiveness of our recommended measures.

6.15 For technicians in general, we note that the Hong Kong Institution of Engineers has a class of Associate Membership for mid-stream personnel in the engineering discipline. Such professional recognition helps to elevate the status of engineering technicians and offer greater assurance to employers on these technicians' qualification and competence. We recommend that the other professional institutions should similarly consider creating a new grade of membership for technicians in their respective disciplines. We welcome the positive initial response of the Hong Kong Institute of Architects and the Hong Kong Institute of Surveyors to our proposal.

Manpower development for construction workers

6.16 Workmanship has a direct bearing on the quality of the output of the construction industry. To raise the quality standards of the finished product, construction workers need to be equipped with the requisite technical skills through proper training. We also need to inculcate a strong performance culture among workers and instill in them a sense of pride in their work. Because of its poor image and unstable employment, the construction industry has hitherto encountered difficulty in attracting new blood and in retaining those who have joined the workforce. Under the daily-wage system of employment and the subcontracting mode of operation, most employers are also reluctant to invest in developing the capabilities and competencies of those under their employment through systematic training. These developments have severely undermined the industry's efforts in improving its performance.

6.17 We note that a number of measures are being taken to improve on the current situation, including –

(a) *Proposed implementation of a worker registration scheme*. Under this scheme proposed by the Construction Advisory Board[21], all construction workers[22], are required to be registered by trade and by reference to their skill levels. Skilled and semi-skilled workers will only be registered as such if they have passed relevant trade tests or have attained equivalent qualification and experience (The key features of the scheme as currently proposed by the Construction Advisory Board are at Annex E). We understand that the proposed scheme will be implemented subject to further consultation with the industry and the enactment of the relevant legislation.

(b) *Contractual requirements imposed by public sector clients on the proportion of trade-tested workers engaged for their projects*. All works departments require their contractors to employ a minimum number of Qualified Tradesmen and Intermediate Tradesmen (15% in general, depending on the trade, of the total workforce in each trade on site). The Housing Authority has also undertaken to increase the proportion of trade-tested workers engaged in its contracts from 35% to 60% in three years' time.

6.18 The worker registration scheme proposed by the Construction Advisory Board will help to ensure the quality of construction workers through skill certification, facilitate implementation of initiatives to upgrade the competence level of the workforce (e.g. by requiring safety training and other continuing development) and provide data on labour supply for manpower planning purposes. We support it in principle. To take the matter forward, we recommend that more extensive consultation with the industry on the proposal should be carried out as soon as possible. We also support the steps taken by the Housing Authority and the works departments to contractually require their contractors to employ a specified percentage of trade-tested workers. This

[21] The Construction Advisory Board is an advisory body set up under the Works Bureau. It is chaired by the Secretary for Works and its membership comprises industry representatives and representatives from concerned Government bureaux and departments.

[22] Under the current proposal, the registration scheme will focus initially on site workers.

measure will over time help to raise the skill level of construction workers and set an example for clients in the private sector. However, more needs to be done to substantially raise the quality of our construction workers. Our recommendation in this regard are set out in paragraphs 6.19-6.27 below.

Enhancement of the scope and content of basic craft courses run by the Construction Industry Training Authority (CITA)

6.19 The one-year basic craft courses currently run by the CITA for Form Three school leavers train about 1 600 youngsters in different trades annually. Subject to passing the relevant trade test upon course completion, the trainees attain semi-skilled status. We observe that at present, these basic craft courses focus primarily on equipping the trainees with technical skills in a particular trade with little time allowed for general education and the training of generic skills. Graduates generally have very little, if any, site experience or knowledge of how the industry operates. Moreover, the current arrangement whereby trainees of the one-year full-time basic craft courses attend practical classes at CITA and theory classes at the Vocational Training Council is found to be inefficient from an administrative viewpoint.

6.20 In view of the long-term objective of nurturing a professional workforce to support the development of a quality culture in local construction, we recommend that CITA should place more emphasis on rounded development in designing the content of their one-year basic craft courses for Form Three school leavers by building in modules on the operations of the construction industry (such as the roles of different sectors of the industry in project delivery, environmental protection issues, etc.) and on generic skills (such as language skills, basic IT skills, teamwork, concern for others, etc.). This will enhance the employability of CITA graduates and build up their basic skill set to facilitate future career development. As for all other industries, some wastage of young entrants is inevitable. But the general education given to graduates of CITA's basic craft courses while under training will remain relevant even if they subsequently leave the industry.

6.21 We also recommend that trainees attending CITA's one-year basic craft courses should be given early opportunities to acquire site experience well ahead of course completion. This will enable them to become more effective members of the project delivery team upon graduation. At the same time, early exposure to site conditions will give trainees a realistic view about their future working environment and help them develop a sense of affinity with the industry. Trainees who are unable to adapt to the tough working environment will have an early chance to exit without waiting for the course to complete. This will enable training resources to be used more cost-effectively. Taking account of the expanded scope and content of CITA's current one-year basic craft courses, we recommend that the duration of these courses should be reviewed.

6.22 We further recommend that both practical training and theory training for the one-year basic craft courses should be provided at CITA. Not only will this facilitate course administration, but CITA would also be in a better position to assess the progress made by trainees and provide necessary assistance and guidance.

Apprenticeship arrangement for graduates of CITA's basic craft courses

6.23 The apprenticeship scheme administered under the Apprenticeship Ordinance enables young graduates of CITA's basic craft courses in designated trades[23] to further develop their technical know-how and to gain practical experience. Under law, anyone aged under 19 working in any of the designated trades who has not completed an apprenticeship in the trade must enter into a contract of apprenticeship with the employer. However, we observe that due to workload fluctuations and the prevalence of the daily wage system of employment in the construction industry, many graduates of CITA's basic craft courses in the designated trades have encountered difficulty in signing up apprenticeship contracts with employers. Overall, the number of apprentices

[23] There are currently six designated trades in the construction industry : bamboo scaffolder, bricklayer/plasterer/tiler, carpenter/joiner, construction plant mechanic, painter/decorator/sign writer, and plumber.

employed in the designated trades is very small compared to the overall size of the construction workforce. According to industry feedback, most CITA graduates in the designated trades are employed by subcontractors without the cover of an apprenticeship contract. This truncated training arrangement is not conducive to the development of workers' technical skills and results in poor retention of young trainees in the industry.

6.24 The Vocational Training Council has recently carried out a review of the apprenticeship scheme. Building on the recommendation of the review to allow greater flexibility over the duration and administration of apprenticeship to take account of the specific requirements of individual trades, we recommend a new apprenticeship framework for the construction industry which will forge a closer partnership between employers and the training institutions. Under the proposed arrangement, youngsters will, upon completion of the basic craft courses in CITA, work for a series of contractors or subcontractors in the relevant trade for varying durations (depending on the manpower needs of the employers) to complete the apprenticeship programme. To encourage participation in this arrangement and to streamline the administrative procedures, CITA will oversee and administer the apprenticeship programme for individual graduates. It will provide placement service for its graduates and liaise with contractors and subcontractors who are interested in signing up apprentices. The advantages of this proposed approach are greater flexibility and less administrative work for prospective employers of apprentices on the one hand, and greater employment certainty for apprentices on the other. CITA will continue to oversee the general well-being of the apprentices throughout the apprenticeship period and ensure that the apprentices acquire the necessary skill sets.

6.25 Further flexibility should be built into the system to allow, and encourage, employers to draw up tailor-made apprenticeship programmes with the assistance of CITA, incorporating on-the-job and off-the-job training. These young apprentices will be under employment right from the beginning, and employers will be able to provide more input to the training of their apprentices having regard to company needs. We hope that the prospects of more stable

employment under our recommended apprenticeship model for young craftsman in the initial years as they build up their skills will improve their retention in the industry.

Refinement of skill definition and multi-skilling for over-specialised trades

6.26 We observe that some workers in some construction trades are over-specialised and are not sufficiently competent at related skills in the same trade to carry out their work satisfactorily. We recommend that more emphasis should be placed on multi-skill development to equip workers with a broader appreciation of their job requirements. While workload fluctuations would remain a constraint, employers would be more willing to consider engaging direct labour on a monthly-paid and longer-term basis if the workers had a more varied skill-set.

6.27 At present, workers are broadly classified as general workers, semi-skilled workers and skilled workers. To support the implementation of multi-skill development, we recommend a more refined framework to define workers' qualifications having regard to the competencies they have acquired (which may encompass different proficiency levels for different technical skills, safety awareness, etc.). Credit points will be earned upon attainment of specified competencies and will contribute towards the award of recognised qualifications. This qualification framework will provide a better indication of the skill profile of workers. It will also provide a career path for craftsmen, motivating them to aim for higher qualifications up to master craftsman level. The proposed worker registration scheme should take account of this new skill definition framework.

Enhanced role of CITA in the training of construction workers

6.28 As a result of our recommendations in paragraphs 6.19-6.27 above, we envisage that CITA will assume a more important role in the training and career development of craftsmen. In view of its expanded functions, we recommend that the composition of the CITA Board should be reviewed with the

objective of achieving an appropriately balanced membership to enable the organisation to discharge its new responsibilities effectively.

Fostering an ethical culture

6.29 The recent spate of non-compliant construction works has underlined the importance of fostering an ethical culture in the industry in order to eradicate corruption and dishonest acts. We should strive to achieve this objective through education and appropriate enforcement action. We acknowledge the efforts made by the ICAC in this regard through the promotion of best practice and ethics management in the construction industry. The comprehensive education and publicity programme implemented by ICAC covers all sectors of the industry as well as prospective entrants under training. It serves to enhance the vigilance of practitioners at all levels against the risk of corruption, and equip them with the know-how in corruption prevention. The enforcement action taken by ICAC also plays an important role in maintaining the integrity of the system. These efforts must be sustained, with the active participation of all stakeholders, to ensure that members of the construction workforce at all levels conduct themselves in a responsible manner towards their professions, colleagues, employers and clients as well as the public, and discharge their duties with integrity.

6.30 To complement the ongoing efforts of the ICAC and public sector clients in combating corruption, we recommend the following measures –

(a) Noting that frontline site supervisory staff and those responsible for accepting completed works are particularly exposed to corruption risks, employers should issue clear guidelines to frontline staff on prohibitions against acceptance of advantages and excessive entertainment offered by contractors and subcontractors;

(b) Public sector clients should take a lead in requiring consultants and contractors working on their projects to pledge for probity,

promulgate a code of conduct and provide probity training for their staff;

(c) Professional institutions and other industry bodies should maintain an effective disciplinary mechanism to sanction construction personnel who have breached the rules of conduct or codes of practice;

(d) Tertiary institutions with built-environment faculties/departments and all other construction training institutions should make professional ethics a compulsory subject in construction-related courses wherever that is not yet the case;

(e) Training on professional ethics for practitioners should be enhanced through continuing development programmes and refresher courses; and

(f) ICAC should widely disseminate information based on actual cases to educational, professional and training institutions, Government departments, developers and construction firms for use as training materials. The industry should also co-operate with the ICAC in identifying processes and practices which are corruption-prone and implement precautionary measures accordingly.

Need for better mechanism to collate construction manpower statistics

6.31 To facilitate manpower planning and the provision of training activities for the construction industry, we need to have a sound mechanism for projecting construction manpower supply and demand. We recognise that this is not an easy task, especially with regard to construction workers in view of the prevalence of the daily wage system of employment. We envisage that with the implementation of the proposed worker registration scheme, more reliable statistics will be available. In anticipation of this development, we recommend

that the Education and Manpower Bureau should, in consultation with the Works Bureau and other concerned parties, improve on the methodology for collating and compiling construction manpower statistics so as to facilitate manpower planning in the long run and to provide a consistent basis for reference by policy-makers and the industry.

Mode of employment of construction workers

6.32 Many construction workers are at present employed on a daily basis because of uneven manpower requirements for different trades during the construction process and workers' own preferences. Although such employment arrangement may optimise the utilisation of the construction workforce, the lack of job security inhibits the nurturing of a quality culture among construction workers and deters capable personnel from joining and remaining in the industry. This directly affects construction quality.

6.33 The industry's drive for excellent performance depends on a professional workforce at all levels, workers included. The construction industry must look beyond short-term efficiency gain. To achieve sustainable development, the industry must invest in upgrading the quality of its manpower resources. Enhanced professionalism of the construction workforce will only come about in an environment of more stable employment and a commitment from construction companies to training.

6.34 We recommend that clients and the industry should work together to widen the use of direct labour in order to enhance the quality of our construction workers and to instill in them a strong performance-oriented culture. We note that the Housing Authority and the Works Bureau are planning to launch trial schemes to promote long-term employment of construction workers. Priority will be given to the core trades and the proportion of contract workers will be increased progressively. This is a pragmatic approach. Casual labour in the construction industry is inevitable to a degree given fluctuating workloads and the varying capacity of different trades to employ workers on a long-term basis.

But there is great scope for the engagement of more direct labour without compromising construction efficiency and productivity. Our recommendations on an improved apprenticeship scheme for construction workers, the development of a multi-skilled workforce, and the proposed implementation of a worker registration scheme will lead to a more favourable climate for the wider use of direct labour in local construction. We urge both public and private sector clients to give impetus to this development through contractual requirements.

Chapter 7

An Efficient, Innovative and Productive Industry

7.1 Construction costs in Hong Kong are comparatively high as evidenced by the following tables, which compare the building costs in Hong Kong, Singapore[24] and the United States[25] for different building categories based on 1999 figures –

Table 7.1 : Comparison of construction cost[26] of high rise residential buildings in Hong Kong, Singapore and the United States (from 1996 to 1999)

	1996		1997		1998		1999	
	luxurious quality	good quality	luxurious quality	good quality	luxurious quality	good quality	luxurious quality	good quality
Hong Kong	$1,210 - $1,740	$1,070 - $1,240	$1,420 - $1,920	$1,280 - $1,460	$1,460 - $1,900	$1,310 - $1,490	$1,390 - $1,790	$1,260 - $1,400
Singapore	$1,210 - $1,420	$920 - $1,210	$1,210 - $1,480	$1,010 - $1,210	$960 - $1,200	$780 - $900	$890 - $1,120	$710 - $940
United States	$1,190 - $1,350	$1,080 - $1,190	$1,240 - $1,400	$1,080 - $1,240	$1,350 - $1,460	$1,080 - $1,300	$1,400 - $1,620	$1,130 - $1,350

Note : All costs are in US$ per construction floor area (CFA) in m^2

Source : Levett and Bailey Chartered Quantity Surveyors

[24] The study used the following average US : Singapore exchange rates – US$1 : S$1.4101 (1996), US$1 : S$1.4848 (1997), US$1 : S$1.6736 (1998) and US$1 : S$1.6949 (1999).

[25] The study chose Los Angeles as the city representing the United States as it was in the middle of the cost range among major US cities.

[26] The figures quoted in Table 7.1 and Table 7.2 are tender prices.

Table 7.2 : Comparison of construction cost[26] of high rise office buildings in Hong Kong, Singapore and the United States (from 1996 to 1999)

	1996		1997		1998		1999	
	high quality	good quality	high quality	good quality	high quality	good quality	high quality	good quality
Hong Kong	$1,290 - $1,730	$1,110 - $1,370	$1,510 - $1,960	$1,250 - $1,520	$1,550- $1,980	$1,260 - $1,520	$1,490 - $1,890	$1,210 - $1,440
Singapore	$1,450 - $1,680	$1,380- $1,540	$1,440 - $1,640	$1,370 - $1,510	$1,130 - $1,340	$1,070 - $1,220	$1,030 - $1,240	$970 - $1,120
United States	$1,730 - $1,890	$1,510 - $1,730	$1,670 - $1,890	$1,460 - $1,670	$1,730 - $1,940	$1,510 - $1,730	$1,830 - $2,050	$1,670 - $1,830

Note : All costs are in US$ per construction floor area (CFA) in m^2
Source : Levett and Bailey Chartered Quantity Surveyors

7.2 We recognise that exchange rate policies, broader economic conditions as well as local variations (e.g. in design and construction practices, climatic and geographical conditions, building regulations, specifications, etc.) all have an impact on building costs. Bearing this in mind, we have examined the cost drivers in local construction with a view to identifying improvement measures to enhance the operational efficiency and productivity of our construction industry.

Cost drivers in local construction

7.3 Setting aside imposed constraints, e.g. ground conditions and climatic conditions in Hong Kong which give rise to higher costs to provide for more robust foundation and structural works, we have identified a number of cost drivers which, if properly addressed, would enable the construction industry to become more efficient and productive. These cost factors are –

(a) low efficiency due to a fragmented approach to construction and

poor supply chain management;

(b) unreasonably short construction programmes;

(c) tendency to accept the lowest bid without sufficient regard to quality, leading to higher outturn prices and life-cycle costs;

(d) lax control over variations after awarding the contract, leading to an outturn price much higher than the contract price;

(e) non-value adding multi-layered subcontracting, which reduces the profit margins of the parties carrying out the actual works, thus inducing them to cut corners and compromise on quality;

(f) prevalent use of labour-intensive, in-situ construction methods, which necessitates more supervisory efforts and leads to high material wastage;

(g) low labour productivity and shortage of skilled labour supply during construction peaks;

(h) the cumulative regulatory impact of local legislation affecting the construction industry;

(i) inefficiencies arising from incomplete, and sometimes inaccurate, as-built records of underground utilities; and

(j) the high cost of some material components.

Enhancing construction efficiency and productivity

7.4 Some of the cost factors set out in paragraph 7.3 above are addressed in other parts of this report. In this chapter, we shall focus on the following

measures which would help to raise the cost-competitiveness of local construction –

(a) process re-engineering to achieve better integration in the project delivery process;

(b) wider use of standardisation in component design and processes to eliminate waste and inefficiencies;

(c) a manufacturing approach to construction through wider use of prefabrication;

(d) wider application of information technology in project implementation;

(e) investment in construction-related research and development (R&D);

(f) rationalising regulatory controls and fostering a service culture amongst regulatory authorities;

(g) more reliable records of underground utilities; and

(h) lowering the cost of ready-mixed concrete.

Process re-engineering to achieve better integration

7.5 Under the conventional approach to construction, project delivery is a highly fragmented process. Planning, design and construction proceed in sequence, often with inefficient interaction across disciplines throughout the delivery process. Adding the adversarial relationship among stakeholders on top of these separate processes, our construction industry is inhibited from delivering value to the client by fully utilising the skills and knowledge of all participants of

the project team.

7.6 We should seek to facilitate downstream activities by thorough planning at the outset of a construction project. In drawing up the design, account should be taken not only of the client's functional requirements, but also maintainability and other life-cycle cost implications, site safety, ease of construction and environmental considerations both during construction and when in use. This calls for an integrated approach to project implementation, which is predicated on improved communication among stakeholders and better integration of the design and construction processes. Designers will need to have a better appreciation of practical issues arising from the construction and post-commissioning stages. At the same time, we need to find ways to tap the expertise of suppliers and contractors before the design is finalised.

7.7 The use of a multi-disciplinary team working in close collaboration is, in fact, not a novel concept in local construction. We note that some local developers with an in-house construction arm or closely affiliated construction partners are already operating in a vertically integrated fashion with positive outcomes. The concept and benefits of an all-encompassing approach to construction should be more widely promoted locally. To bring about better integration across the construction value chain, we need to explore other procurement strategies as an alternative to the traditional "construct only" type of contracts. Paragraphs 7.8-7.11 examine two such alternative procurement approaches, namely design and build and prime contracting.

Design and build

7.8 In a design and construct contract, the party undertaking the project is responsible for both the design and construction of the facility in accordance with certain performance-based specifications laid down by the client. This approach allows designers, contractors and suppliers to work together from an early stage of project development through detailed design to construction. Given the greater flexibility allowed for the design, buildability is improved. The

cost-effectiveness of construction can also be improved through a design that is compatible with individual contractors' skills and experience or certain construction plant and equipment owned by the contractors. Moreover, because a large part of the detailed design and construction can be carried out in parallel, the overall project delivery can be fast-tracked with possible savings in project costs.

7.9 We note that the use of the design and build form of contract is becoming more common for public works projects, particularly for Government building projects and electrical and mechanical engineering projects. We understand that the Housing Authority also intends to experiment with the design-and-build approach in order to enhance the buildability of public housing and to engender a better team spirit amongst stakeholders.

Prime contracting

7.10 Prime contracting has been widely advocated in the UK in recent years to allow better integration of the construction supply chain, thereby providing better value to the client. Under this approach, there is a single point of responsibility (the prime contractor) between the client and the construction supply chain. The prime contractor brings together all the necessary parties in the supply chain to meet the clients' requirements effectively. He is responsible for planning, programming, cost control, design, system engineering and testing, and overall procurement management. In short, he is responsible for the total delivery of a project, fit for purpose and in line with whole-life costs predictions.

7.11 We recognise that to facilitate better integration in the delivery of construction projects, we will need some fundamental changes to the way we procure construction services. In this regard, we recommend that alternative procurement approaches such as design and construct should be adopted more widely in local construction in both the public and the private sectors, wherever appropriate. But in adopting a more integrated approach to construction, clear accountability must be maintained and appropriate arrangements should be made for independent monitoring purposes to safeguard construction quality.

Wider use of standardisation in component design and processes

7.12 Standardisation is the extensive use of components, methods or processes in which there is regularity, repetition and a background of successful practice (e.g. standardisation of the dimensions of components such as doors and windows, uniform standards for certain common materials such as steel and concrete, etc.). We see a lot of scope for the construction industry to improve its efficiency through wider use of components of standardised dimensions and standardised processes.

7.13 A survey conducted by the Reading Construction Forum on the UK construction industry had the following findings –

(a) there was a high incidence of one-off component use within the construction industry;

(b) at least half of all components were unique; and

(c) the remaining components were repeatedly used only between two and six times on average.

We observe that the inefficiency arising from the extensive use of non-standard components across the industry is considerable and must be addressed.

7.14 We are aware of concerns in the industry that standardisation of components would result in poor aesthetics and monotonous designs. This view is probably much coloured by local experience in the use of standard designs for our public housing projects. We should point out that judicious use of standardised or modular components (e.g. windows, doors, staircases, etc.) is entirely compatible with uniqueness in construction design and need not limit the scope for design innovation.

7.15 Standardisation of components brings many benefits, including

reduction in manufacturing costs; fewer interface and tolerance problems, thus better quality of the end product; greater certainty over outcomes; more efficient research and development of components; reduced maintenance cost for end-users; reduced waste and more scope for recycling. To maximise these benefits, we need to factor in the use of standardised components at the design stage to ensure compatibility in design and to facilitate the manufacturing process. The industry will also need to act together in order to achieve the necessary economy of scale. We recommend that the use of standardised and modular components should be more widely promoted in local construction, with the public sector taking the lead.

7.16 Similarly, we encourage clients and the industry to devote more effort to aligning and rationalising their current processes and practices so as to achieve more efficient operation and to reduce implementation efforts. Standardised processes and practices provide much greater predictability about what is performed, by whom, how and when and the possible outcomes. Wide adoption of standardised processes and practices across the industry would facilitate integration among industry participants, minimise development efforts, promote learning sharing and, as pointed out later in this chapter, provide a sound basis for the wider use of IT in local construction. We observe, however, that the current state of fragmentation within the industry is not conducive to the adoption of common procedures and practices.

7.17 Using public sectors clients as an example, we note that the Housing Authority and the works departments maintain separate lists of contractors and consultants, each with its own listing requirements. Specifications adopted for similar types of construction works (e.g. building works, site formation works, waterworks and drainage works, etc.) also differ between public works projects and Housing Authority projects. For example, in the case of site formation works, if they are funded by the Housing Authority and undertaken by the Housing Department in connection with the redevelopment of public housing estates, they are carried out in accordance with the Housing Department's specifications. If such works fall outside public housing estates and are undertaken by the Civil

Engineering Department or the Territory Development Department, then the specifications applicable to public works projects will be followed. Another example is school projects. We understand that even in cases where the standard school design is adopted, different specifications will apply depending on whether school construction forms part of a public housing project or a public works project. There is a need for rationalisation to avoid wasteful efforts. We recommend that the public sector clients should lead in this drive for greater efficiency through judicious standardisation and rationalisation of their processes and practices.

7.18 On a related issue concerning construction standards, we note that at present, Hong Kong does not have a central standardisation body responsible for the development, co-ordination and promulgation of construction standards for use locally. Except for mandatory standards specified under the relevant ordinances and regulations, e.g. the Buildings Ordinance and the regulations thereunder, individual organisations in the public and the private sectors decide on their own which construction standards are most appropriate to their projects having regard to international practices. There is hitherto little co-ordination in standardisation activities carried out locally by individual organisations. This piecemeal and ad hoc approach locally in the development of construction standards leads to duplication of efforts. It has also affected Hong Kong's ability to keep up with regional and international trends in harmonisation of standards for the facilitation of global trade.

7.19 We have studied the findings of a consultancy study commissioned by the Works Bureau recently on the subject. We consider that better co-ordination in the development of construction standards in Hong Kong through the establishment of a dedicated office will be beneficial to the construction industry. Duplication of efforts in standardisation activities in the industry will be minimised. Research service envisaged to be carried out by the central standardisation body would facilitate the application of advanced construction technologies and the use of environmentally friendly construction materials in local construction. Such research support would also help to ensure

that the standards to be adopted locally are technically feasible and cost-effective. We support more co-ordinated efforts in the development and application of construction standards in the industry and recommend that the industry co-ordinating body proposed to be set up in Chapter 9 should lead in this regard.

Wider use of prefabrication

7.20 On the whole, local construction is labour-intensive and involves extensive wet trades on site. As a result, the quality and cost of construction are highly dependent on a steady supply of skilled labour. Extensive on-site processes put a heavy demand on site logistics management and necessitate intensive site supervision for quality assurance. In-situ construction also gives rise to considerable environmental problems, such as dust nuisance from on-site concrete mixing, excessive noise and waste from the use of timber formwork, and muddy site run-off. In addition, material wastage, the removal and management of wastes and rectification of defects generate not insignificant indirect costs for the project. Wider use of prefabrication will help to overcome many of these problems inherent in in-situ construction.

7.21 We observe that prefabrication, coupled with the use of standardised and modular components, will contribute to improved buildability and associated efficiency gains. Prefabrication in a factory environment offers much better quality control to meet required quality standards. There is less wastage because of mass production and fewer defective products under a repetitive process. Repetition of component production and assembly also allows the team to build up speed and to achieve economy of scale. By reducing the amount of wet trade work on construction sites, prefabrication makes sites cleaner and tidier. This would in turn contribute to better site safety performance.

7.22 The Housing Authority has adopted prefabrication since the mid-1980s. Precast concrete facades are now a mandatory requirement for all standard domestic blocks. A variety of other prefabricated building components such as precast concrete structural elements and panel wall partitions are also

used. The Housing Authority's experience has confirmed the benefits of prefabrication outlined in paragraph 7.21 above. It also demonstrates that prefabrication requires a sufficient scale of operation to be cost-effective.

7.23 All factors considered, we take the view that to stay competitive, our construction industry will have to adopt a manufacturing approach with an emphasis on prefabrication and standardised components in line with global trends. We note that probably precipitated by the recent downturn in the property market, a number of property developers have shown increased interest in the adoption of more efficient construction methods (such as the use of system formwork, precast components, etc.). Such interest, we anticipate, will be further sustained by the incentive measures now under consideration by the Buildings Department to encourage building innovation and greener building designs and construction methods (please see paragraph 8.35 in Chapter 8 for further details).

7.24 In the light of these developments and consistent with our preference to bring about continuous improvements in the construction industry through market forces, we are not in favour of a legislative approach to promote wider use of prefabrication and other buildability measures in Hong Kong. Instead, we recommend that public sector clients, in particular the Housing Authority with its pioneering efforts in these techniques, should lead in this direction by progressively increasing the proportion of precast elements and the use of other buildability measures in their projects. We further urge public sector clients to share their experience with the private sector to quicken the pace of this development.

7.25 In support of the recommendation in paragraph 7.24 above, we recommend the following additional measures to help provide a favourable environment for the wider adoption of prefabrication and other efficient construction techniques locally –

(a) To derive the full benefits of standardised components and prefabrication, thorough consideration should be given at the design

stage to the possible use of these techniques. Clients, professional institutions, designers and contractors should work together to share knowledge and experience in this regard, and to consider the need for guidelines and codes to encourage wider take-up;

(b) With the increased use of standardised components and pre-assembled parts, there will be greater emphasis on effective logistics management to ensure that off-site activities are well co-ordinated with on-site programmes. The right components will need to be produced and delivered to the site at the right time, in the right order and without any defects. Management personnel will need to be trained to master precise logistical control and effective site co-ordination;

(c) The carrying out of production activities off-site and the use of other efficient construction methods (e.g. use of system formwork) will have implications for construction manpower demand. Adequate training and retraining will need to be provided to facilitate this technological migration. Other construction personnel, including professionals, should also acquire knowledge of these construction techniques to facilitate their adoption and implementation; and

(d) Rapid developments have been made in this field overseas. In transferring technologies to Hong Kong, we need to ascertain their applicability in local circumstances and the need for adaptation through R&D. In this connection, better co-ordination between academia and industry and effective dissemination of research results to the industry will be necessary. (We shall address the subject of construction R&D in paragraphs 7.35-7.40 below.)

The wider use of prefabrication in local construction will only come about through the collaborative efforts of the entire industry and knowledge sharing among industry participants. A common industry forum, such as the industry

co-ordinating body proposed in Chapter 9 of this report, will play a vital role in facilitating this modernisation process.

Wider application of information technology (IT) in project implementation

7.26 The construction industry is an information-intensive industry. In view of the participation of multiple parties during the project delivery process, effective communication within the project team is crucial for successful project implementation. The ubiquity of the Internet and the increasing processing power of computers have enabled construction personnel to access and exchange project information and to transact with one another electronically in a seamless manner. IT has huge potential to bring all industry participants to work together more effectively and efficiently. The construction industry stands to derive extensive benefits from the wider use of IT tools through improved information flow along the construction value chain.

7.27 We observe that while the construction industry is familiar with the use of software applications for selected tasks such as computer-aided drafting (CAD), structural analysis, budget estimation and contract administration, it has yet to harness the full potential of IT to enhance efficiency in construction management, logistics planning and information sharing. We have identified a number of factors which had inhibited a higher IT take-up in local construction as set out below –

(a) the fragmented nature of the industry which impedes the wider adoption of common IT tools across disciplines;

(b) absence of a conducive environment due to the lack of common standards and a common data infrastructure;

(c) low awareness at management levels of the potential benefits of IT;

(d) lack of practical application solutions in the market place that suit

local circumstances;

(e) high initial development cost and uncertain return on investment; and

(f) low IT literacy among construction personnel.

7.28 It is important to recognise that IT is an enabler, and not a solution in itself. To maximise the benefits of IT and to achieve significant productivity gain through improved information flow across processes and disciplines, the industry should give priority to setting common standards and developing a common data infrastructure for seamless electronic communication among stakeholders. To successfully drive more extensive use of IT throughout the construction delivery process, we need to build up a critical mass of IT users within the construction industry. Major clients and other key stakeholders can facilitate this by taking a lead in adopting IT and committing resources for the successful implementation of various IT initiatives. Training for the management and the construction workforce at all levels will also need to be organised in order to raise the IT literacy of the industry.

7.29 We note a number of initiatives undertaken by the Government which will contribute to the development of a common platform for electronic communication in the industry. These include: the ongoing consultancy study on the alignment of planning, lands and works data; the consultancy study on CAD standard for drawings for works projects; the pilot scheme to digitalise the building plans kept by the Buildings Department and the feasibility study commissioned by the Buildings Department on the development of an electronic system for building plan submission and document management. We understand that the Buildings Department is also closely monitoring developments in artificial intelligence technology with a view to testing the feasibility of introducing electronic checking of building plans when the technology becomes available.

7.30 These initiatives are timely. We recommend that the implementing bureaux and departments should pursue them as a matter of priority and, in the light of the outcome of these consultancy studies and feasibility studies, put in place the proposed infrastructure and facilities without delay. To maximise the potential benefits, we urge that there should be wide consultation with industry participants in the development process and due attention should be paid to compatibility and interoperability with global standards. We hope that with these developments, many of the exemptions currently made under the Electronic Transactions Ordinance for construction-related legislation could be withdrawn in the not too distant future. This would give further impetus to the wider adoption of IT in local construction.

7.31 Availability of applications that meet the needs of the industry is an important driver to encourage IT take-up. We note that during the past year, a variety of IT solutions and integrated industry portals catering for the construction industry were launched on the market. We encourage closer collaboration between the construction industry and the software industry to facilitate the development of applications that cater for local requirements. The industry co-ordinating body proposed to be established in Chapter 9 would have a useful role to play in this regard. We recommend that it should, in consultation with industry stakeholders, identify priority areas for software development to help tackle those areas where performance is lagging and communicate the industry's requirements to software developers.

7.32 IT is a rapidly developing field. Many other industries, e.g. the logistics industry and the manufacturing industry, have surged ahead in utilising IT tools, particularly the Internet, to improve on their business processes. The construction industry should learn from the experience of other industries.

7.33 We note that the Works Bureau has taken active steps in exploring ways to enhance the efficiency of service delivery through electronic means. The implementation of the Electronic Mark Plant Circulation System and the electronic tendering initiative are examples of these efforts. We understand that

the Works Bureau, in its capacity as a client, is also giving consideration to widen IT usage in its work processes through, for example, web-based project management, electronic supply chain and logistics management, mobile computing for project delivery, electronic document management and electronic maintenance management system.

7.34 We support the Works Bureau's efforts in this regard and urge industry stakeholders to pool their efforts in the development of these applications to minimise duplication of efforts. In the process, we should also draw on the expertise of academia and support organisations (such as the Hong Kong Productivity Council). To maximise synergy in R&D efforts, closer collaboration between the IT faculties and the built environment faculties/departments in our tertiary institutions should be encouraged.

Investment in construction-related R&D

7.35 Research is instrumental in steadily improving the overall performance and competitiveness of any industry by enhancing productivity and improving quality through innovation. Construction research is an important means of expanding the industry's knowledge base leading to the development of better designs and materials as well as improved construction methods and management practices. A strong R&D culture within our construction industry will help it to adapt innovative technologies successfully used elsewhere to local conditions, and foster the development of original solutions in Hong Kong to meet specific local needs.

7.36 Local construction-related R&D is undertaken primarily by the built environment faculties/departments of the tertiary institutions. Two sources of funding are available, namely the Research Grants Council and the Innovation and Technology Fund. The former is focused more on basic research while the latter supports applied research that contributes to innovation or technology upgrading in local industries, including the construction industry.

7.37 Compared with their counterparts in other economies, the investment made by our construction industry in R&D is low and there is a lack of co-ordination between academia and industry in research activities. We must improve on the current situation to keep abreast of global technological advancement. Investment in construction research will need to be significantly increased to promote an innovation culture in the construction industry. We recommend that public sector clients and other progressive clients in the private sector should see R&D as a key driver for sustained business success and be prepared to commit adequate resources for the carrying out of research activities beneficial to their corporate and project objectives. The lead taken by these organisations will set an example for the rest of the industry, encouraging others to attach greater importance to innovation and technology upgrading.

7.38 We note a suggestion from the industry that a dedicated fund should be set up for construction research. We consider that since the construction industry falls within the coverage of the recently established Innovation and Technology Fund, the industry should in the first instance make greater use of this fund to finance construction research activities without creating a new funding mechanism. The Innovation and Technology Commission could assist in this process by explaining to the industry the funding scope of the Innovation and Technology Fund and encouraging funding applications.

7.39 We observe that at present, there is a relatively low awareness of the research output of local tertiary institutions in the construction field and, with some important exceptions, there is a low take-up of these research results. Communication and co-ordination between industry and local research organisations will need to be substantially improved so that there will be better matching between the construction research outputs of the local research community and the research needs of the local construction industry.

7.40 We note that under the aegis of an inter-university task force, the local tertiary institutions with built environment expertise are now engaged in a dialogue to achieve better co-ordination among themselves in construction

research. This will need to be matched by similar efforts within the industry so that the industry will be able to articulate its research needs to the local research bodies in a more effective manner. Better co-ordination will also facilitate effective dissemination of research results within the industry and encourage their application. To avoid duplication of efforts and to achieve cost-effectiveness in local construction research activities, we further recommend that research funding bodies, research providers and potential research users should work in partnership, under the industry co-ordinating body proposed to be set up, to set clear objectives, directions and priorities for local construction R&D activities. A strategic framework which takes account of both the immediate needs of the industry and the direction of its long-term development will ensure a balanced research programme that does not just focus on solving today's problems.

Facilitating regulators

7.41 Construction activities are highly complex carrying implications in a variety of diverse fields, including land and planning control, public health and safety, site safety, environmental protection and others. Such complexity is reflected in the vast number of ordinances and regulations which the construction industry is required to comply with.

7.42 We consider that a robust and comprehensive regulatory framework is necessary in order to set minimum technical standards and to ensure that the industry does not compromise its social obligations. That said, we consider that there is room for improvement in the current regulatory framework to facilitate the healthy development of the industry and to drive the industry towards excellence. Attention should be paid, in particular, to the following areas –

(a) substitution of prescriptive provisions which inhibit innovation by performance-based provisions;

(b) shorter processing time and streamlined procedures;

(c) better co-ordination among regulatory authorities to minimise conflicting requirements; and

(d) fostering of a service culture among the regulatory authorities.

7.43 We fully support the initiative taken by the Government to embark on a comprehensive review of the Buildings Ordinance and its subsidiary regulations, which provide the statutory framework governing the design, construction and supervision of private building works. The objectives of the review are to remove obsolete provisions which impede the adoption of modern and buildable designs, replace prescriptive provisions with performance-based ones so as to encourage innovation and environmental sustainability, and streamline the statutory approval procedures for various levels of building works. These objectives are fully in line with the directions of future development set by this Committee. We urge the Planning and Lands Bureau and the Buildings Department to proceed with the review at full speed in consultation with the industry. Bearing in mind that land use policy and planning policy have a significant impact on building designs, we recommend that the Lands Department and the Planning Department should be closely involved in this review process and render their support to the move towards more imaginative land use and innovative building designs (please also see paragraph 8.35 in Chapter 8).

7.44 The construction industry needs more facilitating regulators to successfully implement the envisaged change programme. Our recommendations to achieve this outcome are set out in paragraphs 7.45-7.48 below.

7.45 As a result of the segregated approach adopted by the enforcement authorities, conflicting requirements by different authorities are not uncommon. In the case of applications for an Excavation Permit, for example, the industry is sometimes caught between the Transport Department's requirement that the concerned works should be carried out during the night to minimise impacts on

traffic and the Environmental Protection Department's prohibition against night work on environmental grounds. Programme delays become inevitable as a result. Such lack of co-ordination must be addressed.

7.46 The prolonged approval process for building plans is another major source of concern. Under current arrangements, the Buildings Department is responsible for co-ordinating inputs from the other public authorities. Delayed or conflicting responses from any of the contributing parties will prolong the entire process. The Buildings Department's recent decision to streamline the plan approval procedures e.g. by convening pre-approval conferences for innovative design proposals, will benefit the industry. In order that the Buildings Department can make further headway in streamlining and expediting the plan approval process, we recommend that the Government should designate the Buildings Department to assume the lead role in resolving any conflicting requirements among public authorities that may arise during the plan approval process, and eventually to develop a more condensed and integrated processing system so as to minimise the time required for plan approval. We further recommend that all Government departments involved in the plan approval process should pledge a time limit for tendering their advice, and adopt a forthcoming and proactive approach to help clients address their difficulties in meeting various regulatory requirements.

7.47 Regulations are meant to be complied with, rather than transgressed. We consider that while regulatory authorities should enforce the law vigorously, they should at the same time assist industry participants in compliance. We urge the regulators to respond promptly and constructively to the industry's requests for assistance when the latter encounters difficulty in meeting the requirements of the law. We also encourage regulators to draw up codes and guidelines, whenever appropriate, to help the industry better understand the intentions behind the legislation and acceptable conduct to satisfy the legislative provisions.

7.48 While the potential implications of proposed legislation on industry participants and the community have been comprehensively analysed and

assessed before enactment, the cumulative impact on the industry of existing legislation and new legislation from many different sources may not have been given sufficient attention. We urge concerned regulatory authorities to keep their legislative requirements under review and to identify scope for improvement on an ongoing basis, in consultation with the industry. In this connection, we recommend that priority should be given to assessing the impact of the body of environment-related legislation on the construction industry vis-à-vis the community in order to induce compliance. We shall elaborate on this point in paragraphs 8.40-8.41 in Chapter 8.

More reliable records of underground utilities

7.49 Most construction activities and building developments require road excavation for laying connections for drainage, water supply or utilities. Road opening works undertakers are required to apply for an Excavation Permit from the Highways Department before commencement of works to facilitate better co-ordination of road opening works and to minimise disturbance to the public.

7.50 According to industry feedback, the application process for an Excavation Permit can be rather prolonged and complicated, often involving protracted and difficult negotiations with the concerned utility undertakings and Government departments. This process would impact on project programming and delivery. Moreover, the lack of accurate as-built records of some underground utilities may create considerable problems for logistics planning and work organisation.

7.51 To address the identified problems, we recommend that the Highways Department should take the lead in developing an efficient, possibly web-based, system to facilitate access by contractors and project proponents to information on existing and proposed underground utilities. It should, in consultation with other concerned bureaux and departments, draw up measures to require utility undertakings and the relevant Government departments to enhance the accuracy of as-built records of underground utilities. We also recommend

that the Highways Department, together with the other concerned departments (e.g. the Transport Department and the Environmental Protection Department), should work together to streamline the existing procedures for processing road excavation permits. The feasibility of one-stop service should be considered.

Lowering the cost of ready-mixed concrete

7.52 In the course of the review, our attention has been drawn to the relatively high prices of ready-mixed concrete in Hong Kong. According to a study commissioned by the Housing Authority in 1999, the prices of ready-mixed concrete increased by a total of 67% between 1994 and 1997 due to a substantial increase in demand during that period. In 1998, ready-mixed concrete in Hong Kong became the most expensive in the Asia-Pacific region.

7.53 We note that following the above-mentioned study, the Housing Authority and the Works Bureau are considering the feasibility of various measures to promote competition in the local ready-mixed concrete industry. These measures include: encouraging the wider use of on-site concrete batching and prefabrication, exploring measures to facilitate market entry through land use policy and setting up public off-loading facilities for cement imports, etc. In the interest of trimming the cost base of local construction, we support this move. We should caution, however, that in enhancing competition in the supply of ready-mixed concrete, quality should not be compromised.

7.54 We note that some of the improvement measures suggested in paragraph 7.53 touch on many complex and inter-linked issues (such as land use and environmental considerations). To facilitate balanced consideration of all relevant factors, we recommend that the Works Bureau and the Housing Authority should consult other concerned bureaux and departments, industry stakeholders and the ready-mixed concrete industry in studying the feasibility of the suggested improvement measures. The possibility of drawing up a code of practice for self-regulation among ready-mixed concrete suppliers to ensure fair competition among them should be explored in this context.

Export potential of the construction industry

7.55 In this chapter, we have put forward a package of specific measures to firmly establish our construction industry as an efficient, innovative and productive industry. The successful implementation of these measures will improve the industry's competitiveness significantly, enabling it to look beyond the borders of Hong Kong to find new business opportunities. With the opening up of the Mainland market and the need for extensive infrastructural development there, huge market opportunities lie at our doorsteps. To capture these opportunities and to compete successfully, our construction industry must move swiftly forward with its reform programme.

7.56 Our construction industry has a proven record in the development and implementation of large-scale infrastructure and building projects. It has amassed considerable expertise in project planning, contract management and works procurement, which can be exported. Given the geographical proximity, the Mainland market is a prime target for exporting our construction services and expertise. Compared with overseas competitors, Hong Kong companies in the construction field have an advantage in terms of knowledge of doing business with the Mainland, cultural and linguistic affinity as well as access to project financing facilities. We should capitalise on these strengths. At the same time, industry participants should proactively build up their understanding of the construction system and practices as well as market opportunities in the Mainland. They should also market more vigorously their expertise to Mainland clients and overseas investors interested in establishing a presence in the Mainland.

7.57 We consider that Hong Kong has strong potential to develop into an infrastructure service integrator for the Mainland market. By combining our expertise in accounting, financing and legal services with our construction expertise, we can provide a comprehensive service package to Hong Kong and foreign clients undertaking construction works in the Mainland. With a foothold in the Mainland market and a better understanding of the complementing capabilities of our counterparts in the Mainland, local industry participants could

also explore the feasibility of teaming up with Mainland companies to secure business opportunities elsewhere. We have taken note of recent efforts made by the Works Bureau and the Hong Kong Trade Development Council in promoting the export of Hong Kong's construction services to the Mainland market and elsewhere. These efforts are timely and should be strengthened. We recommend that the Government, the Hong Kong Trade Development Council, the industry, together with other relevant professional sectors in Hong Kong, should critically examine the strategy and action plan for more proactive promotion of our construction services in other markets.

Chapter 8

A Safer Workplace and an Environmentally Responsible Industry

8.1 Despite its importance to Hong Kong's social and economic development, the construction industry has a poor image : it is dangerous and polluting. Although significant improvement has been made in the safety performance of the construction industry in recent years, our site accident rate remains unacceptably high. Construction sites are also generally regarded as bad neighbours, producing excessive noise disturbance and dust pollution, dirty site run-off and a large amount of construction and demolition waste. These problems call for rectification in their own right. The industry also needs to improve its safety and environmental performance in order to project a better image of itself as a socially responsible industry. If these problems are left unaddressed, the industry will find it increasingly difficult to attract and retain talent. This will seriously affect the long-term healthy development of the industry.

8.2 We should point out at the outset that a project's safety and environmental performance is part and parcel of overall project performance and is reflective of the effectiveness or otherwise of project management. We observe that in general, the construction industry's performance in site safety and environmental protection is hampered by the following factors –

(a) fragmentation of the project delivery process which inhibits a comprehensive approach in handling site safety and environmental issues arising from project implementation;

(b) unrealistically low contract prices and excessively accelerated

delivery programmes, leading to inadequate attention being given to safety and environmental considerations;

(c) non-value adding multi-layered subcontracting and lax site supervision, which result in ineffective site management; and

(d) low awareness of safety and environmental issues within the construction workforce, and reluctance of senior management to commit resources to tackle these issues.

8.3 In the previous chapters, we have recommended a number of improvement measures which seek to promote an integrated approach to construction and project management, build up a professional workforce, encourage the adoption of quality-oriented procurement strategies, enhance the effectiveness of site supervision, and encourage wider use of modern construction technologies and IT. If implemented, these measures would help to build up a quality culture in the industry and would provide a conducive environment for the successful implementation of the more specific improvement measures set out in this chapter to enhance safety and environmental performance of local construction.

I. A Safer Workplace

8.4 We note that the Education and Manpower Bureau, the Labour Department, the Occupational Safety and Health Council, the Construction Industry Training Authority and public sector clients have devoted considerable efforts during the past decades to lift the safety performance of local construction through various legislative and administrative measures, including –

(a) statutory controls over potentially hazardous construction activities and processes;

(b) safety training;

(c) promotion and publicity; and

(d) safety programmes for public sector projects.

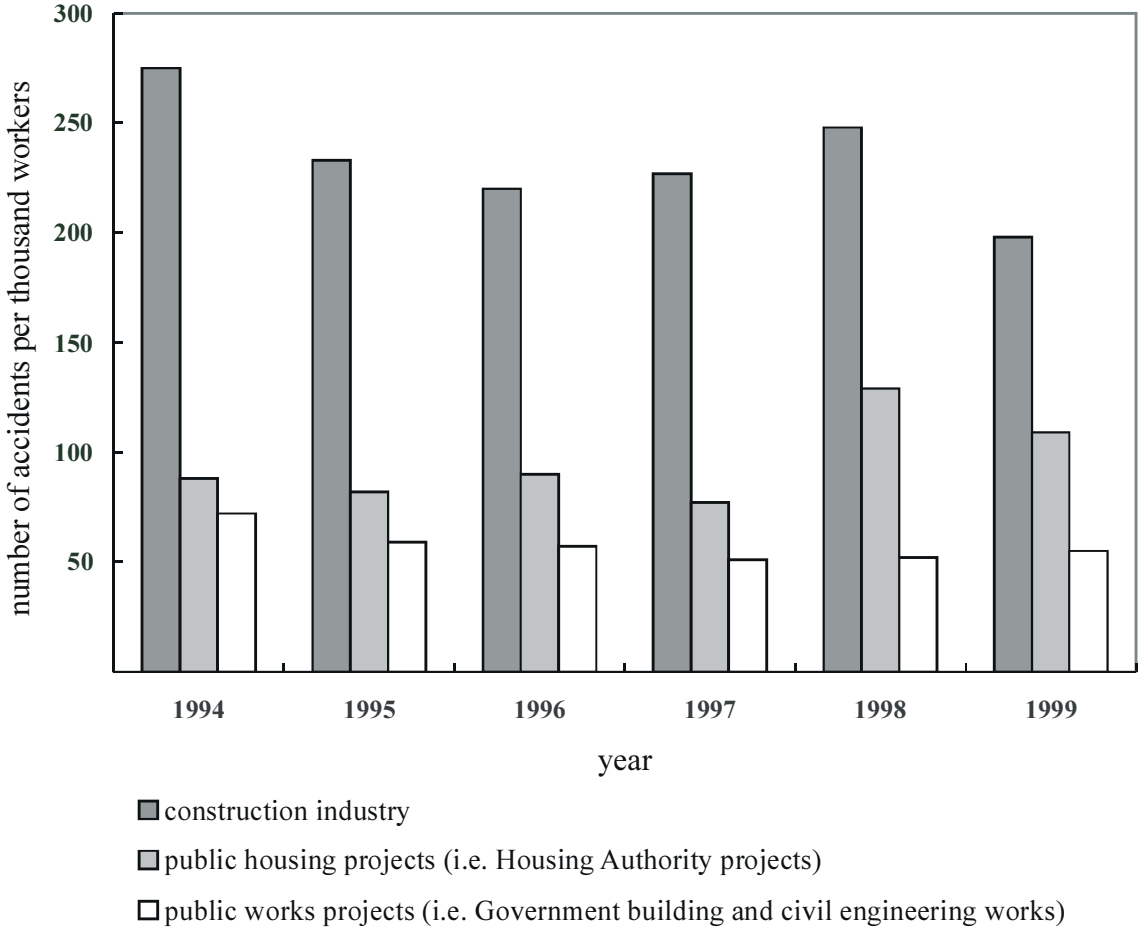
These measures have resulted in an improvement in the overall site accident rate from 374 per 1 000 workers in 1989 to 198 per 1 000 workers in 1999.

8.5 For public housing projects, the site accident rate has almost halved from 206 accidents per 1 000 workers in 1989 to 109 accidents per 1 000 workers in 1999, reflecting better performance than private sector projects. For public works projects, the implementation of safety management systems since the early 1990s and the subsequent introduction of the Considerate Contractors Site Award Scheme [27], the Pay-for-Safety Scheme [28] and the Independent Safety Audit Scheme[28] have brought a steady improvement in the site accident rate from 72 per 1 000 workers in 1994 to 55 per 1 000 workers in 1999. Chart 8.1 below compares the respective site accident rates for the construction industry, public housing projects and public works projects.

[27] The Considerate Contractors Site Award Scheme was introduced in 1995 for voluntary participation. Participating contractors are required to demonstrate that they maintain a safe and healthy environment in order to be eligible for an award. The scheme was extended to cover private sector sites in 1997.

[28] The Pay-for-Safety Scheme (PFSS) was introduced in 1996 with the aim of removing site safety considerations from competitive bidding. Fixed sums are included in the bill of quantities as payment to the contractor for complying with safety management-related elements. Payment is made according to interim valuations after compliance has been certified. The total amount included in the safety items is about 2% of the estimated contract sum, but may vary between projects depending on the project nature. The Independent Safety Audit Scheme (ISAS) was introduced in 1996. Safety audits are carried out on a quarterly basis by independent safety auditors. The ISAS and the PFSS operate in parallel, and the contractor is paid only if the audit scores are 70% or above. If the audit score is below 60%, the contractor not only receives no payment but is also given an adverse performance report which can affect future tendering opportunities.

Chart 8.1 : Site accident rates for the construction industry, public housing projects and public works projects in 1994 to 1999



Source : Labour Department

8.6 Notwithstanding the steady improvement in site safety in recent years, the accident rate for local construction is very high compared to other industries. In 1999, the accident rate per 1 000 employees in all industrial undertakings was 55.1, far below the overall construction site accident rate. Of all industries, the construction industry is amongst the most dangerous. In 1999, about 39.1% of our industrial accidents were related to the construction industry which employed about 71 000 site workers, 34.9% to catering which employed 188 000 workers and 15.3% to the manufacturing industries which employed 248 000 workers. There is clearly room for improvement. But we should point out that the current methodology adopted by the Labour Department for calculating the overall construction site accident rate (see details at Annex F) may

have over-represented the actual accident rate involving site workers.

Methodology for collating construction safety statistics

8.7 We observe that at present, while the number of construction site accidents included in the overall construction site accident rate (i.e. the numerator of the accident rate) covers practically all reportable accidents that occur on construction sites, minor works sites as well as maintenance and interior decoration sites, the number of construction workers taken into account (i.e. the denominator of the accident rate) is confined to construction workers working on construction sites, but not workers engaged in village-type housing construction works or minor repair, maintenance and renovation works. Moreover, the accident figure has captured accidents involving site personnel of all ranks, not just construction workers. Thus, there is a very high likelihood that the overall site accident rate referred in paragraph 8.4 above has presented a worse picture of the safety performance of the construction industry as a whole than is actually the case. In comparison, the site accident rates for pubic works projects and public housing projects are more reliable since they are calculated on the basis of the number of reportable accidents which have occurred on those sites and the corresponding number of workers or man-hours worked on such sites.

8.8 In seeking better performance in site safety in local construction, it is important to have an objective measure of the progress made so that we can refine our action strategy as necessary. In view of the shortcomings of the existing methodology for calculating the overall site accident rate for the construction industry, we recommend that the Labour Department should review the methodology as a matter of urgency, with a view to developing a more reliable mechanism for calculating the site accident rate. We also call upon all industry participants to report site accidents honestly with all necessary information so as to assist the Labour Department in its task. The objective is to develop an effective management tool for progress monitoring and for benchmarking purposes.

Improved safety performance

8.9 Site safety is a shared responsibility of the regulator, employers and employees. Legislation is necessary to stipulate the minimum site safety standards for construction activities. In Hong Kong, a comprehensive set of legislation, in terms of both scope and content, has been put in place to deal with site safety matters. There is also a shift from a prescriptive and punitive approach to a modern preventive approach with an emphasis on hazard management and risk assessment. We endorse such a development. But a sound regulatory framework by itself will not bring about breakthroughs in the safety performance of local construction.

8.10 We need to foster a safety culture within the industry at all levels. Senior management must demonstrate strong commitment and support to achieving continuous improvement in site safety performance beyond meeting the minimum statutory requirements. Adequate attention must be paid at the design stage to forestall possible safety hazards which may arise during construction. Site management personnel must acquire the necessary knowledge and expertise so that they will be able to tackle site safety as an integral part of site management. We must also raise awareness among construction workers of safety hazards on site and urge them to take responsibility for their personal safety. In pursuit of these objectives, we recommend a four-pronged approach targeted at the following areas –

(a) designing for construction safety and integrated management;

(b) safety promotion and training;

(c) incentives for sound safety management; and

(d) enhanced enforcement.

Details are set out in paragraphs 8.11-8.24 below.

Designing for construction safety and integrated management

8.11 To achieve better site safety performance, we should place emphasis on hazard identification and mitigation. This should start from the design stage and be carried through subsequent phases of project development and implementation. We have studied the UK's experience in this regard, with particular reference to the Construction (Design and Management) Regulations 1994. These Regulations cover all parties involved in the construction process who can contribute to the avoidance, reduction and management of health and safety risks (including the client, the planning supervisor, the designer, the principal contractor and other contractors). Each duty holder has a clearly specified role as set out below –

(a) Client– The client must be satisfied that only competent persons are employed as the planning supervisor, the designer(s) and the principal contractor. He must also be satisfied that sufficient resources, including time, have been or will be allocated to enable the project to be carried out in compliance with health and safety laws;

(b) Planning supervisor – This is a new position required by the Regulations with an overall responsibility for co-ordinating the health and safety aspects of the planning and design phases. The planning supervisor ensures that a pre-tender health and safety plan is prepared, monitors the health and safety aspects of the design, advises the client on the satisfactory allocation of resources for health and safety, and prepares a health and safety file;

(c) Designer – The designer is required to design in a way which forestalls, reduces, or controls risks to health and safety as far as is reasonably practicable so that the projects he designs can be constructed and maintained safely. Where risks remain, they have to be stated to the extent necessary to enable reliable performance by a

competent contractor;

(d) Principal contractor – The principal contractor is required to take account of the specific requirements of a project when preparing and presenting tenders, take over and develop the health and safety plan, co-ordinate the activities of all contractors and subcontractors and ensure that they comply with relevant health and safety legislation and with the developed health and safety plan; and

(e) Contractor – Contractors and subcontractors are required to co-operate with the principal contractor and provide the latter with details on the management and prevention of health and safety risks created by their work.

Through teamwork, all duty holders work together to improve health, safety and welfare standards on construction sites and for maintenance and repair works which take place post-completion through systematic safety management from the project onset.

8.12 We consider that the concept of a preventive approach through improved hazard management by all key players in a co-ordinated fashion throughout the project delivery process should be more widely promoted locally. But we note from the experience of the UK that successful implementation of this concept would hinge on a general acceptance among the duty holders of the need for a more proactive approach to mitigating site safety risks and sufficient expertise among the duty holders to discharge their statutory responsibilities. We consider that as a whole, the construction industry in Hong Kong has not progressed to this stage yet. A step-by-step approach is, therefore, preferred.

8.13 Under the Factories and Industrial Undertakings (Safety Management) Regulation which will enter into force in stages from early 2001, contractors are required to develop, implement and maintain a safety management system as well as to appoint safety auditors/review officers to

audit/review their safety management systems periodically and make recommendations for improvement as appropriate. This Regulation provides a structured approach to managing safety and health at construction sites and will help to lay the foundation for the implementation in due course of practices and requirements in line with the spirit of the UK's Construction (Design and Management) Regulations. We recommend that we should allow time for the construction industry to get used to the requirements under the Factories and Industrial Undertakings (Safety Management) Regulation and that the Government should review the need for introducing legislation similar to the UK Regulations in five years.

8.14 Meanwhile, ahead of putting in place statutory requirements, clients and industry participants should be encouraged to adopt on a voluntary basis the good practices currently mandated in the UK. We recommend that the Works Bureau and the Housing Authority should take a lead in this direction by incorporating practicable features of the UK's Construction (Design and Management) Regulations into the safety planning and management systems for public works projects and public housing projects. We further recommend that to promote the concept of designing for safe construction and maintenance works, industry bodies, professional institutions and the local research community should collaborate in the preparation of a code of practice or a guide to assist design professionals in evaluating safety risks and hazards, and to provide guidelines on known hazardous activities and procedures on site, safe work sequences, precautionary measures and determination of reasonable time-frame for the safe conduct of construction activities, etc.

8.15 Site safety is an integral part of site management responsibility. However, we observe that probably as a result of the statutory requirement for the engagement of safety officers on construction sites, site safety issues are sometimes handled separately with little interaction with other aspects of site management. Such a fragmented approach has to change. We recommend that integrated management systems should be more widely promoted to firmly establish that site safety is an integrated part of line managers' overall site

management responsibility.

Safety promotion and training

8.16 We need to build up a new safety culture in the construction industry with a greater emphasis on personal responsibility and self-regulation as opposed to relying primarily on legislative sanctions. To facilitate the envisaged change in attitude and to empower industry participants to approach site safety matters in a more proactive manner, we recommend that safety training and promotional efforts should be strengthened in the following manner –

(a) For construction professionals, education on safety issues, principles and techniques should be an integral part of the undergraduate curriculum and continuing professional development programmes;

(b) Line managers and supervisors at construction sites should receive appropriate training on site safety to enable them to perform an effective management role;

(c) Safety officers in the construction industry who have been trained as general safety officers should be required to receive training more specifically related to construction safety before working on site;

(d) Site-specific safety briefings and training should be more widely promoted. Major clients (including the Works Bureau and the Housing Authority) should take a lead in requiring their contractors to conduct such training for their teams. Assistance should be provided to contractors and subcontractors on how to develop and conduct in-house safety training; and

(e) Green card safety training for construction workers should be enhanced by including hands-on training and impressing on workers

the disastrous consequences of site accidents. More advanced safety training should be provided to construction workers to enhance their awareness and knowledge of safety issues now that the majority of them have received the basic green card training. The safety content in skill testing should also be increased.

Incentives for sound safety management

8.17 To foster a safety culture in the construction industry, senior management must demonstrate commitment to achieving better safety performance and make available the necessary resources to achieve this goal. We look to the top management of major public and private sector clients to drive further improvements in safety performance through procurement and contractual arrangements. They could, for instance, state at the outset their expectations of the safety performance of their contractors; contractually require their contractors to clearly specify the safety responsibilities of respective personnel and require all on-site professional, managerial and supervisory staff employed by these contractors to undergo appropriate safety training; and sanction those contractors with a poor safety performance record by reducing their tendering opportunities or their chance of bidding successfully.

8.18 We note that in Japan, accidents are reported to the Ministry of Health, Labour and Welfare which also administers the employees' accident compensation insurance scheme. If no fatal or major accidents are reported under a contract, the contractor concerned will receive a certificate of no accident and a concession of about 30% in the insurance premium for the next contract. These measures provide a financial incentive for contractors to strive for a clean safety record. Having regard to Japan's experience, we recommend that the Labour Department should work with the construction industry and the insurance industry to explore the feasibility of developing incentive schemes in construction insurance policies similar to "no-claim" bonus commonly used in vehicle insurance so as to encourage contractors to maintain consistently good safety performance. The proposal to charge contractors with a poor safety

performance record a higher insurance premium would also help the insurance industry to run a more viable business in the provision of employees' compensation insurance for the construction industry.

8.19 We are aware that at present, there are a number of award schemes, some organised by public authorities and some by major clients, to give recognition to contractors who have performed strongly in site safety. To avoid duplication of efforts and to give the event a higher public profile, we recommend that interested organisations should work together to set up a co-ordinated safety award to motivate the senior management of client organisations and contractors to compete for excellence in this important aspect of construction performance. The industry co-ordinating body which we recommend in Chapter 9 of the report to be set up to deal with pan-industry strategic issues is well positioned to take up this task.

Enhanced enforcement

8.20 We consider the existing statutory framework for site safety sufficiently comprehensive at this stage. To improve on it, we support the Labour Department's intention to transform prescriptive provisions in our laws to performance-based ones so as to allow stakeholders flexibility to adopt the best solutions for identified safety risks and hazards. At the same time, the regulatory authority should assist the industry in compliance by preparing practice notes and guidelines on measures regarded as meeting the statutory requirements.

8.21 We support the Labour Department's current approach in targeting known poor performers in its enforcement action. To strengthen the deterrent effect of its enforcement action, we recommend that the Labour Department should be more vigilant in taking enforcement action against those sites with unacceptably poor accident records and blatant offenders of statutory safety requirements.

8.22 Currently, the Factories and Industrial Undertakings Ordinance and

its subsidiary legislation state that where more than one contractor operate on the site, the principal contractor is held liable for offences committed on that site. We observe that in practice, this may, in some circumstances, absolve the offending subcontractors from their responsibilities. To establish clear accountability and to mete out sanction where it is due, we recommend that the relevant provisions should be amended to enable prosecution action to be brought against subcontractors for non-compliance with safety requirements in operations under their direct control.

8.23 We also observe that the regulatory authority currently encounters much difficulty in prosecuting workers who do not comply with statutory site safety requirements because employers are unwilling to confirm the concerned workers' identities and their employment status. To encourage construction workers to take responsibility for their personal safety, we urge contractors and subcontractors to co-operate with the Labour Department in taking enforcement action against non-compliant workers.

8.24 As a further step to ensure that project management is fully committed to site safety, we recommend that the Buildings Department should consider initiating disciplinary action against Registered General Building Contractors and Registered Specialist Contractors for blatant negligence leading to serious site accidents or for poor site safety performance below a certain benchmark. We also recommend that the Buildings Department and the Labour Department should co-ordinate the requirements for the Site Supervision Plan System mandated under the Buildings Ordinance and the Safety Management System under the Factories and Industrial Undertakings (Safety Management) Regulation to facilitate compliance efforts.

II. An Environmentally Responsible Industry

8.25 The construction industry has a major impact on our environment. Construction activities are the source of many environmental problems such as noise, air and water pollution, solid waste and land contamination. Moreover,

built structures consume a lot of energy and natural resources both during their construction and subsequent occupation. To improve the environmental performance of the construction industry, we need to devote more effort to the proper management of various environmental issues arising from the design, construction and operation phases. The objective is to achieve a healthier living environment and better quality of life for the community at large through a more sustainable approach to construction.

8.26 Sustainable construction is a global trend. In brief, sustainable construction refers to construction activities whose negative impacts are minimised and positive impacts maximised so as to achieve a balance in terms of environmental, economic and social performance. Examples of sustainable construction include –

(a) refurbishment of existing buildings;

(b) restoration of historical buildings;

(c) use of non-depletable and recycled construction materials;

(d) reduction of construction and demolition waste;

(e) reduction of energy consumption in buildings; and

(f) provision of healthy, safe and pleasant built facilities.

8.27 We note that the Government is taking active steps to tackle many environmental issues arising from construction . But on the whole, these efforts are rather fragmented and tend to be organised by reference to the established functional distribution of responsibilities among policy bureaux and departments without a central steer. For instance, the Environment and Food Bureau, assisted by the Civil Engineering Department and the Environmental Protection Department, focuses on minimising the environmental nuisances generated by

construction activities through statutory control over noise, air and water pollution and through reduction of construction and demolition material. The Planning and Lands Bureau and the Buildings Department have recently embarked on an initiative to promote excellence in the environmental performance of private buildings from the building design perspective. Energy efficiency of buildings and indoor air quality issues, on the other hand, are dealt with by the Environment and Food Bureau and the Electrical and Mechanical Services Department. To achieve the objective of sustainable construction and to maximise the impact of the efforts made by individual bureaux and departments, better co-ordination among the regulators is called for.

8.28 Apart from the regulators, clients, designers, contractors, suppliers and occupiers will also need to act in concert and show firm commitment to achieving better environmental performance. Each of them has an important role to play in the delivery of sustainable construction as explained below –

(a) Clients – They have a key role to play in promoting sustainable construction. For instance, they can decide whether a new building is required or whether refurbishment or extension of an existing building will be sufficient. Clients can also make a contribution by ensuring that sustainable construction methods and features, such as use of environmentally friendly materials and specification for low energy consumption, are included in the design at the outset;

(b) Designers – Designers can help to ensure that environmental issues are considered throughout the design process, that sustainable materials and construction methods are chosen, and that high environmental standards pertain in the built facilities;

(c) Contractors – Contractors can contribute towards sustainability by adopting environmentally friendly construction methods and by planning their work to efficiently eliminate waste to the maximum extent possible;

(d) Suppliers – Suppliers can contribute by assuring their customers that the products they supply will have little or no impact on the environment over their whole life-cycle; and

(e) Occupiers – Occupiers can make a contribution by ensuring that buildings are used efficiently and maintained properly.

8.29 Sustainable construction is an integral element of the broader subject of sustainable development. Efforts to promote sustainable construction in Hong Kong would stand a better chance of success if there was a general appreciation of the need for sustainable development and a firm commitment to this cause. We recommend that in order to improve the environmental performance of local construction, we should first and foremost develop a coherent policy framework that anchors the concept of sustainable construction firmly in the context of sustainable development. We should also seek to build up a broad base of public support by ensuring that the need for sustainability is more widely understood in the community.

8.30 In paragraphs 8.31-8.50 below, we shall address more specific environmental concerns pertaining to local construction under the following headings –

(a) life-cycle costing;

(b) greener and more energy efficient designs;

(c) abatement of environmental nuisance during construction;

(d) reduction and management of construction and demolition material; and

(e) environmental assessment schemes and environmental management systems.

Life-cycle costing

8.31 Conventionally, in evaluating construction procurement options, the focus is on the initial capital cost of acquisition. Much less attention is given to the cost of operation and maintenance of the built structure in the long run. Increasingly, this approach is found inadequate and in many overseas economies, the concept of life-cycle costing is gaining importance.

8.32 Life-cycle costing refers to the systematic consideration of all relevant costs and revenues associated with the acquisition and ownership of an asset. It is a method of economic analysis used for comparing different development or procurement options on the basis of their respective total lifetime costs, i.e. the sum total of the initial capital or procurement costs and a projection of all future maintenance and operating costs that would be incurred in actual use. The objective of applying this analytical tool is to arrive at an optimal option at each decision stage of the procurement process which takes into account the total cost over the whole project life. With a systematic evaluation of the long-term costs, it becomes possible to determine whether a higher initial cost is justified and to identify whether changes are necessary during the design and construction stages to achieve better cost-effectiveness in subsequent management and maintenance stages. The major benefits derived from the application of life-cycle costing are –

(a) minimising operating costs and hence maximising productivity in a commercial building and minimising living costs in a residential building;

(b) minimising maintenance, repair and replacement requirements and hence enhancing end-user satisfaction; and

(c) minimising waste and energy consumption which is critical to the achievement of sustainable construction.

8.33 In view of the envisaged benefits, we recommend that major clients, in particular the works departments and the Housing Authority, should take a lead in practising the concept of life-cycle costing through, for example, formulation of guidelines for reference by project staff, setting appropriate specifications for the components used for their built structures and giving due recognition to life-cycle costs in assessing tenders. Noting that the concept of life-cycle costing is fairly new in Hong Kong, we recommend that the professional institutions and the local research community should work together on the development of assessment tools and databases, e.g. costing models and tools for calculating life-cycle costs, a database on the life-cycle costs and performance of materials and components, and a common set of accepted performance-based specifications for materials and components. For private buildings which are intended for sale, developers' immediate concern is to recoup their financial investments as quickly as possible. There is little interest in the life-cycle costs of the built structure as long-term maintenance becomes the responsibility of the end-user. In order to promote more durable and maintainable buildings, and generally to enhance built quality, we support the proposal recently put forward by the Task Force on Building Safety and Preventive Maintenance that defects liability warranty for new buildings should be strengthened[29].

Greener and more energy efficient designs

8.34 As pointed out in earlier parts of the report, the design stage is a critical stage which sets the parameters for many downstream activities and in many ways determines the final outcome of the project. Proper consideration given to relevant factors at this stage will give the widest scope for better project performance. To enhance the environmental performance of the project during the construction phase and post-commissioning, we need to give due consideration to various issues such as the life-cycle costs, buildability,

[29] The Task Force on Building Safety and Preventive Maintenance has proposed that developers should provide safe and sound buildings and help to lay a firm foundation for future management and maintenance by strengthening defects liability warranty for new buildings to guard against, for instance, structural defects for ten years, scheduled defects (e.g. leakage, seepage or concrete spalling) for five years and workmanship-related defects for two years.

maintainability, repairability, upgradability, choice of materials and their recyclability, construction methods, energy efficiency, and users' health and comfort before the design is finalised. This calls for closer co-operation among design team members from different disciplines (e.g. architects, structural engineers, civil engineers and building services engineers) to facilitate the development of well-considered design solutions. Failure to address these environmental issues at the design stage would significantly minimise the benefits to be derived. For instance, the use of metal formwork instead of timber formwork and the wider adoption of prefabrication, standardisation and modular designs are strongly supported from an environmental perspective. But to implement these construction methods and techniques successfully, the design will need to take full account of their use.

8.35 To drive the construction industry to give more emphasis to sustainability, we need a regulatory framework which encourages innovative, green construction, a market demand for green designs as well as enhanced knowledge of the environmental performance of different construction technologies and materials. We fully support the initiatives taken by the Buildings Department during the past year to modernise and liberalise building rules and regulations and to fast track the approval of building plans with green design elements. To encourage developers to respond positively to the Buildings Department's initiatives, we recommend that as a matter of policy, the Government should exempt extra floor areas required for the installation of green features and facilities from the calculation of gross floor area, and provide additional gross floor area necessary to offset the extra cost incurred in the use of green construction methods and materials as well as the provision of building services, devices and systems which would improve the environmental performance of a building. The latter incentive should also apply to cases where a developer proposes to set back his building at street level for trees and greenery or provide a roof garden for common use. We further recommend that no premium should be charged for modifying existing restricted leases for the provision of green features (particularly, balconies, noise barriers and extra space for prefabricated external walls) and that the processing time for such lease

modification should be kept to the absolute minimum. The above measures would, in our view, effectively create momentum in the local market place for the construction of green buildings.

8.36 In the long run, these green initiatives will only be sustainable if there is sufficient market demand for structures built according to these principles. Education of the end-users is thus important. There is no better way to bring home the benefits of an environmentally friendly design than giving end-users the opportunity of living in such an environment. The Housing Authority, being the biggest home-provider in Hong Kong, is well-positioned to take up this role and we recommend that it should take a lead in the wider use of green designs in its housing estates. We also strongly encourage progressive developers in the private sector to see their proactive engagement in this area to be essential to business success.

8.37 For decades, due to high land costs, the designs for private building projects tend to focus on economic use of space to maximise the plot ratio and the gross floor area. To encourage a change of culture and mindset among design professionals, more studies are required on the environmental performance of different construction methods, the properties and availability of environmentally friendly building materials, as well as more advanced predictive design tools (e.g. computer modelling) to enable designers to compare alternative design options. We recommend that stakeholders and the local research community work together to develop these tools and to build up a knowledge base for local design professionals.

8.38 As far as energy efficiency of buildings is concerned, we note that the Electrical and Mechanical Services Department has introduced a number of measures to promote public awareness of energy efficiency and wider adoption of energy efficient designs, e.g. promulgation of the Building Energy Codes[30], the

[30] The Building Energy Codes are voluntary codes of practice published by the Energy Efficiency Office of the Electrical and Mechanical Services Department. At present, there are four codes, providing guidelines for implementing energy-efficient lighting, air-conditioning, electrical, and lifts and escalators installations.

Hong Kong Energy Efficiency Registration Scheme for Buildings[31], etc. We recommend that the Electrical and Mechanical Services Department should work closely with the Buildings Department in implementing the latter's recent initiatives on greener buildings so as to achieve better synergy in their parallel efforts. To encourage more energy efficient designs, we recommend that more efforts should be devoted to the development and dissemination of guidelines and design tools for analysing the energy consequences of design options, also with the involvement of the local research community. In addition, guidelines targeted at clients and occupiers should be developed to help them assess the life-cycle energy cost of construction and to carry out self-audits of energy consumption.

Abatement of environmental nuisance during construction

8.39 Construction sites are frequently criticised for causing nuisance to their neighbours. Environmental nuisances arising from construction activities include noise pollution, dust emission, contamination by wastewater and muddy runoffs, and improper disposal of chemical waste. Convictions for environmental offences in 1999 involving construction activities increased by about 40% over 1998 to 633 cases, with convictions on noise pollution topping the list (about 42%). In the same year, there were altogether 3 660 complaints against the construction industry of non-compliance with environmental protection requirements, representing an increase of 9% over 1998. Complaints against noise pollution accounted for about 65% of all complaints. The situation calls for urgent attention.

8.40 The construction industry must substantially improve its environmental performance. In seeking to achieve this objective, the industry needs to tackle a number of inherent constraints, including tight construction programmes, inadequate consideration of environmental issues at the design

[31] The Hong Kong Energy Efficiency Registration Scheme for Buildings, launched in 1998, is a voluntary implementation of the Building Energy Codes and is open to application for all types of new and existing building. All building developers, architects, property management agencies and other parties involved in the building and construction industries are encouraged to participate in the scheme. A registration certificate will be issued to the successful participants, who are allowed to use the Energy Efficient Building logo in documents related to the registered buildings for publicity.

stage, congested site conditions and insufficient knowledge of practical solutions to meet the statutory requirements, so as to improve compliance with the requirements of the existing environmental legislation.

8.41 We advocate elsewhere in the report the adoption of a more integrated approach to construction, more realistic project programming and thorough consideration of relevant factors during the design stage. These measures would all contribute towards minimising environmental nuisances which arise during the construction stage. We recommend the following additional specific measures to bring about better results –

(a) Clients should give appropriate weight to the environmental performance of contractors in tender assessment and ongoing performance assessment. They should also consider allowing a separate account in construction contracts for measures taken to address pollution prevention and control during the construction stage, which will be withheld from payment in case of non-compliance with environmental requirements. We urge public sector clients to take a lead in adopting these measures;

(b) Contractors should be encouraged to employ dedicated personnel on-site to assist line managers in managing the environmental aspects of construction activities, adopt environmental management systems described in paragraphs 8.49-8.50 below to systematically identify the environmental impacts arising from construction, and take appropriate steps to mitigate any adverse impact; and

(c) The Environment and Food Bureau and the Environmental Protection Department should, as a matter of priority, conduct a regulatory impact assessment on the cumulative impact of the environmental legislation on the construction industry vis-à-vis the community. The Environmental Protection Department should develop a service culture and work in partnership with the

construction industry to improve the latter's environmental performance. In this connection, we urge the Environmental Protection Department to compile and disseminate information on good environmental practices and provide practical guidelines to assist contractors in complying with statutory requirements and in seeking better performance beyond the minimum requirements of the law.

Reduction and management of construction and demolition material

8.42 Construction and demolition (C&D) material is a mixture of inert and organic materials arising from clearance, excavation, construction, refurbishment, renovation, demolition and road works. The inert C&D material can be reused in public filling areas and site formation works. The remaining materials are C&D waste, comprising plastic, bamboo and packaging materials. They are often mixed and contaminated, and are not suitable for reuse or recycling. Thus, they have to be disposed of at landfills. There has been a year-on-year increase in the amount of C&D material produced locally. In 1999, the construction industry produced 7.52 million cubic metres of C&D material. Of this, about 79% was reused in public filling areas and the remaining 21% (a mixture of public fill and C&D waste) was disposed of at landfills. This accounted for about 44% of the total solid waste disposed of at landfills.

8.43 A number of factors account for the current unsatisfactory state. They include : lack of public filling areas for disposal of inert C&D material due to public sentiments against reclamation projects, mismatch of supply and demand for public fill, inadequate provision of off-site facilities for sorting of C&D material before disposal, lack of suitable sites for setting up public fill barging points, insufficient reuse and recycling of C&D material, and inadequate efforts to tackle waste reduction at source.

8.44 To successfully tackle the problem, we must reduce the generation of waste at source. Our recommendations to encourage the wider adoption of a

manufacturing approach to construction through the use of metal formwork, prefabrication, and standardised and modular components would minimise the extent of wet trade work to be carried out on site and the waste generated by such activities. We note the Government's plan to introduce charges for waste disposal facilities (such as landfills) to encourage contractors to look for more economic and environmentally friendly means to handle construction waste. We support the implementation of such charging schemes to motivate contractors to separate and sort C&D material or to seek alternative disposal outlets. In parallel, the Government should support the industry's effort by identifying and providing suitable sites for –

(a) temporary and permanent off-site sorting facilities;

(b) temporary and permanent barging points for public fill;

(c) setting up of "fill banks" for stockpiling surplus fill materials; and

(d) establishing recycling and prefabrication facilities.

8.45 We further recommend that public sector clients should take a lead in the wider use of recycled materials (such as recycled aggregate and reclaimed bituminous material) in their projects. The general specifications for public works projects and public housing projects should be suitably revised to facilitate this. Pilot projects or trial projects should be carried out to ascertain feasibility and to resolve any technical issues. More durable buildings would also help to minimise the generation of demolition materials. In this connection, we note recent action taken by the Government to educate and encourage building owners to take better care of their properties. This is a step in the right direction and we support this in principle. We also recommend that the Government should consider appropriately extending the incentive scheme intended to promote the construction of new buildings that are environmentally friendly (see paragraph 8.35) to also cover existing buildings. This measure would encourage the upgrading of existing buildings and an urban renewal process by private

initiatives.

Environmental assessment schemes and environmental management systems

8.46 Environmental assessment schemes for buildings and environmental management systems provide a systematic basis to tackle various environmental issues arising from construction. We have examined their potential merits in tackling the environmental challenge.

8.47 The Hong Kong Building Environmental Assessment Method[32] (HK-BEAM) was initiated by the private sector in 1996 as a voluntary certification scheme which gives recognition to improved environmental performance in building design and management. The scheme seeks to promote environmentally friendly buildings, minimise adverse environmental impacts, encourage best practices in design and management, set industry standards, provide market recognition for improved environmental performance, and ensure the integration of environmental features into building design and management. We support these principles.

8.48 Noting that the Buildings Department is currently working on the criteria for assessing the environmental merits of building designs for the purpose of granting incentives, we recommend that the Buildings Department and other industry participants should work together on a common, comprehensive assessment scheme with appropriate incentives (e.g. in the form of financial incentives and/or public recognition) for local use, capitalising on the work that has gone into the formulation of HK-BEAM, the Hong Kong Energy Efficiency Registration Scheme for Buildings administered by the Electrical and Mechanical Services Department and similar assessment schemes. To facilitate

[32] The scheme defines in detail objective criteria for assessing buildings on a wide range of environmental issues (including global, local and indoor issues) relating to design, operation, maintenance and management. After initial assessment, a participant building will undergo a provisional evaluation which awards credits to areas where the established criteria have been met and suggests improvement options for areas where better performance can be achieved. After a final assessment, the environmental performance of the participant building is recognised through the issue of a HK-BEAM certificate, which features a qualitative rating on overall performance. At present, HK-BEAM covers only new and existing air-conditioned office buildings, and new residential buildings. Consideration is being given to extend the scheme to other types of building.

application and to encourage continuous improvement, we recommend that the assessment scheme should cater for different building types and that separate scores could be given for different environmental aspects.

8.49 We have also studied the potential benefits of environmental management systems, such as the ISO 14001 international environmental management standards, in enhancing the environmental performance of the construction industry. We note that ISO 14001 is essentially a management system standard which provides a general framework for organising the tasks necessary for effective environmental management without, however, setting specific environmental goals. ISO 14001 certification is a demonstration of an organisation's commitment to environmental protection, but may fall short of securing concrete environmental benefits. Experience also suggests that in some instances, in conforming with the documentation requirement mandated by ISO 14001, an organisation may create excessive paperwork which detracts from the management efforts needed for achieving the goal of improved environmental performance.

8.50 Having regard to local circumstances, we consider that the immediate priority is to foster the management's commitment to achieving various environmental objectives and to educate industry participants on practical means to tackle various environmental issues arising from the project delivery process. We encourage the voluntary adoption of ISO 14001 by committed industry participants. But mandatory ISO 14001 certification should preferably be considered at a later stage when the construction industry has acquired more expertise in tackling the environmental challenge.

Chapter 9

Institutional Framework for Implementing the Change Programme

9.1 In the previous chapters, we have made recommendations on a package of specific improvement measures to uplift the all-round performance of the construction industry. In drawing up these measures, we have taken full account of the problems and difficulties faced by the industry today, while at the same time maintaining a clear vision of the promising future held out for the industry if it continuously upgrades itself. Our construction industry now stands at a critical turning point. Changes of an unprecedented scale are lying ahead. The Government, industry and the community have a shared interest in the successful transformation of the construction industry. To steer the change programme forward and to sustain the forces of change throughout the construction value chain, we need committed leadership, a common purpose among all stakeholders and an institutional framework that enables all concerned parties to act in concert in order to advance the collective interests of the construction industry.

9.2 Fragmentation has hitherto reinforced the integrity of individual disciplines and sectors within local construction and foiled co-operation across boundaries. Fragmentation has also inhibited learning sharing with the result that while the industry boasts of many isolated examples of outstanding achievements, it has not been able to build on these successes to elevate its overall standards. We need an environment without these inhibitions to enable the industry to progress and to realise its full potential.

Co-ordination within the Government

9.3 The Government's interaction with the construction industry can broadly be defined through its following roles –

(a) Government as a regulator;

(b) Government as a client; and

(c) Government as a promoter of the industry.

Government as a regulator

9.4 A host of bureaux and departments exercise statutory and regulatory controls over different aspects of construction activities. The Environmental Protection Department and the Labour Department are the enforcement authorities for environmental and industrial safety regulations respectively. The Buildings Department exercises control over private sector building works to protect public safety and health. Other departments such as the Transport Department and the Fire Services Department have regulatory authority over the industry with regard to those aspects falling within their respective portfolios (e.g. traffic diversions, fire safety, etc.).

9.5 At present, there is no single dedicated bureau or department which oversees the entire spectrum of regulatory activities affecting the construction industry. While we recognise the need for a distribution of responsibilities within the Government along functional lines, the absence of a co-ordination mechanism under the current arrangement has sometimes resulted in conflicting regulatory requirements and ineffective communication between the Government and the industry over regulatory matters.

Government as a client

9.6 The Government undertakes a wide variety of engineering and building projects on behalf of the community. The Works Bureau and the works departments, together with the Housing Authority, constitute a major client for local construction, accounting for almost half of the total construction volume locally[33] in 1999. This represents very significant market power. Government clients have over the years leveraged on their dominant position to champion, through contractual requirements, the adoption of good construction practices (e.g. sound site safety practices and effective environmental management). We observe that while there are frequent exchanges among Government clients on their approaches to construction procurement and other construction-related matters, there is room for rationalisation in the approaches and practices adopted by different Government clients, particularly between the Housing Authority and the works departments. We consider that judicious rationalisation of practices and procedures among Government clients would not only bring about greater administrative and operational efficiency, but also facilitate more consistent application of good practices to drive the continuous improvement of the industry.

Government as a promoter of the industry

9.7 At present, the Works Bureau promotes the interests of the construction industry to a limited extent. It reflects the industry's broad interests and advises other policy bureaux and departments on the merits and practicability of major policy and legislative proposals which may impact on local construction. It also promotes the construction industry's interests in the Mainland. The Secretary for Works chairs the Construction Advisory Board, which advises the Government on a broad range of construction-related issues, from construction procurement matters concerning public works projects to broader industry-wide issues (such as construction R&D, manpower development for the construction

[33] In this context, the total construction volume refers to the gross value of construction work performed by main contractors at construction sites.

workforce and the resource capacity of the industry). We note, however, that the Construction Advisory Board is not the sole forum for deliberating construction-related policies and issues. Under current arrangements, policy proposals emanating from other functional areas such as environmental protection and industrial safety which may impact on the construction industry are often deliberated in established consultative fora in the concerned functional area instead of the Construction Advisory Board. On the whole, we consider that the effectiveness of the Works Bureau's role as a promoter of the construction industry is constrained by the existing institutional arrangements within the Government.

9.8 To overcome the current state of fragmentation within the Government, we recommend that the Government should appoint a lead agency to maintain an overview of all matters concerning the construction industry. This agency will work in close collaboration with relevant bureaux and departments to ensure that the concerns of the industry on strategic issues are properly reflected and that there is better co-ordination in policy-making which impacts on the construction industry. In view of the Works Bureau's close involvement in planning and implementing capital works projects, its long-established relationship with different sectors of the industry and the activities of the Construction Advisory Board set up under it, we consider it a very suitable candidate to become the proposed lead agency.

Co-ordination within the industry

9.9 The industry must take ownership of the change programme in order to successfully reform itself. The different sectors of the industry must work together on various reform initiatives to achieve visible results quickly. But the industry cannot merely set its eyes on current issues. It needs to be able to look beyond the present and build up strengths to meet its future challenges. The industry needs to establish a better focus on pan-industry strategic issues that are critical to its healthy long-term development, to bring all stakeholders behind it to tackle these issues, and to maintain momentum in achieving continuous

improvements across the industry. We recommend the setting up of an industry co-ordinating body, which will be a statutory body, to provide this focus and to sustain momentum.

9.10 The proposed industry co-ordinating body is intended to be an organisation set up by the industry, for the industry. It will deliberate and generate consensus among its members on strategic issues affecting the industry, and communicate the industry's needs and aspirations to the Government through regular dialogue. It may also serve as the main channel for Government bureaux and departments to seek the industry's feedback on strategic matters impacting on local construction. We envisage that sector-specific issues will continue to be dealt with through the existing advisory mechanism.

9.11 We envisage that based on discussions and consensus building, the proposed co-ordinating body will have an active role to play at least in the following areas –

(a) to carry out self-regulatory functions for the industry through the formulation of codes of conduct and the administration of registration schemes for construction workers, subcontractors, renovation contractors and decorators, and other types of construction personnel;

(b) to provide guidance to the Construction Industry Training Authority and set direction for its work;

(c) to identify priority areas in construction research and to promote better co-ordination between the local research community and industry in order to encourage innovation in local construction;

(d) to assume responsibility over construction standardisation matters;

(e) to promote sharing of knowledge on industry good practices,

innovative construction technologies and sound management techniques through learning networks and demonstration projects[34];

(f) to devise performance indicators[35] for the industry to measure its improvement; and

(g) to organise, in co-operation with the Government, award schemes to give recognition to outstanding performance in site safety, environmental protection, buildability, construction innovation and other built quality attributes.

9.12 In order that the industry co-ordinating body will be able to carry out its intended functions effectively, we consider it important that all stakeholders, including construction clients, professionals, academics, consultants, contractors, subcontractors and workers, participate in its deliberations and activities. The Government will be represented on the body as clients, alongside other client organisations in the public and the private sectors. We also see merit in including some independent members on the body. To provide leadership and to make an impact, the proposed industry co-ordinating body must be driven by eminent members of the industry. We recommend that the chairman of the industry co-ordinating body should initially be appointed by the Government. But as soon as practicable thereafter, the chairman should be elected from among the members of the industry co-ordinating body.

9.13 Given its wide scope of activities and broad spectrum of

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[34] In the UK, following the publication of the "Rethinking Construction" report prepared by the Construction Task Force, a programme of demonstration projects was launched whereby public and private sector clients of the construction industry, together with the builders, designers and suppliers that work with them, are invited to carry out demonstration projects to experiment with best construction practices and to spread the knowledge gained from the process within the industry through discussions and seminars.

[35] To drive industry participants to seek continuous improvement in their performance, the Movement for Innovation and the Construction Best Practice Programme in the UK have produced a set of Key Performance Indicators (KPIs) to measure the performance of the industry in a number of key areas, such as on-time delivery, delivery within budget, client satisfaction, health and safety, productivity and profitability. These KPIs enable industry participants to measure project performance and organisational performance against the rest of the industry. Clients can also use the KPIs to evaluate their service providers against a broader range of parameters than just price.

membership, the industry co-ordinating body will require a permanent secretariat to oversee its day-to-day operation. We consider that as an industry body, the proposed organisation should be funded by the industry itself. We recommend that the levies currently collected from the construction industry under various Ordinances (such as the Industrial Training (Construction Industry) Ordinance and possibly others) should be pooled together for more efficient deployment of resources and for part of the available resources to fund the daily operation of the secretariat of the industry co-ordinating body as well as other activities that will benefit the industry. In view of the establishment of the proposed industry co-ordinating body, those bureaux and departments currently with their own advisory boards and/or committees to deal with construction-related matters should consider whether their existing advisory mechanism would require any modification.

9.14 A diagrammatic representation of the co-ordination framework proposed in paragraphs 9.8-9.13 above is at Annex G of the report.

9.15 This review exercise has focused on how we can improve the operation and performance of the construction industry. In the course of the review exercise, suggestions have been made that to achieve greater efficiency and more productive utilisation of our limited land resources, we need to examine more closely the overall development process that encompasses the planning and land approval processes in addition to construction. This is a very broad subject which falls outside the scope of the current review. We suggest that the Government should consider the need and the timeframe for such a comprehensive review.

Chapter 10

Priorities of Implementation

10.1 We have put forward a comprehensive package of improvement measures with the objective of lifting the quality and cost-competitiveness of local construction. The successful implementation of these measures will lead to a more professional and productive construction workforce as well as more efficient and effective project delivery. The cost savings thus derived will materialise over time, resulting in a lower cost base for local construction. At the same time, the quality of built products will be significantly enhanced.

10.2 The transformation of the construction industry into a modern, efficient, innovative, client-oriented, safe and environmentally responsible industry requires the concerted efforts of all stakeholders and their firm support to the change process –

- **Clients**, in particular public sector clients, should lead the implementation of the change programme by demanding the best performance from industry participants through appropriate procurement and contract strategies;

- **Government as the regulator** should provide a conducive regulatory environment, which will set the minimum acceptable standards compatible with public interest while at the same time allowing flexibility for the industry to respond to client demands in an innovative manner;

- **Consultants, contractors and subcontractors** should aim to achieve the best project outcome by adopting an integrated approach to project development and implementation, and strive for improvement in their performance on a continuous basis;

- **All project team members** should conduct themselves in a dedicated, accountable and ethical manner and seek to fully meet the needs and expectations of the client;

- **Professional institutions, educational institutions and training organisations** should help to nurture a committed, ethical, knowledgeable, and productive workforce to support continuous improvement in construction performance; and

- **Research organisations** should collaborate with the construction industry to modernise the operations of local construction through construction research and innovations.

10.3 The implementation of the change programme should start as soon as possible. Many of our recommended improvement measures have an immediate and direct impact on construction performance and, if successfully implemented, are expected to bring early visible results. Those measures relating to, for instance, site safety, site supervision, equitable risk allocation and realistic project programming fall in this category. There are other measures which aim at building up the technical or manpower capabilities of the construction industry. Examples are those related to the nurturing of a professional workforce, adoption of modern construction methods and management techniques, construction-related research and developing the export potential of local construction. These are essentially investment items to support the sustained development of the industry in the long run. The effect of these measures will take time to show up, and for this reason we should proceed with the initial steps without delay.

10.4 In the summary table set out later in this chapter, we have given an indication of the timeframe within which action should be taken on each suggested improvement measure. We have also made suggestions on the key implementing parties. Other stakeholders which have not been specifically

named should be brought in as appropriate. Assuming that the new co-ordination framework recommended in Chapter 9 will be put in place, we envisage that the Works Bureau as the lead agency for construction-related matters within the Government and the proposed industry co-ordinating body will play a pivotal role in driving the implementation of the entire change programme. These two bodies will need to work together to further refine the implementation programme.

10.5 Of all the recommended improvement measures, we have identified a number of areas which provide the key building blocks for the future success of the industry and which should be acted on as soon as possible. They are –

(a) establishment of the new co-ordination framework proposed in Chapter 9;

(b) public sector clients to take a lead in changing the behaviour of the construction industry through contractual requirements;

(c) need for better statistics and formulation of performance indicators to measure improvements; and

(d) launching of demonstration projects to illustrate the benefits of modern approaches to construction and to spread learning within the industry.

We recommend that particular attention should be given to these areas in taking forward the change programme.

10.6 We should point out that the pace of change for our construction industry is, to a very large extent, set by competitive forces in the global construction market. The construction industry in many other places is undergoing a similar transformation process, some faster than others. Our construction market has been very open to overseas industry participants for

many years. This has provided a useful window for local companies in the construction industry to work with global leaders in the field and to progressively upgrade themselves. We must, nevertheless, be more proactive in bringing the performance of our construction industry on a par with world standards so as to maintain the industry's competitive edge against overseas competitors in the local market and beyond.

10.7 In the course of the review exercise, we have examined the key issues that have affected the performance and productivity of the construction industry and have attempted to identify the key success factors. This is but a first step in trying to tackle the problems that have beset the construction industry for many years and in charting a direction for the industry's future development. To ensure that our recommended change programme proceeds on track and to consider any need for fine-tuning the recommendations set out in this report, we recommend that the Government should take stock of the implementation progress of the recommended improvement measures in three years.

Summary of recommended improvement measures

			Recommended Implementation Timeframe
Fostering a Quality Culture			
I. A knowledgeable and involved client			
1.	Clients to develop a better understanding of the different facets of the construction delivery process, to set clear project requirements and to maintain close involvement in project implementation. Project managers to promote clients' knowledge of the project delivery process through regular feedback on implementation progress. [paragraph 4.7]	Clients, consultants and contractors	Start immediately

			Recommended Implementation Timeframe
II.	***Importance of the planning and design stages***		
2.	Clients to ensure more integrated input from different disciplines at the outset of a project. [paragraph 4.10]	All clients in collaboration with their project teams	Start immediately
3.	Wider use of value management techniques in local construction. [paragraphs 4.10-4.11]	All clients, with public sector clients taking the lead	Start immediately
III.	***Realistic project programming***		
4.	Clients to allow sufficient time for proper consideration of all relevant factors at the outset of a project and to mobilise the necessary resources to deliver projects to a good standard. [paragraph 4.14]	All clients	Start immediately
5.	Government to consider practical means to address the effect of high land cost on construction quality. [paragraph 4.14]	Planning and Lands Bureau	Within 3 years
IV.	***Clear accountability***		
6.	Regulators to ensure that legislation allocates responsibilities clearly and fairly and that appropriate sanctions are in place. Whenever appropriate, regulators should explore with the industry ways for industry participants to assume greater responsibility over their behaviour through self-regulation so that the regulatory authorities can focus on enforcement against those particularly at risk. [paragraphs 4.16-4.17]	Government departments with regulatory authority over the construction industry	Within 5 years

			Recommended Implementation Timeframe
7.	Clients to ensure appropriate allocation of responsibilities among project participants and to enforce a clear accountability structure within their own organisations. [paragraph 4.18]	Clients	Start immediately
8.	Professional institutions and other industry bodies to instill a greater sense of accountability among industry participants by stipulating acceptable standards of behaviour and putting in place an effective disciplinary mechanism. [paragraph 4.21]	Industry co-ordinating body, professional institutions and other industry bodies	Within 1 year
V.	***Subcontracting***		
9.	(a) Set up a voluntary subcontractor registration scheme, to be administered by the industry itself, to raise the standard of local trade subcontractors. The scheme should build on the Organized Specialist Subcontractors System initiative. [paragraphs 4.24-4.26] (b) Government to review in due course the need for introducing a mandatory registration scheme in the light of practical experience in implementing the voluntary scheme. [paragraph 4.25]	Industry co-ordinating body in consultation with stakeholders and Government departments Government	Within 3 years Three years after the implementation of the voluntary registration scheme
10.	Provide training to enhance the skills and competence of subcontractors. [paragraph 4.27]	Industry co-ordinating body and training institutions	Start within 1 year

			Recommended Implementation Timeframe
11.	(a) Clients and the main contractors to prohibit total subletting and exercise tighter control over the performance and management of subcontractors. [paragraph 4.28]	Clients and contractors	Start immediately
	(b) Works Bureau and the works departments to exercise more effective control over subcontractors working on public works projects. [paragraph 4.29]	Works Bureau and the works departments	Start immediately
	(c) Housing Authority to tighten control over subcontracting in other areas of construction works in addition to piling works. [paragraph 4.30]	Housing Authority	Within 2 years
12.	Contractors to assist in raising the performance standards of subcontractors by providing a conducive environment. [paragraph 4.31]	HKCA*, HKEMCA* and individual contractors	Start immediately
VI.	***Site supervision and quality assurance***		
13.	(a) Clients and project teams to ensure that adequate supervisory provision (especially at professional level) is made for critical stages of construction having regard to the nature and complexity of works. [paragraph 4.34]	Clients and project teams	Start within 1 year
	(b) Buildings Department to consider the merits of introducing quality supervision requirements for superstructure works. [paragraph 4.35]	Buildings Department	Within 1 year

* HKCA : Hong Kong Construction Association

* HKEMCA : Hong Kong Electrical and Mechanical Contractors' Association

			Recommended Implementation Timeframe
	(c) Housing Authority and works departments to develop a more structured site supervision system which specifies the supervision requirements for various stages of construction for different types of works undertaken by them. [paragraph 4.35]	Housing Authority, Works Bureau and works departments	Within 1 year
14.	Clients to rigorously enforce acceptance standards and to consider designating site supervision proposals as a critical criterion for tender evaluation. For consultant-managed projects, clients to require consultants to demonstrate that they have satisfactorily carried out their supervisory role in all project activities. [paragraph 4.36]	Clients	Start immediately
15.	Clients, consultants and contractors to critically examine their site supervision systems with a view to streamlining bureaucratic procedures. Documentation to be maintained at a suitable level sufficient to clearly establish accountability. [paragraph 4.37]	Clients, consultants and contractors	Start within 1 year
16.	Independent technical audits to be carried out on a regular basis as work progresses. Malpractices identified should be sanctioned. [paragraph 4.38]	Clients and project teams	Start within 1 year
17.	Works Bureau to regularly review the findings of the audit teams under the Independent Audit Scheme in consultation with the works departments and to identify common improvement areas. [paragraph 4.38]	Works Bureau	Start within 1 year

			Recommended Implementation Timeframe
18.	The Government and the Housing Authority to consider the feasibility of bringing public housing projects within the ambit of the Buildings Ordinance, and put in place appropriate and practical independent auditing arrangements to uphold the quality standards of public housing. [paragraph 4.39]	Government and Housing Authority	Ongoing action
19.	Employers and project teams to improve on current arrangements for quality control tests to safeguard quality. [paragraph 4.41]	Clients and project teams	Start immediately
VII. Raising the quality standard of renovation contractors and decorators			
20.	Establish a voluntary registration scheme for renovation contractors and decorators. [paragraph 4.44]	Industry co-ordinating body	Start within 3 years
Achieving Value in Construction Procurement			
21.	Housing Authority to keep the new arrangements for consultant selection under review with the objective of promoting better performance among consultants. [paragraph 5.13]	Housing Authority	Ongoing action
22.	AACSB* to review its listing criteria and shortlisting arrangements with a view to encouraging new entrants and driving continuous improvement in performance. [paragraphs 5.15-5.16]	Finance Bureau, Works Bureau and Architectural Services Department	Within 1 year

* AACSB : Architectural and Associated Consultants Selection Board

			Recommended Implementation Timeframe
23.	The marking schemes for public works consultancies to adequately reflect all quality aspects critical to a project with appropriate weightings. Introduce past performance as one of the quality criteria for prequalification and bid assessment for public works consultancies, and develop a quantitative means for measuring the past performance of consultants. Failure of consultants to adhere to their staffing proposals made at the tender stage with a demonstrably adverse impact on performance should be reflected in the performance assessment on the consultant. [paragraphs 5.17-5.19]	Finance Bureau, Works Bureau, AACSB and EACSB*	Within 2 years
24.	Support the objectives of Housing Authority's recent initiatives to improve its contractor listing and tendering practices and its contractor performance appraisal system. Housing Authority to proceed quickly with the implementation of these initiatives in close consultation with the industry. [paragraph 5.28]	Housing Authority	Ongoing action
25.	(a) Improve the contractor selection system for public works projects. [paragraphs 5.33-5.36]	Finance Bureau and Works Bureau	Within 1 year
	(b) Works Bureau to consider the merit of allowing only those with consistently good performance to take part in the pre-qualification exercise for major public works projects. [paragraph 5.37]	Finance Bureau and Works Bureau	Within 5 years

* EACSB : Engineering and Associated Consultants Selection Board

			Recommended Implementation Timeframe
26.	Housing Authority to review and further refine the Performance Assessment Scoring System 2000 in the light of industry feedback. [paragraph 5.39]	Housing Authority	Ongoing action
27.	(a) Enhance the transparency of the performance assessment arrangements for consultants and contractors for public works projects. [paragraph 5.41(a)] (b) Works Bureau to provide the industry regularly with benchmark scores from the Public Works Contractors' Performance Index System and other quantitative performance indicators that may be developed in future in respect of different categories of works and for different performance attributes. [paragraph 5.41(b)]	Works Bureau And works departments Works Bureau	Within 2 years Within 3 years
28.	Works Bureau to improve the objectivity of the performance assessment system for consultants and contractors for public works projects and consistency in the application of evaluation standards. [paragraph 5.42]	Works Bureau and works departments	Within 2 years
29.	Clients to offer debriefing to unsuccessful bidders and to make known the quality score of the winning bidder as well as the highest score attained for each quality attribute in addition to the winning bid price. [paragraph 5.46]	All clients, with public sector clients taking the lead	Within 2 years

			Recommended Implementation Timeframe
30.	Public sector clients to conduct post-completion reviews with consultants and contractors. [paragraph 5.46]	Public sector clients	Within 2 years
31.	To develop an effective disciplinary mechanism to tackle non-performers –		
	(a) Public sector clients to consider sharing information among themselves on the performance of their consultants and contractors. [paragraph 5.47]	Public sector clients	Within 1 year
	(b) Buildings Department to consider taking disciplinary action under the Buildings Ordinance against those Registered General Building Contractors and Registered Specialist Contractors who perform poorly in public sector projects. [paragraph 5.47]	Buildings Department	Within 1 year
32.	(a) Public sector clients to take a lead in promoting wider adoption of systematic risk management to improve project performance. [paragraph 5.51]	Public sector clients	Within 2 years
	(b) Develop guidance notes on integrated and systematic risk identification and management. [paragraph 5.51]	Professional institutions and client organisations	Within 2 years
33.	Clients should be prepared to reject exceptionally low bids which have not taken full account of the risks involved, while tenderers should make adequate provisions in tender prices for statutory and contractual responsibilities. [paragraph 5.54]	All client organisations, consultants, contractors and subcontractors	Start immediately

			Recommended Implementation Timeframe
34.	Clients to exercise robust change control, with particular emphasis on comprehensive project planning and risk assessment at project outset. Promulgate systematic change control procedures for adoption by client organisations. [paragraph 5.52]	All client organisations	Start immediately
35.	Reconsider the recommendations of the consultancy study on the General Conditions of Contract for Public Works Projects with the objective of achieving a more equitable allocation of risks between the contracting parties and of arriving at a contract document that – ● carries clear definitions of risks and their allocations; ● is designed for effective contract management of time, cost, safety and quality; ● is designed to be simpler to read and understand; and ● contains an effective means to settle disputes as risks materialise. [paragraph 5.59]	Works Bureau in consultation with the industry	Within 1 year
36.	Review the Standard Form of Building Contract, Private Edition with a view to achieving the same objectives as set out in Item 35 above. [paragraph 5.59]	Industry co-ordinating body in consultation with concerned stakeholders	Within 2 years

			Recommended Implementation Timeframe
37.	(a) Employers, consultants and contractors to adopt a proactive approach in resolving claims and disputes as they arise. Training for the project team and other resources to be provided to ensure the effective implementation of this approach. [paragraph 5.64(a)]	All client organisations, consultants and contractors	Start immediately
	(b) Encourage proactive and collaborative ways of dispute resolution by providing in contracts alternative dispute resolution methods, in addition to formal and binding adjudication means. [paragraph 5.64(b)]	All client organisations, consultants and contractors	Start immediately
38.	Public sector clients and progressive clients in the private sector to take a lead in the wider adoption of a partnering approach in implementing construction projects. [paragraph 5.69]	All stakeholders	Within 1 year
39.	Government and other major clients to consider a new form of contract which integrates a partnering approach into the contractual relationship. [paragraph 5.70]	Major clients in consultation with stakeholders	Start within 2 years
40.	Clients and project teams to secure teamwork, good practice and commitment from all parties at a project level through a jointly developed project pact. [paragraph 5.71]	Clients and all stakeholders	Start immediately

			Recommended Implementation Timeframe
41.	Government and other major clients to consider the wider adoption of the milestone payments approach. [paragraph 5.76]	Works Bureau and other major clients	Within 3 years
42.	Works Bureau to consider the merits of and the need for enacting security of payment legislation [paragraph 5.80]	Works Bureau	Within 3 years
43.	Client organisations and others in the project delivery chain to improve the security of project payments to parties engaged by them. [paragraph 5.80]	Clients and other paying parties	Start immediately
44.	Major clients to consider the wider adoption of alternative procurement approaches (such as target cost contracting) to achieve better value for money in construction procurement. [paragraph 5.85]	Major clients	Within 5 years
Nurturing a Professional Workforce			
45.	Local tertiary institutions, in consultation with the professional institutions and others in the industry, to review and enhance the curricula of construction-related undergraduates and postgraduate courses. More opportunities, preferably in the form of a structured programme, to be provided for undergraduates to acquire site experience through summer job placements or sandwich course arrangements. [paragraphs 6.5 and 6.7]	Relevant tertiary institutions, professional institutions and industry bodies	Within 3 years

			Recommended Implementation Timeframe
46.	(a) Encourage teaching staff of local tertiary institutions to acquire practical experience in the industry. [paragraph 6.7]	Relevant tertiary institutions	Within 3 years
	(b) Promote part-time direct involvement of experienced construction professionals in the teaching process of undergraduate and postgraduate courses, where appropriate. [paragraph 6.7]	Relevant tertiary institutions and industry co-ordinating body	Within 3 years
47.	Mandatory participation in Continuing Professional Development (CPD) activities as a pre-requisite for renewal of membership of professional institutions in the construction field. Appropriate CPD programmes to be developed. [paragraph 6.9]	Professional institutions	Within 2 years
48.	Draw up a structured training framework based on practical training for site supervisors to supplement institutional training. Training institutions to improve on the curricula of diploma courses for site supervisors. Top-up courses to be organised for supervisors without formal training to acquire the necessary competencies. [paragraphs 6.11-6.12]	Industry co-ordinating body, relevant training institutions and other concerned stakeholders	Within 2 years

			Recommended Implementation Timeframe
49.	Professional institutions to consider the introduction of a new class of membership for site supervisors. Co-ordination among concerned institutions and industry bodies to devise a common platform for professional recognition for site supervisors as far as possible. [paragraph 6.13]	Professional institutions and other concerned industry bodies	Within 2 years
50.	Review the need for introduction of a mandatory supervisor registration scheme in 3 years. [paragraph 6.14]	Industry co-ordinating body and other concerned stakeholders	In 3 years
51.	Professional institutions to consider the introduction of a new class of membership for technicians in their respective disciplines, similar to the Associate Membership for engineering technicians in HKIE*. [paragraph 6.15]	Professional institutions	Within 2 years
52.	Support in principle the Construction Advisory Board's proposal to implement a construction worker registration scheme. Works Bureau to consult the industry widely on the proposed scheme and the implementation details. The scheme should take account of the more refined skill definition framework proposed for construction workers. [paragraphs 6.18 and 6.27]	Works Bureau	As soon as possible

* HKIE : The Hong Kong Institution of Engineers

			Recommended Implementation Timeframe
53.	Support the initiatives taken by public sector clients to contractually require their contractors to employ a specified percentage of trade-tested workers and to increase such percentage over time. [paragraph 6.18]	Works Bureau and Housing Authority	Ongoing action
54.	CITA* to enhance the scope and content of its basic craft courses, and to review the duration of such courses. [paragraphs 6.20-6.22]	CITA and Education and Manpower Bureau	Within 1 year
55.	Revamp the apprenticeship scheme for the construction industry. [paragraphs 6.24-6.25]	Works Bureau, Education and Manpower Bureau, industry co-ordinating body, VTC* and CITA	Within 2 years
56.	(a) Encourage multi-skill development for construction workers. [paragraph 6.26]	Industry co-ordinating body, employers and training institutions	Within 2 years
	(b) Develop a craft skill qualification framework to provide a career path for tradesmen. [paragraph 6.27]	Industry co-ordinating body, Education and Manpower Bureau and CITA	Within 2 years

* CITA : Construction Industry Training Authority

* VTC : Vocational Training Council

			Recommended Implementation Timeframe
57.	Review the composition of the CITA Board. [paragraph 6.28]	Education and Manpower Bureau, industry co-ordinating body and CITA	Within 1 year
58.	Foster an ethical culture by the following means –		
	(a) ICAC* to sustain its efforts in rigorous enforcement and corruption prevention education (including dissemination of case study materials to the industry for training purpose). [paragraphs 6.29-6.30]	ICAC	Ongoing action
	(b) Employers to issue clear guidelines to frontline site supervisory staff and those responsible for accepting completed works on prohibitions against acceptance of advantages and excessive entertainment offered by contractors and subcontractors. [paragraph 6.30]	Works Bureau and ICAC in collaboration with industry	Within 1 year
	(c) Public sector clients to take a lead in requiring their consultants and contractors to pledge for probity, promulgate a code of conduct and provide probity training for their staff. [paragraph 6.30]	Public sector clients and ICAC	Within 1 year

* ICAC : Independent Commission Against Corruption

			Recommended Implementation Timeframe
	(d) Professional institutions and other industry bodies to maintain an effective sanction mechanism against those who have breached the rules of conduct or codes of practice (see Item 8 above). [paragraph 6.30]	Industry co-ordinating body, professional institutions and other industry bodies	Within 1 year
	(e) Tertiary institutions and other construction training institutions to make professional ethics a compulsory subject in construction-related courses. [paragraph 6.30]	ICAC, tertiary institutions and other construction training institutions	Within 1 year
	(f) Enhance training on professional ethics for practitioners through continuing development programmes and refresher courses. [paragraph 6.30]	ICAC and construction training institutions	Within 1 year
59.	Education and Manpower Bureau to improve on the methodology for collating and compiling construction manpower statistics to facilitate manpower planning. [paragraph 6.31]	Education and Manpower Bureau, Works Bureau and other concerned parties	Within 2 years
60.	Client organisations to promote wider use of direct labour through contractual requirements. [paragraph 6.34]	Client organisations	Within 2 years

			Recommended Implementation Timeframe
An Efficient, Innovative and Productive Industry			
I.	***Process re-engineering to achieve better integration***		
61.	Facilitate better integration in the delivery of construction projects through wider adoption of alternative procurement approaches (e.g. design and build and prime contracting) in both the public and the private sectors. [paragraph 7.11]	Client organisations, industry co-ordinating body, tertiary institutions, professional institutions and training institutions	Start within 2 years
II.	***Wider use of standardisation in component design and processes***		
62.	Public sector clients to take the lead in promoting wider use of standardised and modular components in local construction. [paragraph 7.15]	Public sector clients with other industry stakeholders	Start within 2 years
63.	Clients, with public sector clients taking the lead, to work with stakeholders to improve construction efficiency by judicious standardisation and rationalisation of construction processes and practices. [paragraph 7.17]	Client organisations and other stakeholders	Within 3 years
64.	Support the proposed establishment of a central construction standardisation body in Hong Kong. [paragraph 7.19]	Works Bureau and industry co-ordinating body	Within 3 years

			Recommended Implementation Timeframe
III.	***Wider use of prefabrication***		
65.	Public sector clients, in particular the Housing Authority, to take the lead in promoting wider use of prefabrication and other buildability measures in Hong Kong. Enhance private sector capability in this regard through training, promulgation of guidelines and codes and R&D. [paragraphs 7.24-7.25]	Public sector clients, industry co-ordinating body in collaboration with other stakeholders	Start within 2 years
IV.	***Wider application of information technology (IT) in project implementation***		
66.	Raise the IT literacy of the construction industry through IT training for the management and the construction workforce at all levels. [paragraph 7.28]	Industry stakeholders, professional institutions, tertiary institutions and training institutions	Start within 1 year
67.	Major clients and other key stakeholders to lead in the wider adoption of IT and to commit resources for the successful implementation of various IT initiatives. [paragraph 7.28]	Major clients and key stakeholders	Start immediately
68.	Buildings Department to closely monitor the development of artificial intelligence technology with a view to testing the feasibility of introducing electronic checking of building plans when the necessary technology becomes available. [paragraph 7.29]	Buildings Department	Ongoing action

			Recommended Implementation Timeframe
69.	Government to expedite the development of a common platform for electronic communications within the local construction industry. Exemptions made under the Electronic Transactions Ordinance for construction-related legislation to be withdrawn as soon as possible. [paragraphs 7.29-7.30]	Works Bureau and concerned regulatory authorities	As soon as possible
70.	Industry co-ordinating body, in consultation with industry stakeholders, to identify priority areas for software development to help tackle those areas where performance is lagging and to communicate the industry's requirements to software developers. Works Bureau to work with the industry on its electronic service delivery initiatives. [paragraphs 7.31-7.34]	Works Bureau, industry co-ordinating body, academia and other industry stakeholders	Start within 1 year
V.	***Investment in construction-related R&D***		
71.	Public sector clients and other progressive clients in the private sector to commit adequate resources for the carrying out of research activities beneficial to their corporate and project objectives. [paragraph 7.37]	Public sector clients and progressive private sector clients	Start within 2 years
72.	Encourage the industry to make more use of the Innovation and Technology Fund to finance construction research activities. [paragraph 7.38]	Works Bureau, Innovation and Technology Commission, industry co-ordinating body and research bodies	Start within 1 year

			Recommended Implementation Timeframe
73.	Establish better collaboration between industry and local research bodies on construction-related R&D. Set clear objectives, directions and priorities for such R&D efforts. [paragraphs 7.39-7.40]	Works Bureau, industry co-ordinating body and research bodies	Start within 1 year
VI.	***Facilitating regulators***		
74.	Planning and Lands Bureau and Buildings Department to proceed with the comprehensive review of the Buildings Ordinance and its subsidiary regulations at full speed in consultation with the industry. Lands Department and Planning Department to be closely involved in the review to facilitate more imaginative land use and innovative building designs. [paragraph 7.43]	Planning and Lands Bureau, Buildings Department, Lands Department and Planning Department	Within 1 year
75.	(a) Government to designate Buildings Department to assume the lead role in resolving any conflicting requirements among public authorities that may arise during the building plan approval process, and eventually to develop a more condensed and integrated processing system so as to minimise the time required for plan approval. [paragraph 7.46]	Government	Within 2 years

			Recommended Implementation Timeframe
	(b) All Government departments involved in the building plan approval process to pledge a time limit for tendering their advice, and adopt a forthcoming and proactive approach to help clients address their difficulties in meeting various regulatory requirements. [paragraph 7.46]	Concerned Government departments	Within 1 year
76.	Government regulators to respond promptly and constructively to the industry's requests for assistance and to draw up codes and guidelines, whenever appropriate, to help the industry better understand the intentions behind legislation and acceptable conduct to satisfy legislative requirements. Legislative requirements to be kept under regular review. [paragraphs 7.47-7.48]	All regulatory authorities	Ongoing action
VII. More reliable records of underground utilities			
77.	(a) Highways Department to take the lead in developing an efficient system to facilitate access to information on existing and proposed underground utilities by contractors and project proponents. [paragraph 7.51]	Highways Department (lead)	Start within 2 years
	(b) Highways Department, in consultation with other concerned bureaux and departments, to draw up measures to require utility undertakings and the relevant Government departments to improve the accuracy of as-built records of underground utilities. [paragraph 7.51]	Highways Department (lead)	Start within 2 years

			Recommended Implementation Timeframe
	(c) Highways Department, together with other concerned Government departments, to streamline the existing procedures for processing road excavation permits and to consider the feasibility of one-stop service. [paragraph 7.51]	Highways Department (lead)	Within 2 years
VIII. Lowering the cost of ready-mixed concrete			
78.	Works Bureau and the Housing Authority to consult other concerned bureaux and departments, industry stakeholders and the ready-mixed concrete industry in studying the feasibility of the suggested improvement measures to promote competition in the prices of ready-mixed concrete. [paragraph 7.54]	Works Bureau, Housing Authority, concerned industry stakeholders and the ready-mixed concrete industry	Within 1 year
IX. Export potential of the construction industry			
79.	Works Bureau, the Hong Kong Trade Development Council (TDC), the industry and other related professional sectors to examine critically the strategy and action plan for more proactive promotion of Hong Kong's construction services in other markets. [paragraph 7.57]	Works Bureau, TDC, industry stakeholders and other relevant professional sectors	Within 2 years

			Recommended Implementation Timeframe
A Safer Workplace and an Environmentally Responsible Industry			
I.	***A safer workplace***		
80.	Labour Department to review the methodology for collating construction safety statistics with a view to developing a more reliable mechanism for calculating the site accident rate. [paragraph 8.8]	Labour Department and Census and Statistics Department	Within 1 year
81.	Government to review the need for introducing legislation similar to the UK's Construction (Design and Management) Regulations in five years. [paragraph 8.13]	Labour Department in consultation with stakeholders	Within 5 years
82.	Works Bureau and the Housing Authority to take a lead in incorporating practicable features of the UK's Construction (Design and Management) Regulations into the safety planning and management systems for public works projects and public housing projects. [paragraph 8.14]	Works Bureau and Housing Authority	Within 2 years
83.	Industry bodies, professional institutions and the local research community to draw up a code of practice or designers' guide to assist design professionals in evaluating safety risks and hazards and to provide guidelines on known hazardous activities and procedures on site, safe work sequences, precautionary measures and determination of the reasonable time-frame for the safe conduct of construction activities. [paragraph 8.14]	Professional institutions, relevant industry bodies and research bodies	Within 3 years

			Recommended Implementation Timeframe
84.	Promote wide adoption of integrated site management systems with site safety being an integral part of line managers' overall site management responsibility. [paragraph 8.15]	Clients and contractors	Within 1 year
85.	Safety training and promotional efforts to be strengthened by the following means –		
	(a) Provision of safety training to construction professionals as an integral part of the undergraduate curriculum and CPD programmes. [paragraph 8.16]	Tertiary institutions and professional bodies	Within 1 year
	(b) Providing site safety training to line managers and site supervisors to achieve effective management. [paragraph 8.16]	Clients, contractors, relevant training institutions	Within 1 year
	(c) Requiring safety officers in the construction industry who have been trained as general safety officers to receive training more specifically related to construction safety before working on site. [paragraph 8.16]	Labour Department and contractors	Within 1 year

			Recommended Implementation Timeframe
	(d) Promoting site-specific safety briefings and training. Major clients to lead by requiring their contractors to conduct such training. Assistance to be provided to contractors and subcontractors on how to develop and conduct in-house safety training. [paragraph 8.16]	Labour Department to provide necessary training framework with the assistance of CITA and OSHC*. Major clients to lead by stipulating site-specific safety training as a contractual requirement	Start within 1 year
	(e) Enhance green card safety training for construction workers by including hands-on training. More advanced safety training to construction workers who have attended basic green card training. Safety content in skill testing to be increased. [paragraph 8.16]	Labour Department with the assistance of CITA, OSHC and other relevant training bodies	Within 1 year
86.	Top management of major public and private sector clients to drive improvements in safety performance through procurement and contractual arrangements. [paragraph 8.17]	Major clients	Within 1 year

* OSHC : Occupational Safety and Health Council

			Recommended Implementation Timeframe
87.	Labour Department to work with the construction industry and the insurance industry to explore the feasibility of developing incentive schemes for construction insurance policies to encourage better safety performance. [paragraph 8.18]	Labour Department	Within 2 years
88.	Enhanced enforcement through the following means –		
	(a) Labour Department to be more vigilant in taking enforcement action against those sites with unacceptably high accident records and blatant offenders of statutory safety requirements. [paragraph 8.21]	Labour Department	Ongoing action
	(b) To make statutory provision for prosecution to be brought against subcontractors for non-compliance with safety requirements in operations under their direct control. [paragraph 8.22]	Education and Manpower Bureau and Labour Department	Within 2 years, allowing time for the legislative process
	(c) Labour Department to secure the co-operation of contractors and subcontractors in enforcement action against workers who do not comply with statutory site safety requirements. [paragraph 8.23]	Labour Department, contractors and subcontractors	Start immediately

			Recommended Implementation Timeframe
	(d) Buildings Department to consider initiating disciplinary action against Registered General Building Contractors and Registered Specialist Contractors for blatant negligence leading to serious site accidents or for poor site safety performance below a certain benchmark. [paragraph 8.24]	Buildings Department	Within 1 year
	(e) Buildings Department and Labour Department to co-ordinate the requirements for the Site Supervision Plan System mandated under the Buildings Ordinance and the Safety Management System under the Factories and Industrial Undertakings (Safety Management) Regulation. [paragraph 8.24]	Buildings Department and Labour Department	Within 2 years
II.	***An environmentally responsible industry***		
89.	Develop a coherent policy framework with the concept of sustainable construction being an integral element of sustainable development. Secure public support for sustainable construction. [paragraph 8.29]	Government	As soon as possible
90.	Major clients, in particular public sector clients, to take a lead in practising the concept of life-cycle costing. [paragraph 8.33]	Public sector clients and major clients in the private sector	Start within 1 year

			Recommended Implementation Timeframe
91.	Develop costing models and tools for calculating life-cycle costs, a database on the life-cycle costs and performance of materials and components, and a common set of accepted performance-based specifications for materials and components. [paragraph 8.33]	Works Bureau, major clients, professional institutions and research bodies	Start within 2 years
92.	Strengthen defects liability warranty for new buildings. [paragraph 8.33]	Buildings Department, REDA* and developers	Within 3 years, subject to enactment of legislation
93.	Government to encourage green designs by the following means – (a) Exempting extra floor areas required for the installation of green features and facilities from the calculation of gross floor area (GFA). [paragraph 8.35]	Planning and Lands Bureau, Buildings Department, Lands Department and Planning Department	Within 1 year

* REDA : Real Estate Developers Association

			Recommended Implementation Timeframe
	(b) Providing additional GFA necessary to offset the extra cost incurred in the use of green construction methods and materials as well as the provision of building services, devices and systems which would improve the environmental performance of a building. The same incentive also applies to cases where a developer proposes to set back his building at street level for trees and greenery or provide a roof garden for common use. [paragraph 8.35]	Planning and Lands Bureau, Buildings Department, Lands Department and Planning Department	Within 1 year
	(c) Government to charge no premium for modifying existing restricted leases for the provision of green features (particularly balconies, noise barriers and extra space for prefabricated external walls) and to keep the processing time for such lease modification to the absolute minimum. [paragraph 8.35]	Planning and Lands Bureau, Buildings Department, Lands Department and Planning Department	Within 1 year
94.	Housing Authority to take a lead in the wider use of green designs in its housing estates. Encourage progressive developers in the private sector to see their proactive engagement in this area to be essential to business success. [paragraph 8.36]	Housing Authority, REDA and other major clients	Within 1 year
95.	Stakeholders and the local research community to jointly develop necessary design tools and databases to promote the development of environmentally friendly designs. [paragraph 8.37]	Buildings Department, industry co-ordinating body and research bodies	Start within 2 years

			Recommended Implementation Timeframe
96.	Electrical and Mechanical Services Department to work closely with Buildings Department in promoting public awareness of energy efficiency and wider adoption of energy efficient designs. Develop and disseminate guidelines and design tools for analysing the energy consequences of design options. Also develop guidelines to help clients and occupiers to assess life-cycle energy cost of construction and to carry out self-audits of energy consumption. [paragraph 8.38]	Electrical and Mechanical Services Department, Buildings Department, industry co-ordinating body and research bodies	Start within 2 years
97.	Public sector clients to take a lead in abating environmental nuisance during construction by the following means – (a) Giving appropriate weight to the environmental performance of contractors in tender assessment and ongoing performance assessment. [paragraph 8.41] (b) Considering allowing a separate account in construction contracts for measures taken to address pollution prevention and control during the construction stage, which will be withheld from payment in case of non-compliance with environmental requirements. [paragraph 8.41]	All clients	Start within 1 year

			Recommended Implementation Timeframe
	(c) Encouraging contractors to employ dedicated personnel on-site to assist line managers in managing the environmental aspects of construction activities, adopt environmental management systems to systematically identify the environmental impacts arising from construction, and take appropriate steps to mitigate any adverse impact. [paragraph 8.41]		
98.	Environment and Food Bureau and Environmental Protection Department to conduct a regulatory impact assessment on the cumulative impact of the environmental legislation on the construction industry vis-à-vis the community. [paragraph 8.41]	Environment and Food Bureau and Environmental Protection Department	Start within 1 year
99.	Environmental Protection Department to develop a service culture and work in partnership with the construction industry to improve the latter's environmental performance. [paragraph 8.41]	Environmental Protection Department	Start within 1 year
100.	Support Government's plan to introduce charges for waste disposal facilities (such as landfills) to motivate contractors to separate and sort C&D material or to seek alternative disposal outlets. [paragraph 8.44]	Environment and Food Bureau and Environmental Protection Department	As soon as possible

			Recommended Implementation Timeframe
101.	Government to identify and provide suitable sites for – (a) temporary and permanent off-site sorting facilities; (b) temporary and permanent barging points for public fill; (c) setting up of "fill banks" for stockpiling surplus fill materials; and (d) establishing recycling and prefabrication facilities. [paragraph 8.44]	Environment and Food Bureau, Planning and Lands Bureau, Environmental Protection Department, Lands Department and Planning Department	Start within 1 year
102.	Public sector clients to take a lead in the wider use of recycled materials (such as recycled aggregate and reclaimed bituminous material) in their projects by suitably revising the general specifications for public works projects and public housing projects and carrying out trial projects. [paragraph 8.45]	Public sector clients	Within 2 years
103.	Government to encourage more durable buildings to minimise the generation of demolition materials. Support the early implementation of the Government's proposals announced recently to educate and encourage building owners to take better care of their properties. [paragraph 8.45]	Buildings Department	As soon as possible

			Recommended Implementation Timeframe
104.	Government to consider appropriately extending the incentive scheme intended to promote the construction of new environmentally friendly buildings to also cover existing buildings so as to encourage the upgrading of existing buildings and an urban renewal process by private initiatives. [paragraph 8.45]	Planning and Lands Bureau, Buildings Department, Lands Department and Planning Department	Within 2 years
105.	Buildings Department and other industry participants to work together on a common, comprehensive environmental assessment scheme with appropriate incentives (e.g. in the form of financial incentives and/or public recognition) for local use, capitalising on the work that has gone into the formulation of HK-BEAM, the Hong Kong Energy Efficiency Registration Scheme for Buildings and similar assessment schemes. The assessment scheme should cater for different building types and separate scores should be given for different environmental aspects. [paragraph 8.48]	Buildings Department and other industry stakeholders	Within 3 years
Institutional Framework for Implementing the Change Programme			
106.	Government to appoint a lead agency to co-ordinate with relevant bureaux and departments on construction-related matters. [paragraph 9.8]	Government	Immediately upon endorsement
107.	To establish an industry co-ordinating body for the construction industry. [paragraphs 9.9-9.13]	Government and all stakeholders	As soon as possible, subject to enactment of necessary legislation

			Recommended Implementation Timeframe
108.	Government to consider the need and the timeframe for a comprehensive review of the entire development process. [paragraph 9.15]	Government	Within 3 years
Review of Implementation Progress of the Change Programme			
109.	To review the implementation progress of the recommendations arising from the current review in three years' time. [paragraph 10.7]	Government	In 3 years

Annex A

Construction Industry Review Committee

Terms of Reference

Having regard to local circumstances and best practices overseas –

(a) to examine the current state of the construction industry in respect of quality, quantity, environmental friendliness, manpower, safety and supervision;

(b) to identify specific actions and good practices to improve the efficiency and cost effectiveness of local construction in terms of quality, customer satisfaction, timeliness in delivery and value for money; and

(c) to advise on an order of priority for implementation.

Construction Industry Review Committee
Membership

Chairman

The Honourable Henry TANG Ying-yen
Member, Executive Council

Members

Professor Michael ANSON
Immediate past Dean, Faculty of Construction and Land Use
The Hong Kong Polytechnic University

Mr Francis BONG Shu-ying
Chairman,
Maunsell Consultants Asia Limited

Mr CHAN Kam-ling
Managing Director,
Hip Hing Construction Company Limited

Mrs Pamela CHAN
Chief Executive,
Consumer Council

Mr Keith KERR
Managing Director,
Swire Properties Limited

Mr KWOK Kwok-chuen
Chief Economist,
Standard Chartered Bank

Mr Daniel LAM Chun
Chairman,
Hong Kong Housing Authority Building Committee

Mr LEE Shing-see
Secretary for Works
Government of the Hong Kong Special Administrative Region

Mr LEUNG Chin-man
Director of Buildings
Government of the Hong Kong Special Administrative Region

Mr Frederick MA Si-hang
Managing Director,
The Chase Manhattan Bank

Mr Alasdair MORRISON
Chairman,
Morgan Stanley Dean Witter Asia Limited

Mr POON To-chuen
Consultant,
The Hong Kong Construction Industry Employees General Union

Mr Albert TONG Yat-chu
Executive Director,
Construction Industry Training Authority

Mr Robin WHALLEY
Managing Director,
Mott Connell Limited

Mr Dominic WONG Shing-wah
Secretary for Housing
Government of the Hong Kong Special Administrative Region

Membership of the Construction Quality and Safety Sub-committee

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Members :

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Mr KWOK Kwok-chuen

Mr Daniel LAM Chun

Mr POON To-chuen

Mr Albert TONG Yat-chu

Mr Robin WHALLEY

Secretary for Housing or representative

Secretary for Works or representative

Director of Buildings or representative

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Ir Dr John LUK – representing the Hong Kong Institution of Engineers

Mr Eric CHUNG – representing the Hong Kong Institute of Surveyors

Mr FUNG Ching-nam – representing the Kowloon-Canton Railway Corporation

Mr Russell BLACK – representing the Mass Transit Railway Corporation

Mr Louis WONG – representing the Hong Kong Construction Association

Mr TSANG Chiu-kwan – representing the Hong Kong Electrical and Mechanical Contractors' Association

Dr TAM Chi-ming

Mr S K WONG – representing the Architectural Services Department

Mr Y S CHOW – representing the Civil Engineering Department

Ms Ada FUNG – representing the Housing Department

Mr Fred TING – representing the Labour Department

Membership of the Manpower and Modernisation Sub-committee

Chairman : Mr Alasdair MORRISON

Members :

Professor Michael ANSON

Mr Francis BONG Shu-ying

Mr CHAN Kam-ling

Mr KWOK Kwok-chuen

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Mr POON To-chuen

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Director of Buildings or representative

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Ir Otto POON – representing the Hong Kong Institution of Engineers

Mr Richard CHEUNG – representing the Hong Kong Institute of Surveyors

Mr Russell BLACK – representing the Mass Transit Railway Corporation

Mr Billy WONG – representing the Hong Kong Construction Association

Ir James CHIU – representing the Hong Kong Electrical and Mechanical Contractors' Association

Professor Andrew LEUNG – representing the City University of Hong Kong

Dr CHIANG Yat-hung – representing the Hong Kong Polytechnic University

Professor K W CHAU – representing the University of Hong Kong

Mr P F MAK – representing the Vocational Training Council

Mr Ivan LEE – representing the Education and Manpower Bureau

Mr S K WONG – representing the Architectural Services Department

Mr C S WAI – representing the Highways Department

Mr Joseph KONG – representing the Housing Department

Membership of the Construction Cost and Environment Sub-committee

Chairman : Professor Michael ANSON

Members :

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Mr Keith KERR

Mr KWOK Kwok-chuen

Mr Frederick MA Si-hang

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Ir Y C KOO – representing the Hong Kong Institution of Engineers

Mr P C LAU – representing the Hong Kong Institute of Surveyors

Mr David AVERY – representing the Mass Transit Railway Corporation

Mr Jimmy TSE – representing the Hong Kong Construction Association

Mr Steve GRIFFIN – representing the Hong Kong Electrical and Mechanical Contractors' Association

Ms Annie CHOI – representing the Environment and Food Bureau

Mr Charles LAI – representing the Architectural Services Department

Mr Mike STOKOE – representing the Environmental Protection Department

Mr Daniel LEE – representing the Housing Department

Mr J C COORAY – representing the Territory Development Department

Membership of the Working Group on Use of IT in Construction

Chairman : Mr Daniel LAM Chun

Members :

Professor Michael ANSON
Miss Elaine CHUNG – representing the Housing Bureau
Mr Raymond HO – representing the Works Bureau
Mr HUI Siu-wai – representing the Buildings Department
Mr Bernard HUI – representing the Hong Kong Institute of Architects
Mr Jimmy TSE – representing the Hong Kong Construction Association

Model Project Pact

_____

(Project Title)

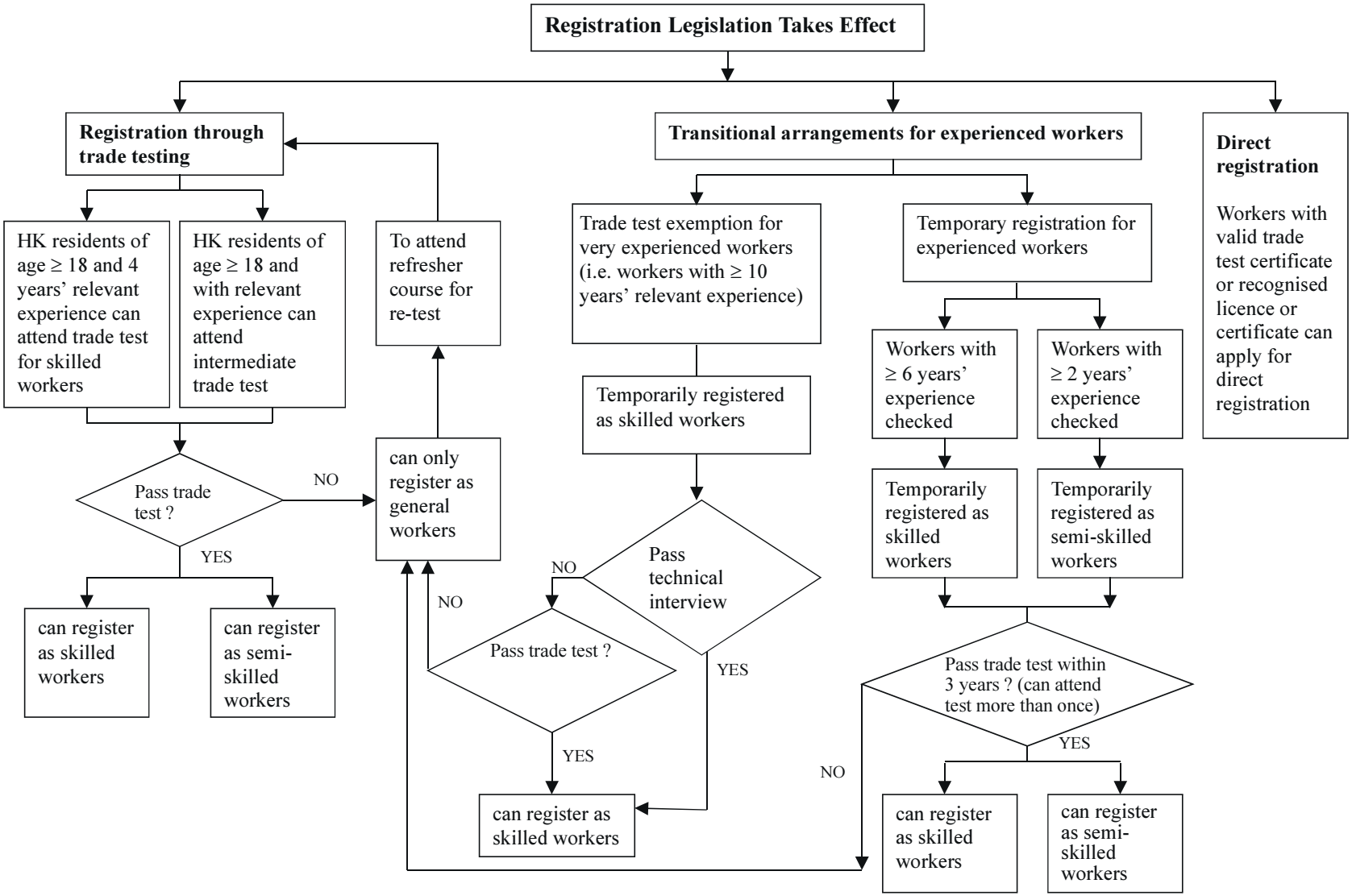
We, the client and members of the supply chain, intend to meet the needs and expectations for this project and to achieve its delivery to the benefits of all parties.

	We aim to work together to :
1	deliver the project specification to the agreed budget, timetable and standards of quality
2	adopt the CIB's Codes of Practice and guidance where applicable in selecting team members
3	practice teamwork, trust, respect, fair dealing, effective communication and openness with all in the project
4	provide all necessary skills to deliver the project
5	build a balanced workforce
6	seek continuous improvement with appropriate research and innovation to support the project
7	define, manage and present the project with a responsible attitude towards the environment, the local neighbourhood and the health and safety of all
8	inform everyone involved in the project of these commitments as well as other key people within our organisations
9	monitor performance and provide feedback to all parties during and after the project
10	……*(other agreed commitments)*

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note : This model project pact was developed by the Construction Industry Board in the UK.

Key Features of the Construction Worker Registration Scheme as proposed by the Construction Advisory Board (Position as at December 2000)



Types of worker proposed to be covered by the construction worker registration scheme initially

Workers employed for building and civil engineering construction works prior to the issue of, where applicable, Occupation Permit or Completion Certificate and workers employed for term maintenance works of the Government, the Housing Department, MTRC and KCRC and other public utility companies are required to be registered.

Trades proposed to be covered by the construction worker registration scheme

All principal trades of the construction industry will be covered. These include workers of the building and civil engineering disciplines and the associated electrical and mechanical disciplines (including building services and electronics streams) listed in the booklet "Unified job titles and descriptions of tradesman and semi-skilled worker/general worker for the construction industry" published by Works Bureau in December 1997, subject to any necessary updating.

Methodology Adopted by the Labour Department for Calculating the Construction Site Accident Rate

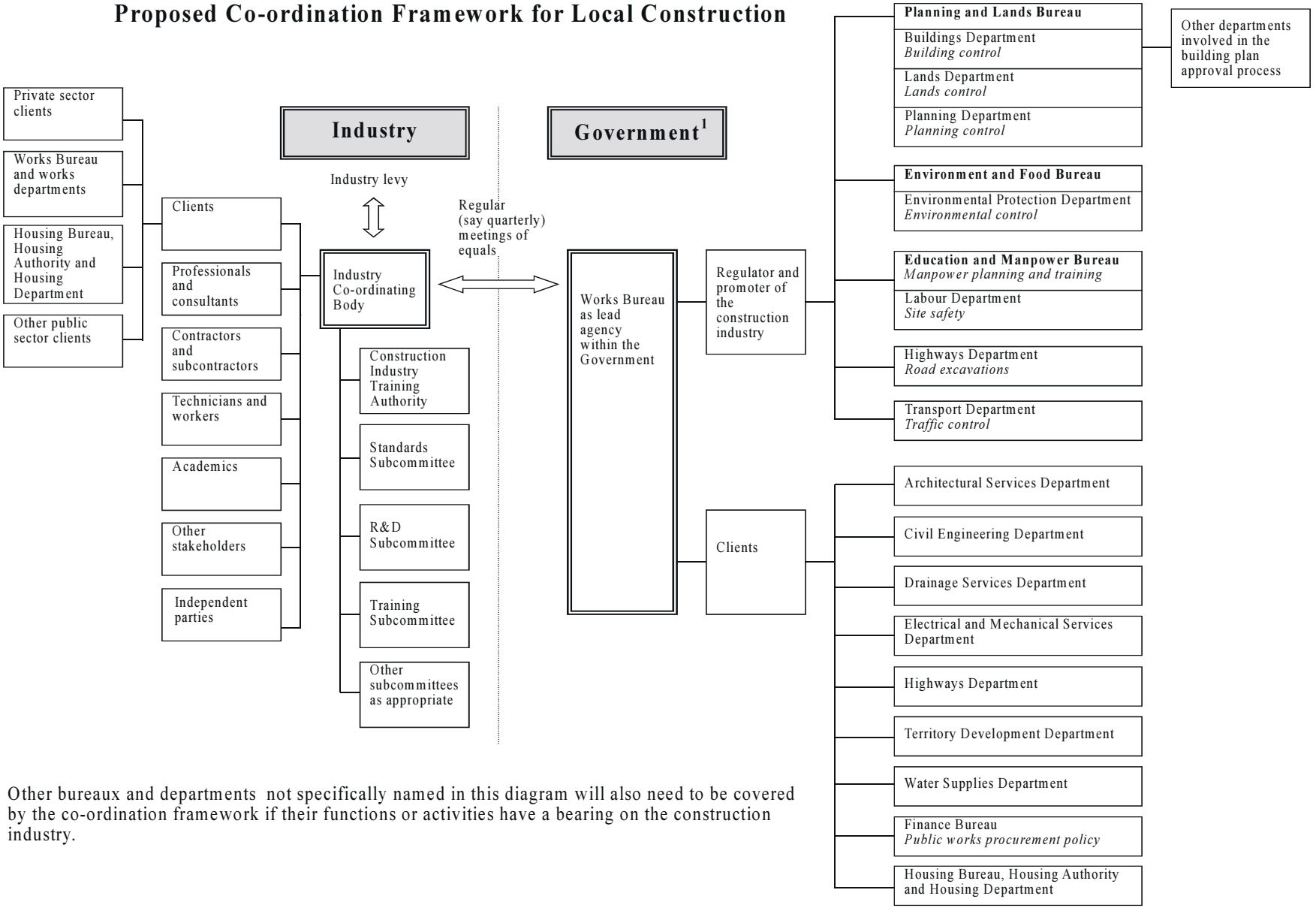
$$\text{Annual accident rate [3]} = \frac{\text{Total number of construction site accidents [1]}}{\text{Total number of workers employed on construction sites [2]}} \times 1000$$

[1] : The total number of construction site accidents in the respective year covers all reportable accidents in the construction industry in its widest sense, including accidents which occur on public sector sites, private sector sites and village-type housing sites, and accidents which occur in the course of minor repair, maintenance and interior decoration works in existing buildings.

[2] : The total number of workers employed on construction sites is taken from the Employment and Vacancies Statistics figure published by the Census and Statistics Department, which covers manual workers employed on all building and engineering sites. But it does not cover workers engaged in the construction of village-type houses, or in minor repair, maintenance and interior decoration of existing buildings.

[3] : The annual accident rate is represented in terms of the number of accidents per thousand workers in the respective year.

Proposed Co-ordination Framework for Local Construction



[1] Other bureaux and departments not specifically named in this diagram will also need to be covered by the co-ordination framework if their functions or activities have a bearing on the construction industry.