



CONSTRUCTION
INDUSTRY COUNCIL
建造業議會



REFERENCE MATERIALS

NEC CASE BOOK – IMPROVEMENT OF FUK MAN ROAD NULLAH IN SAI KUNG

NEC CASE BOOK
新工程合同案例集

Disclaimer

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Preface

The Construction Industry Council (CIC) is committed to seeking continuous improvement in all aspects of the construction industry in Hong Kong. To achieve this aim, the CIC forms Committees, Task Forces and other forums to review specific areas of work with the intention of producing Alerts, Reference Materials, Guidelines and Codes of Conduct to assist participants in the industry to strive for excellence. The CIC appreciates that some improvements and practices can be implemented immediately whilst others may take more time to adjust. It is for this reason that four separate categories of publication have been adopted, the purposes of which are as follows:

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Reminders in the form of brief leaflets produced quickly to draw the immediate attention of relevant stakeholders the need to follow some good practices or to implement some preventative measures in relation to the industry.

Reference Materials

Reference Materials for adopting standards or methodologies in such ways that are generally regarded by the industry as good practices. The CIC recommends the adoption of these Reference Materials by industry stakeholders where appropriate.

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The CIC expects all industry participants to adopt the commendations set out in such Guidelines and to adhere to such standards or procedures therein at all times. Industry participants are expected to be able to justify any course of action that deviates from those recommendations.

Codes of Conduct

Under the Construction Industry Council Ordinance (Cap 587), the CIC is tasked to formulate codes of conduct and enforce such codes. The Codes of Conduct issued by the CIC set out the principles that all relevant industry participants should follow. The CIC may take necessary actions to ensure compliance with the Codes.

If you have attempted to follow this publication, we do encourage you to share your feedback with us. Please take a moment to fill out the Feedback Form attached to this publication in order that we can further enhance it for the benefit of all concerned. With our joint efforts, we believe our construction industry will develop further and will continue to prosper for years to come.

Foreword

The NEC3 suite of contracts is a collaborative form of contract; it provides the framework enabling contracting parties to undertake construction projects in a spirit of mutual trust and co-operation. The Hong Kong Government had conducted a number of pilot trial projects using NEC3 since 2009, covering contracts of different types and works categories with different payment options available to NEC3.

As the Development Bureau continues to evaluate the effectiveness, as well as the limitation of NEC3 in delivering projects with cost, time and quality benefits; any verdict would require further experience from more extensive use of NEC3 in real life projects. However, early indication from industry stakeholders suggests that NEC3 may be a viable alternative to other existing standard form of contracts to be adopted in the local construction industry. The encouraging result of NEC3 trials is echoed in Hong Kong Government's commitment to promote wider use of NEC3 in public works contracts in the coming year, and will try to adopt target cost contract option in some larger scale works projects, which the Government believes will help improve the cost control of public works contracts

This case book was prepared with contribution from the Drainage Services Department; it represents a simple account of Hong Kong Government's first ever NEC3 project completed from the perspective of the project client. As with other contractual and commercial considerations, there will be differing views from different points of observation. Readers are encouraged to explore other sources of reference for a more comprehensive understanding of NEC3. The CIC maintains its support for all types and forms of collaborative contracts to drive for unity and excellence of the construction industry of Hong Kong.

From Zero to One:
The Formulation of Hong Kong Government's first NEC contract
Improvement of Fuk Man Road Nullah in Sai Kung

Project Background

This was where it all started. The Improvement of Fuk Man Road Nullah in Sai Kung (FMR), was the first Government works project in the Hong Kong Special Administrative Region, to adopt the New Engineering Contract Engineering and Construction Contract (NEC3 ECC). FMR aimed at improving the local environment of Sai Kung Town by decking over an existing 180 metre long and 12 metre wide open nullah, constructing the 4,000 square metre marine-themed Fuk Man Garden on top and upgrading of an adjacent roundabout (Fig. 1). The garden included seats shaped as water drops, a 30-metre-long sailing ship, and an 8-metre-long brass and stainless steel dragon boat sculpture, providing a landmark with a relaxing recreational environment for the public.



Fig.1 Bird's Eye View of Site Location

Option C Target Cost with Activity Schedule was chosen for this pilot NEC3 ECC project in Hong Kong. It was envisaged that the contracting parties would fully utilise the potential of this contract form to achieve time and cost savings and good quality of works by encouraging development of innovative and cost saving design solutions. The relevant contract information was summarised in Table A.

Pre-tender Estimate	HK\$63.1M
Final Target Cost	HK\$76.7M
Final Contract Sum	HK\$72.6M
Original Contract Period	31 August 2009 to 31 May 2012 (33 months)
Extended Completion Date	22 November 2012 (38.5 months)
Actual Completion Date	18 May 2012 (32.5 months)
Employer	Drainage Services Department (DSD)
Project Manager	Chief Engineer of Drainage Projects Division, DSD
Supervisor	Black & Veatch Hong Kong Ltd. (B&V)
Contractor	Chun Wo Construction Engineering Co. Ltd. (CW)
NEC Consultant	John Carlisle Partnerships (SEA) Ltd.

Table A Project Summary

Team Building in FMR

Mutual trust and cooperation is the pillar of success in every NEC project. To encourage the flow of ideas and prompt responses among the project team, considerable efforts were expended in conducting partnership trainings to nurture the spirit of cooperation as required under NEC. The organised partnering sessions and associated achievements are shown in Table B.

Session	Achievements
Initial Partnering Workshop	<ul style="list-style-type: none"> - Gain mutual understanding of each party's expectations - Relationship building - Set up mutual project objectives, values and behaviours and record them in the partnership charter
Quarterly Champion Group Meeting	<ul style="list-style-type: none"> - Review partnering performance between management staff in respect of mutual objectives, values and behaviours - Identify problems and determine direction to resolve major site issues
Quarterly Pioneer Group Review Meeting	<ul style="list-style-type: none"> - Review partnering performance between frontline staff in respect of mutual objectives, values and behaviours
Half-yearly Partnering Workshop	<ul style="list-style-type: none"> - Review site and partnering performance - Identify issues that hinder partnering and propose countermeasures
Partnering Workshop for Subcontractors	<ul style="list-style-type: none"> - Extend partnering training to the level of subcontractors - Build up partnering relationship among different subcontractors

Table B Partnering Sessions and Achievements

The partnering workshops and trainings provided the setup for the project team to develop the required mindset, but it is always a challenge for each party to adapt to a sharp cultural change in live projects. At the initial construction stage of the contract, the project team encountered a difficult time to adjust to and accept the high level of notifications, meetings and warnings as required by NEC3, in particular the project team had to comply with the explicit timeframe of reply as stipulated in the contract. Also, it was difficult to shift the attitude from the conventional one-way directive approach to the new partnering approach. Confrontation resulted from additional workloads and administrative efforts as well as the resistance to mindset change, which subsequently harmed the partnering working relationship.

From Confrontation to Collaboration

To overcome the challenge, top management of the project team demonstrated their commitment and leadership by proactively engaging in meetings to sort out the issues and respecting the other party as partner. It was ensured that all early warnings and notifications, instead of being used as contractual evidence for claims and disputes, had been submitted in a collaborative spirit for effective risk management and resolution of site issues as early as possible. As time went by, the project team appreciated that the notices and procedures in NEC3 were for mutual benefit to avoid tremendous effort in dealing with cost overruns and disputes at a later stage of the contract. The changed mindset resulted in a trusting relationship among the team; this was revealed in their set up of site accommodation - a common site office for all - Project Manager, Supervisor and Contractor all together, instead of separate site offices in a traditional contract. This common site office facilitated a prompt and effective communication to resolve problems immediately as they arose.

Overcoming challenges at the work place continued to provide individuals with great job satisfaction and fulfilment. The project team appreciated the joint efforts contributed by each member of the project team and extended the satisfaction beyond the workplace. The project team participated in various social functions as a joint team, such as the Sai Kung Dragon Boat Festival, to demonstrate and solidify the team spirit developed from the contract.



Fig. 2 Joint Site Office Arrangement



Fig. 3 Joint Team at Sai Kung Dragon Boat Festival

Effective Project Management by using NEC3 Contract Provisions

Risks are inherent in construction works, but provisions in the NEC3 contract encouraged collaborative foresight to mitigate problems and risks at an early stage. The pilot project team successfully put the NEC3 clauses into practice for effective project management.

Early Warnings and Risk Reduction Meetings

A real case example in FMR was the use of Clause 16.1 of the contract by the Contractor; when the footing of the existing nullah embankment structure was found to be different from the information contained in the tender drawing, an Early Warning Notice was issued for encountering the unforeseen ground condition. In the risk reduction meeting held between the Project Manager, Supervisor and Contractor, a quick decision was arrived at to carry out trial pits at various locations to ascertain the extent of potential conflicts.

With the information revealed by the trial pits, the Project Manager then promptly instructed the Contractor to modify the box culvert design to accommodate the unforeseen conditions. The instruction was issued to the Contractor within 2 weeks of issuance of the Early Warning Notice and before the planned commencement of the box culvert construction.



Fig. 4 Risk Reduction Meeting to handle Early Warning

With the openness and the drive for common objectives, the project team was willing to detect and notify each other of the risks that would have cost, time or quality implications. The Contractor responded that they were incentivised to give early warning. As noted by the project team, the early warning mechanism “gives an early opportunity for all parties to devise mitigation measures jointly and to select the best option”.

Implementation of Compensation Events

Apart from the Early Warning Notice, the Compensation Event procedure as stipulated in Clause 61 of the contract was essential in the early settlement of changes and hence avoidance of dispute. Among some 350 correspondences related to Compensation Events, the average time taken to reply in FMR was about 20 days and 80% of responses were completed within 27 days. The NEC3 required faster input by both the Project Manager and the Contractor, therefore speeding up the decision making and approval process. This in turn created a good foundation for building the collaborative working relationship, as the parties had to communicate very closely in order to make timely assessments and decisions. The efficient handling of Compensation Events also led to quick implementation, which expedited the overall progress and contract finalisation.

Achievements in the Project

With the concerted effort of every team member, it led to remarkable project success even though the use of the NEC3 form of contract was new to the pilot team. The project completion was within budget and 6 months ahead of the approved contract period. The other project targets and key achievements are summarised in Table C below.

Mutual Objectives	Targets	Achieved Performances
Within time	6 months ahead	Completed in 141 weeks against an extended contract period of 165 weeks, i.e. advance of 24 weeks
Within budget	5% shared gain	Total of the Prices: HK\$76.7M Final PWDD: HK\$72.6M = Gain share of HK\$4.1M (> 5%)
Meet requirements for: Quality Safety Environmental impact Traffic impact Public relations	No major rework Zero reportable incident No summon No suspension of TTA Settle complaint in 1 week	- Minor defects on non-critical items. Handover to maintenance party within 10 days of completion. - No recorded incidents of safety or environmental infringements - 3 safety awards - All complaints settled within 1 week
Landmark for public use	>1 letter of appreciation	8 letters of commendation

Table C Key Target Achievements

Time and Cost Savings

The NEC3 contract form provided incentives to the Contractor to complete the works earlier, which lowered the people, material and equipment costs and in turn resulted in a better gain share to both parties at the end of contract. This incentive was particularly important in case the contract price fluctuation was inflating significantly during the contract period, which could ultimately lead to the project costing more than expected and thus over budget. The FMR project was a good showcase to demonstrate how NEC3 mitigated the impact.

The tender estimate was made in 2009 base on the best available information. The contract was commenced immediately and was completed in 2012, during which the contract price fluctuation was inflating at a rate much higher than the forecast at the stage of preparing the tender estimate, thus already contributing to an increase in the Total of the Prices. Coupled with additional requirements of the Employer; such as enhancement works at Fuk Man Garden and roundabout, it turned out that the Total of the Prices of the contract during the construction stage was much higher than the pre-tender estimate. Nevertheless, the Contractor endeavoured to offset the impact by deploying more resources to complete the works earlier, so as to save the project expenses for sharing the gain between the Employer and Contractor.

Moreover, the project savings in FMR were also the result of good project planning and sequencing of works encouraged by NEC3. In NEC3 the Contractor had to show sufficient level of details, including, but not limited to, the order and timing of procurement, project risk allowances and floats, in the master programme for the Project Manager's assessment. It also required the Contractor to regularly update the programme so as to truly reflect the site condition and the impact that arose from the implementation of compensation events. Together with other project management tools such as early warnings and risk reduction meetings as abovementioned, the major project risks were identified at an early stage and were swiftly resolved to minimise the chance of prolongation to the contract, such that the final project expenses were \$4.1M lower than the target cost and the money saved became a gain shared by both parties.

Collaboration to achieve project excellence

Apart from the time and cost savings, NEC3 also promoted collaboration to achieve project excellence. The enhancement works at Fuk Man Garden were one of the project's achievements that was born from the dedication of the project team who followed the mutual trust and collaborative spirit of NEC. Collaborating with the District Council, the team decided in the middle of the contract period to organise a competition to engage local artists to design a new dragon boat sculpture. In view of the tight construction programme and huge coordination efforts required, it was undoubtedly a great challenge to carry out the competition and procurement exercise. Nevertheless, the three parties worked together as close partners to put the plan into action. While the Project Manager quickly invited the Hong Kong Sculpture Society and local artists to participate, the Supervisor promptly prepared the implementation details and the Contractor managed the tendering exercises, without affecting the main construction programme. The symbolic dragon boat sculpture at the marine-themed park is now a landmark in Hong Kong and it attracts thousands of foreign and local visitors every year.



Fig.5 The Dragon Boat Sculpture in Fuk Man Garden

Conclusion

It was the mutual trust and cooperative relationship of the Project Team, which established the remarkable case of success in this first NEC3 ECC in Hong Kong. With the collaborative working relationship, the provisions in the NEC3 form of contract allowed the contract parties to come up with effective and quick solutions to problems and achieve excellence in construction.

Acknowledgement

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Feedback Form

NEC Case Book - Improvement of Fuk Man Road Nullah in Sai Kung

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(Please put a "✓" in the appropriate box.)

1. As a whole, I feel that the publication is:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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Practical	<input type="checkbox"/>				
2. Does the publication enable you to understand more about the NEC3 Collaborative Contracts?	Yes	No	No Comment		
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