

# “No Pain, No Gain” The Art of Pain/Gain Share

Kwan On Construction Co. Ltd.  
Ambrose KWONG

**Client**  
Alstom Power

**Principal Contractor**  
Kier

**Lead Designer**  
Jacobs

**Value**  
£25m

**Contract Period**  
22 Months

**Contract Form**  
NEC 3 Option D (target cost with BoQ)

# Langage Energy Centre, Plymouth



Kier Construction contracted with Alstom Power to provide the civil engineering works for the new 885Mw Combined Cycle Power Station built for CENTRICA. This included foundations for Steam and Gas Turbines, Air Cooled Condensers, Heat Recovery Steam Generators, Transformers and other ancillary structures. The internal roads, drainage, structural steelwork and cladding to the Turbine Hall and ancillary buildings were also part of the Kier package.

The previous experience gained by successfully completing similar works on twelve other CCGT Power Stations over the past ten years enabled Kier Construction to bring added benefit to this complex project. The ability to plan, communicate, be flexible and operate well with other parties on the scheme is key to the team approach necessary to manage the interdependent work packages.



# Thomas Armstrong (Construction) Limited



**CLIENT:** Low Level Waste Repository (LLWR)

**PROJECT:** Replacement Trench Cap Run-Off Drain

**VALUE:** £500,000

**COMPLETION:** July 2010

**CONTRACT:** NEC 3 Option D

**DURATION:** 13 weeks

## PROJECT DESCRIPTION:

This project was to provide a drainage facility for the surface water run off occurring in the trench cap area. The works involved the demolition, removal and conversion of existing manholes, excavation, installation of temporary and permanent drainage system, welding pipework, new membrane installation and welding of the existing and new membranes.

The project was carried out under a vigorous stop work procedure due to the risks involved with excavating in unknown ground and the potential to uncover unknowns such as UXO's, TNT, radioactive substances, asbestos, etc.



## REFERENCES:

Jim Camall / Sean Southward  
LLWR  
Drigg  
Holmrook  
Cumbria



Images kindly provided by LLWR

# Relationships the key to option D bridge refurbishment



RICHARD SHIMELL AND GRAHAM MADSEN MOTT MACDONALD

works under ECC option D. While not commonly used, option D was appropriate for this contract as the bidder could accurately price the works based on the employer's best estimates of quantities in the tender documents.

Choosing option D rather than a priced contract with bill of quantities allowed the financial risk of the cost over repairs to be shared between the employer and the contractor and provided an incentive to the employer to work with the contractor to find efficient solutions. The contractor share percentage was set at 6% at less than 10% share range, 30% at 10-15% share range, 50% at 16-20% share range and 200% at greater than 20% share range.

Contractor Jackson Civil Engineering won the competitive tender with a proposed 37 week contract, with completion not before Christmas 2009. Mott MacDonald acted as the ECC project manager and supervisor for the on-site work with the Rochester Bridge Trust as the employer.

## Managing road and river traffic

The contractor took possession of the site in March 2010 and closed the upstream footway after establishing the necessary pedestrian diversions. To provide a safe loading and unloading area on the long but narrow footway site, a single lane closure of the dual carriageway crossing the bridge was put in place whenever necessary. This closure was restricted to off-peak traffic hours to minimise the impact on the busy A2 toward London.

A cantilevered scaffolding platform was required to provide a safe working platform to demonstrate the balustrade. It was assumed at tender stage that this platform would extend below the bridge soffit in the event that it would exceed shipping clearance limits. One span of the bridge would thus be kept free of scaffolding throughout the works to provide a navigation span.

The regularisation meetings with Medway Port Authority established development of a scaffolding design that restricted, but did not control, shipping clearance limits. This had significant programme implications as the platform could be installed on all three spans at once. The project team met the maritime body to discuss shipping of restricted clearance in the traditional manner, by hanging at illuminated side of bay above the navigation span.

## Early warnings for each defect type

Once the scaffolding platform of the first span was complete, deconstruction of the balustrade could commence. Mini diggers were able to track along the upstream bridge footway between the scaffolding members to lift out the heavy cast-iron balustrade sections. As expected, numerous latent defects in the cast iron were discovered, particularly after factory blasting in some layers of existing paint. A latent defect register was managed by the supervisor in conjunction with the contractor to assign an early warning reference to each type.

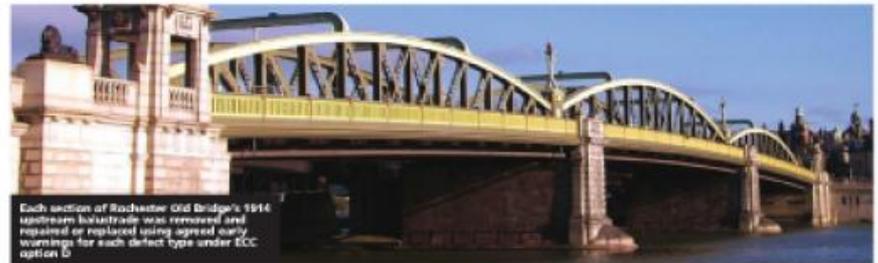
The project team held a series of targeted risk meetings to learn from repair options for each type of defect. The project manager was able to draw on experience of the recent refurbishment of Newark High Level bridge to provide advice on cast iron repair techniques, such as cold metal stitching, plate bolting and heating. Good relationships between the project team allowed these risk meetings and resulting crossing closure to operate to the spirit of the contract, despite the possible programme and cost implications of decisions.

Quick meeting by the contractor allowed the project manager to obtain the employer's understanding of issues and assess the financial and quality implications of selecting a particular option. This engaged the employer with the project and allowed the underlying principle of quality repair over cost to be agreed. As decisions were taken, emergency events relating to defect types were accepted with the most up-to-date quantities based on the last team-to-team register.

## Significant extra work added

The poor caps of the balustrade prevented the haultrails in the gress, taking incidental loading down into the main bridge structure. During the works on the first span it became apparent that this load path had been broken sometime in the past when the deteriorating original cast-iron post caps had been replaced.

A project team risk meeting and option costing allowed agreement from the employer for an increase in order to install new cast-iron caps. This solution was in keeping with the bridge heritage features and would not cost substantially more than the alternative of installing additional concrete in between the haultrail and the gress.



Each section of Rochester Old Bridge's 1914 upstream balustrade was removed and repaired or replaced using agreed early warnings for each defect type under ECC option D

# HK Pilot Project for NEC-Option D

## “Target contract with bill of quantities”

### Contract No. DC/2012/05

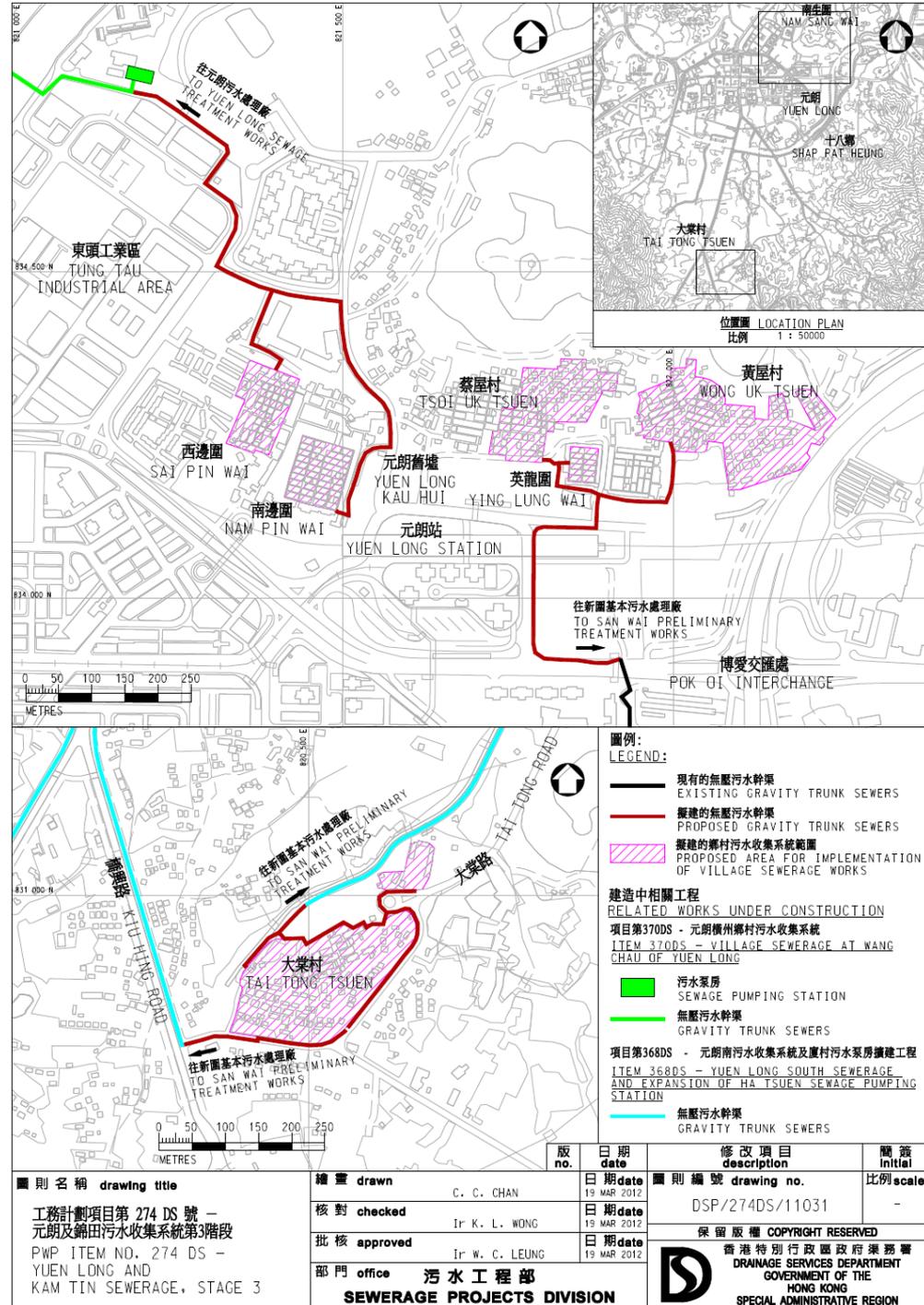
### Sewerage at Yuen Long Kau Hui & Shap Pat Heung

- Employer : Drainage Services Department
- Project Manager : Black & Veatch HK Ltd.
- Supervisor : Black & Veatch HK Ltd.
- Contractor : Kwan On Construction Co., Ltd.
- Contract Date : 2012-08-29
- Starting Date : 2012-09-06
- Completion Date : 2016-09-05 (1,461 Days)
- Contract Sum : \$144.8M

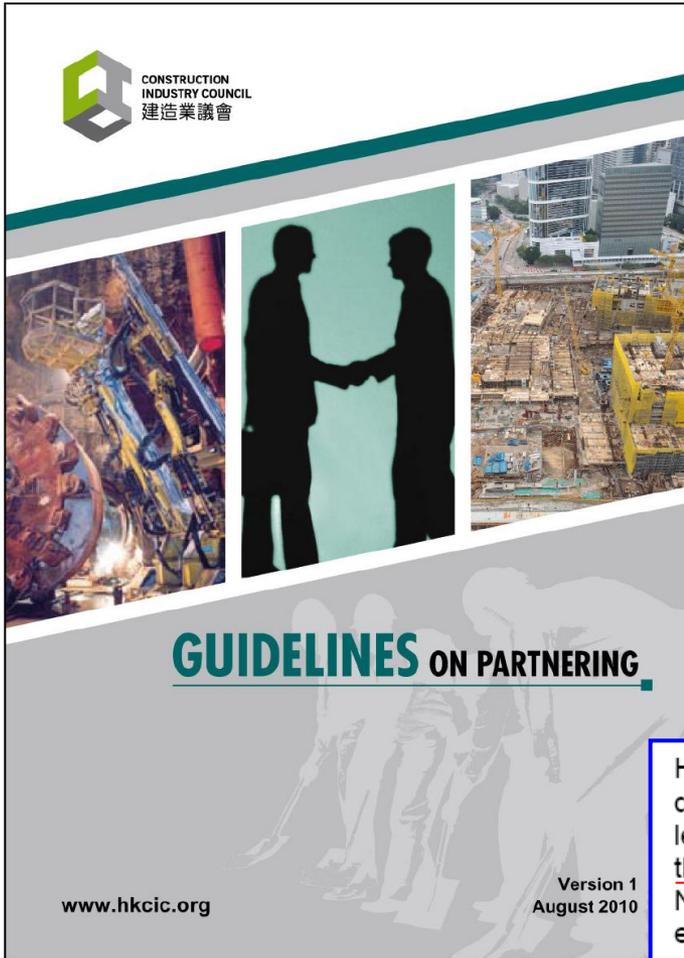
# Project Scope

The works mainly comprise:

- Construction of about 6.5km of sewers for 6 unsewered areas, namely Sai Pin Wai, Nam Pin Wai, Tsoi Uk Tsuen, Ying Lung Wai, Wong Uk Tsuen and Tai Tong Tsuen;
- Construction of about 3.6 km of gravity trunk sewers in the vicinity of aforesaid areas; and ancillary works.



# Pain 1 : NO Previous Experience

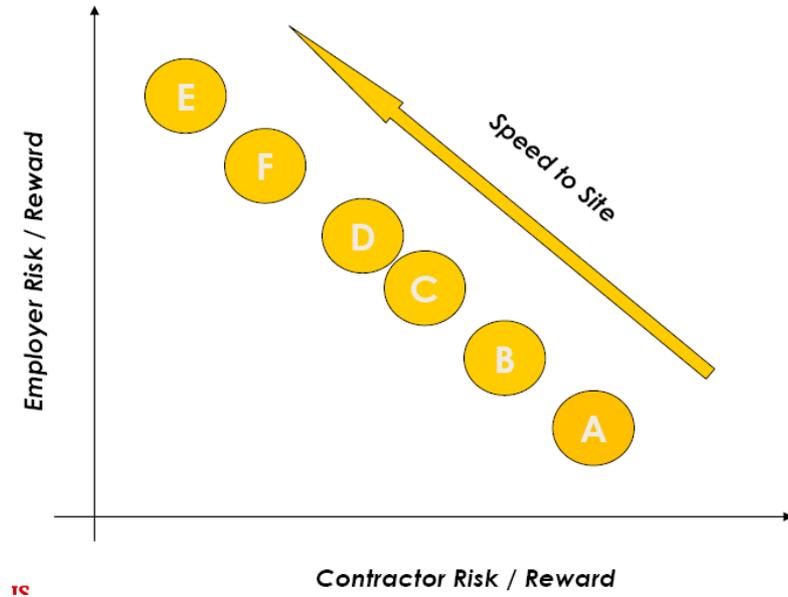


CONSTRUCTION INDUSTRY COUNCIL  
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**GUIDELINES ON PARTNERING**

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However, this form of contract requires greater involvement by the Employer in the day-to-day management of the project and unfamiliar administrative procedures may lead to higher administrative costs and a drain on accounting resources. As such, this option is more appropriate for parties who have previous experience using other NEC3 main options or parties who have readily available technical and managerial expertise.

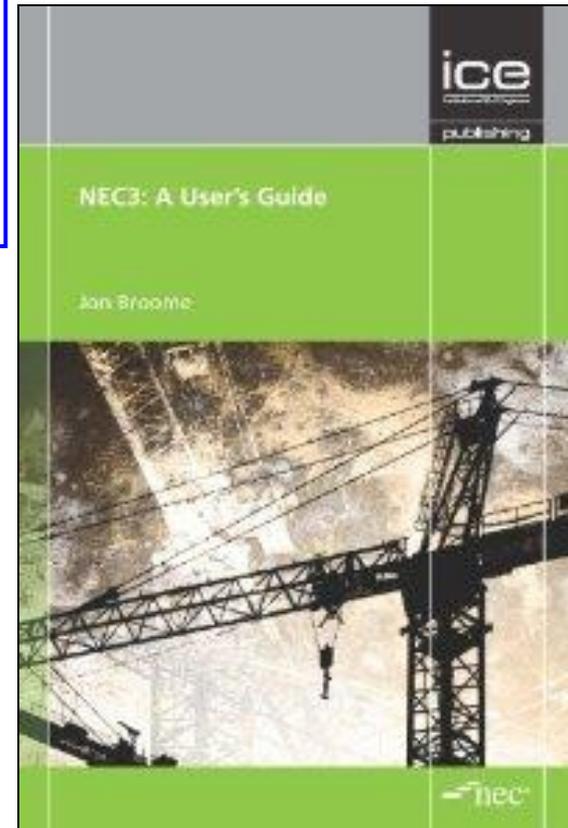
# Pain 2 : Insurance

Drainage Services Department Contract No. DC/2012/05 Sewerage at Yuen Long Kau Hui and Shap Pat Heung					
BILL NO. 1 - PRELIMINARIES					
BQ 1 - 1					
Item	Description	Quantity	Unit	Rate (HK\$)	Amount (HK\$)
<u>SECTION 1 - PRELIMINARIES</u>					
<u>Securities, Sureties and Insurances</u>					
1.007	Third party insurance	-	item	-	

## NEC3: A User's Guide

### Section 2.3.3.2 - Item 7

- “...Note that the cost of taking out insurances is **NOT** a Defined Cost, and therefore needs to be included in the **fee percentage**.”  
(See Gain 1 : Fee Percentage)



# Pain 3 : Pay for Safety & Environmental Scheme (1)



**Development Bureau**

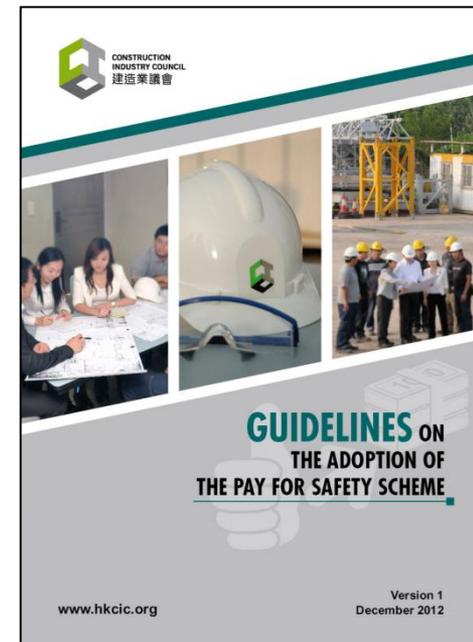
The Government of the Hong Kong Special Administrative Region



## My Blog

### Fostering a culture of site safety

The Pay for Safety Scheme implemented in public works projects has all along been supported by the industry. The objective of the scheme is to remove the provision of site safety measures by contractors from competitive tendering. Contractors will receive monetary reward from the Government upon implementing the safety related items prescribed in tender documents in which related costs have been independently fixed beforehand. Since the launch of the scheme in 1996, the rate of site accidents in public works projects has dropped by 80 per cent, from 56.6 per thousand workers in 1996 to 9.7 in 2012. The Construction Industry Council released the "Guidelines on the Adoption of the Pay for Safety Scheme" last year to encourage the industry to adopt the scheme in both public and private construction projects.



# Pain 3 : Pay for Safety & Environmental Scheme (2)

- The intention of PFSES is that each tenderer for a specific construction project will receive the same pre-priced safety items, and thus separating the safety and health provisions from competitive tendering.
- Each item will be pre-priced on the basis of a total possible payment to the Contractor of approximately 2% of the estimated Contract Sum/total estimated expenditure, not including the Contingency Sum or any sum for the payment of fluctuations.
- All safety staff costs under NEC Option D contract are **NOT** defined costs and the contracting parties can equally share the savings.

Incentive : 2% → 1%

# Pain 4 : Learning Curve

- Following the award of contract, all the parties start to work together on the “Procedure for selecting subcontractors / Suppliers” in accordance with Additional Conditions of Contract C10 Tender Requirements for Subcontracting.
- All the procedures have to be agreed before inviting any tenders for any subcontract.
- These take up to 6 months before significant physical works happen on site.

**Physical work done *very little*  
in the first few months**

# Pain 5 : Negative Cash Flow

- In this contract, recovery of overheads is effected through the fee percentage on the Defined Costs of the physical work done. In the first few months, there is **very little** physical work done.
- The Contractor is paid the amount of Defined Cost plus the Fee due.
- Recovery of the overheads in the first few months will be **very little**, resulting in a **negative cash flow**.



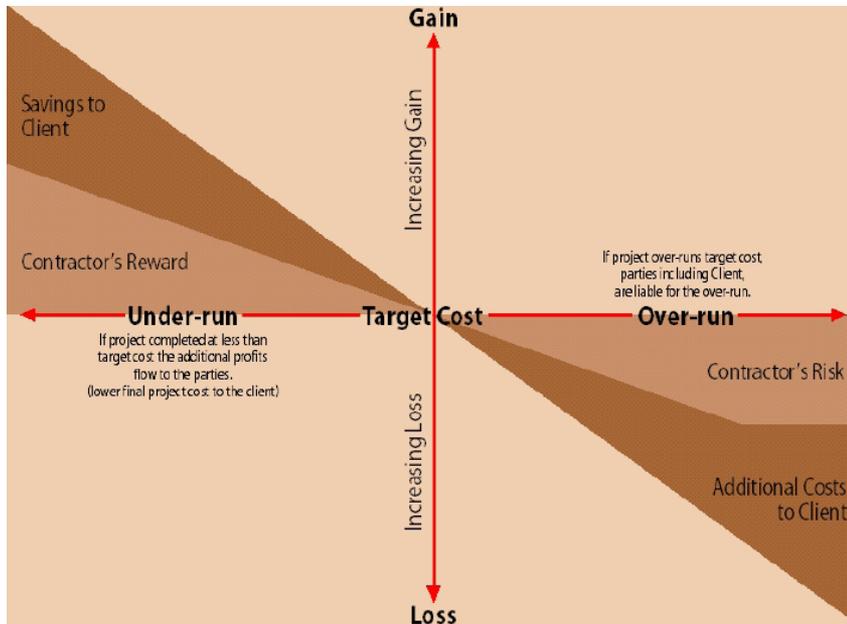
# Gain 1 : Fee Percentage

- The Contractor tenders a target price in the form of the Prices using the Bill of Quantities. The target price includes the Contractor's estimate of Defined Cost **plus his Fee**, which covers other costs (**e.g. Insurances etc.**) and overheads.
- The Contractor tenders his Fee in terms of a fee percentage to be applied to Defined Cost. The tendered fee percentage is subject to a pricing **limit of 35.00%**.
- During the course of the contract, the Contractor is paid the amount of Defined Cost **plus the Fee due**. This is defined as the Price for Work Done to Date.
- This is an **incentive** for the contractor to **progress quickly to recover the overheads**.
- The contractor also has an incentive to economize on overhead expenditures under the fee percentage arrangement.

# Gain 2 : Greater Efficiency

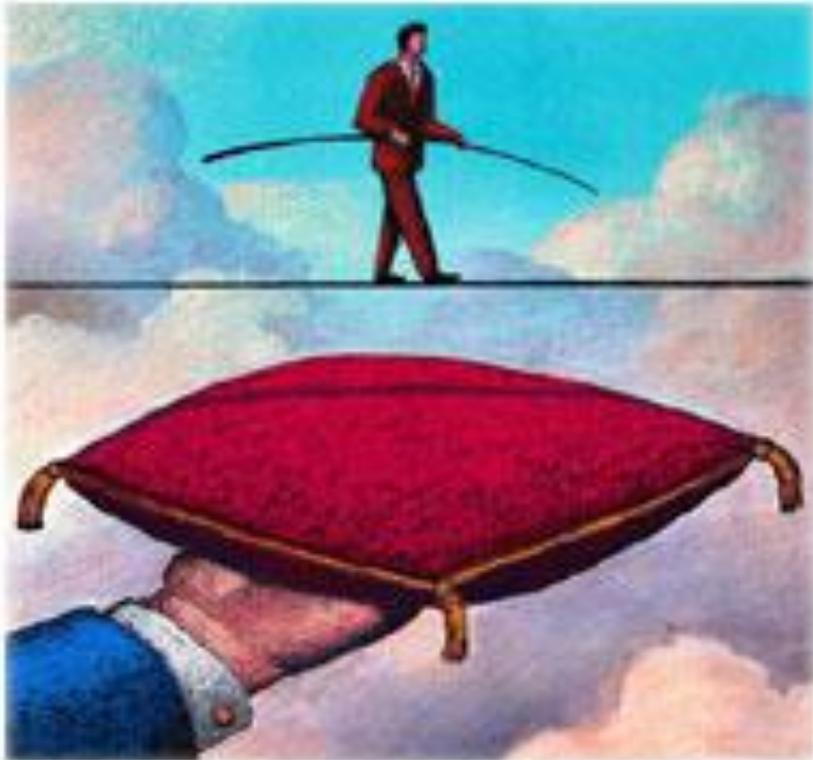
- The biggest difference between NEC and traditional forms of contract is that NEC has built in clear procedures to ensure progress of works.
- This includes requirements such as “Early Warning” and “clear stipulation of response time”.
- NEC also has clear time frame set for handling changes and compensation events.
- Both contracting parties are required under the contract to deal with them as quickly as possible.

# Gain 3 : Equitable Risk Allocation



- Under NEC, there is a fairer risk-sharing mechanism for allocating risks, such as risks in handling unforeseen ground conditions and inclement weather, between the contracting parties.

# Gain 4 : Risk Management



- In traditional contract, there is not clear risk management procedure for the parties to jointly mitigate the risk.
- In contrast, NEC provides an early warning mechanism. Either party can give early warning to the other when there is a problem likely to cause an impact on the project.
- As soon as an early warning is notified, the parties will then sit down together, and figure out the best solution to mitigate the risk.

# Risk Management Vs Value Engineering

## Manage threat OUT

- Initiation phase
- Identification
- Assessment
- Response planning
- Response implementation

## Manage opportunity IN

- Information phase
- Speculation
- Evaluation
- Development
- Recommendation

**A better end product can be achieved for the same money!**



# Gain 5 : Pain/Gain Share Mechanism



- Such mechanism motivates all the parties to cooperate and to jointly manage the construction risks more vigilantly and as early as possible to reduce costs.

# Gain 6 : Relationship (Employer, Contractor & Sub-contractors)

## Traditional Contract

- Adversarial Relationship



## NEC Contract

- Cooperative Relationship



# Safety Awards



# Good Practice following award and the crucial first few months

The principal issues to be addressed in the first few months :

- training – or, more precisely, common understanding of the system - for those involved in running the contract
- putting in place a system and protocols for the efficient administration of the contract (i.e. how we are going to communicate, both informally and formally)
- payment, especially where the Contractor is reimbursed his costs (e.g. options C to F) and how the pain / gain share operates under options C and D
- making best use of the programme, so that there is always an up-to-date, understood, agreed and accepted programme
- operating the early warning and risk-reduction process
- quickly and amicably agree quotations for compensation events / development of the programme by the Contractor and, if possible, acceptance of the programme by the Project Manager

# From Pain to Gain

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- Good contract management is not something which happens by chance.
- With good discipline and contract management the need for adversarialism falls away and the contract is well managed.
- This is a **HAPPY Pain** to **Gain** Experience.

**Partners with a Common Goal!**

# NEC-Option D REVOLUTION

# NEC-Option D REVOLUTION