

# An Overview of Key Road Maintenance Issues in Hong Kong

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# Introduction



# Road Network in Hong Kong

The road network in Hong Kong in 2011 consists of:

- **2,070km** public road
- **3,800** nos of highway structures (1,300 flyovers, 1,170 footbridges and subways, 15 major road tunnels)



# Road Maintenance Contracts in Hong Kong

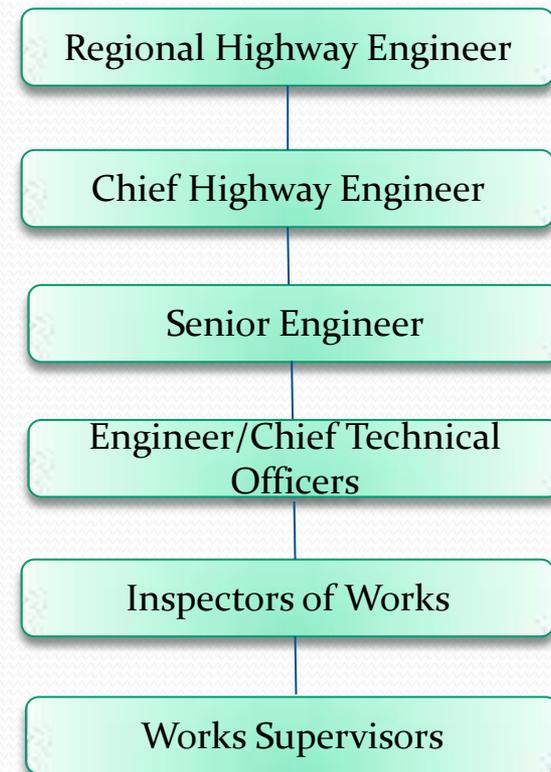
Currently, there are **8** term maintenance contracts for roads within respective designated geographical areas covering Hong Kong Island, Kowloon and New Territories.

- **1** contract in Hong Kong Island
- **2** contracts in Kowloon
- **3** contracts in New Territories
- **2** contracts for High Speed Roads



# Management Structure of HyD for Road Maintenance Contracts

Two Regional Offices of HyD (i.e. **Urban and New Territories Offices**) are responsible for administering the road maintenance contracts.



Management Structure



# Procurement of Contract



# Open Tendering

- HyD procures in-house managed term contracts through competitive open tendering.
- Tender Notice is published on the Government's Gazette.



# Eligibility of Contractor

Only those on the List of Approved Contractor for Public Works are eligible to tender for term contract.

<u>Category</u>	<u>Tender Limit</u>
Group B Contractor	HK\$75 Million
Group C Contractor	HK\$210 Million



# Marking Scheme Tender Evaluation

## Purpose:

- to prevent throating-cutting bidding by poorly performing contractors
- to ensure the contract is awarded to technically competent contractor with good performance track records



# Tender Submission

Tender submission consists of:

- Tender Price
- Technical Submission



# Tender Price

- In *Schedule of Rates*, HyD predetermines a standard market rate for each works item in the trade sections.
- Tenderers offer *Item Percentage, Adjustment Percentage* (increase or decrease) for the trade sections.



# Tender Price

## SCHEDULE OF CONTRACT PERCENTAGES

S of R Section/Item Nos.  (1)	Item Percentage (%) (2)	Adjustment Percentage (3)	Contract Percentage (%) (4)	Weighting Factor (5)	Value for Tender Analysis (%) (6)
Group A (comprising Section 01)		*PLUS/ MINUS %		0.1651	
Group B (comprising Sections 08, 09 and 34)				0.0628	
Group C (comprising Sections 10, 11 and 12)				0.0418	
Group D (comprising Sections 04, 18, 20, 22 and 25)				0.0220	
Group E (comprising Section 37 Items 37181 to 37184)				0.0624	
Total				1.0000	



# Tender Price

- ▶ **Contract Percentage** is calculated from Item Percentage and Adjustment Percentage inserted by the tenderer.

## Contract Percentage

$$= \frac{(100 + \text{Item Percentage}) \times (100 + \text{Adjustment Percentage})}{100} - 100$$

- ▶ The total of Value for Tender Analysis is to be the summation of Contract Percentage Multiplied by **Weighting Factor** for each trade section.



# Technical Submission

Technical Submission includes Four Sections:

- Tenderer's Experience
- Tenderer's Past Performance
- Tenderer's Technical Resource
- Tenderer's Technical Proposal

Of which, **Technical Resource** and **Technical Proposal** form part of contract.



# Marking Scheme - Formula

Weights for price to technical score: **60/40**

Formula for determining **Overall Score**:

$$= 60 \times \frac{100\% + \text{lowest total value for tender analysis among those confirming tenders}}{100\% + \text{total value for tender analysis of the tender}} + 40 \times \frac{\text{the technical score}}{\text{the highest technical score among confirming tenderers}}$$

Normally, the tender with the highest overall score will be recommended for the award of the contract.



# Form of Contract



# Form of Contract

- Form of Contract: Term Contract with Schedule of Rate (SoR)
- Term of Duration: 4-8 years
- Estimated Contract Sum: HK\$100Million per year



# Contract Documents

- General Conditions of Contract
- Special Conditions of Contract
- General Specification
- Particular Specification
- Schedule of Rates
- Units and Method of Measurement to the Schedule of Rates
- Drawings



# Type of Maintenance Works



# Type of Maintenance Works

- Maintenance works can broadly be classified into four types:
  - **Corrective Repair**
  - **Preventive Maintenance**
  - **Rehabilitation**
  - **Minor Improvement**



# Type of Maintenance Works

## Corrective Repair:

to rectify defects identified during regular inspections or reported.  
e.g. Patching of pot hole, sealing of cracks on pavement, fixing damaged/ defective traffic signs etc.



Patching of pot hole



Sealing of cracks



# Type of Maintenance Works

## Preventive Maintenance:

to prevent defects from occurring and be carried out on a regular basis .  
e.g. Clearance of road drainage, clearance of catchpits, re-painting of road marking etc.



clearance of catchpits



re-painting of road marking

# Type of Maintenance Works

**Rehabilitation:** to restore the serviceability and structural conditions of roads and highway structures. e.g. Road resurfacing and reconstruction works etc.



Road resurfacing

# Type of Maintenance Works

## Minor Improvement:

to improve to use of better of newly materials, modify the changes or needs for traffic or pedestrian needs.

e.g. Minor road widening ,Installation of metal steel barrier for high speed road.



Minor road widening



Installation of metal steel barrier

# Inspection and Planning of Maintenance Works



# Road Inspection

- Provide information for the long term **planning** of maintenance works and trigger the **emergency repair of defects**.
- Two types of Road Inspection: **Safety Inspection(SI)** and **Detailed Inspection (DI)**



# Road Inspection

## Safety Inspection:

to identify defects that are likely to create a danger or serious inconvenience to the public.

Type of Roads	Inspection Frequency
Red Route and Pink Route	Monthly
Trunk Road and Primary Distributor Roads	Monthly
Footway	Weekly
Other Roads	Every 1-3 months



# Road Inspection

## Detailed Inspection:

to determine the surface and structural condition of roads and collect relevant data for planning mid and long term repair work.

Type of Roads	Inspection Frequency
All Roads	Every 6 months



# Funding for maintenance of work

Two funding sources for highway maintenance works

- **Maintenance Votes**
- **Block Votes**



# Funding for maintenance of work

## ➤ **Maintenance Votes**

Repair of potholes, minor road resurfacing( <1000m<sup>2</sup>) maintenance of street furniture/surface drainage works and emergency repairs ..etc.

Funds for the Maintenance Votes are allocated annually through the Resource Allocation Exercise (RAE) in April. The funds allocated to the Maintenance Votes will not be subject to changes throughout the whole financial year.



# Funding for maintenance of work

## ➤ **Block Votes**

Road reconstruction/ resurfacing(>1000m<sup>2</sup> but less than 2000m<sup>2</sup>)

Minor improvement work on highway features  
improvement/ stabilization of roadside slopes

Funds for the Block Votes are funded from the Capital Works Reserve Fund (CWRF), the technical approval from the respective Chief Highway Engineer (CHE/CE) should be sought before funding approval.



# Management of Works Orders



# Form of Works Order

Maintenance works are carried out by the issue of works orders to the term contractor, which include:

- Description of the works
- Estimated value of works order
- Drawings and quantity of works
- Location
- Time for completion
- Other necessary information



# Sample of Works Order

Contractor's Copy

**HIGHWAYS DEPARTMENT**

Works Order No.

Check

**BB041551 -4**

Contract No.

\*Date of issue

Location Code

Element Code

013/HY/2009

30/10/2012

31

602124100

TA

Financial Code

Days for Completion

Estimate

Contingency Sum

61005000054310

37

\$ 432

\$ 0

From

Highways / Urban (Kln)

To

CRBC - WCCL JV

Please carry out / supply as detailed below on or before

05/12/2012

under the terms of the Contract.

IOW / ALOW

YAU Pui Hung

Signature

Received by

(Site Agent's Signature)

Designation

DE/MK

Date

30/10/12

\*For covering works order date of issue should be the date of commencement.

**Location**

POK MAN STREET  
NEAR TAI KOK TSUI ROAD  
DMK (MONG KOK)  
WRF No.: WR/HY/TE/KL/12/02284  
File Ref.: HyD  
UK/12-10/8/9(L/M)10  
Small Scale Works 1: S367154  
Daily Report is required

**Description of Works**

Proposed erection of T.S. " No Left Turn " as shown in the enclosed drg. no. K120578.01:  
1. Fix traffic sign and post (1 set)  
Remark: TS supplied by Government  
Supply for Temp Use & Maint. LSG

# Cost Estimate for Works Order

Allow for all the items necessary for the completion of works specified in a works order

- **5% allowance** should be limited for uncertain works in the works order
- Include an allowance for contract **price fluctuation payment**
- To be signed by Works Supervisor (WS), checked by Inspector of Works (IOW) and endorsed by Engineer/Chief Technical Officer(E/CTO)
- To be reviewed regularly and revised accordingly if quantities are found to differ substantially



# Computer System for Processing of Works Orders

**MAINS**, an integrated Maintenance Account Information System for estimating, issuing, accounting, payment processing and finalizing of Works Orders.



# Supervision of Works

- **E/CTO and IOW** ensure the progress of works is timely and properly carried out by the contractor
- **IOW** to conduct site audits in progress, resources, workmanship, quality of material and contractor's performance
- **Works Supervisors (WS)** to record their observations in site diary for works order with time for completion exceeding 3 months
- Site check record form for works order with time for completion less than 3 months and checked by **IOW**



# Supervision of Works

**(100 % supervision for the following works)**

- filling and compaction of earthwork materials;
- placing of concrete to a structure, road pavement or footpath;
- laying and compaction of bituminous material;
- construction of protective surfacing to slopes, and
- installation of soil nails/ rock bolts;
- strategic routes with potential significant traffic impact;



# General and Specific Guidelines of Supervision

## ➤ General guideline

Critical stages/ features of works shall be checked as far as practicable.

## ➤ Specific guidelines

Buried pipes and ducts – verify size, depth before backfill.

Foundation of street furniture, traffic sign and railing can be checked by Photographs or open up if any query occur (if large quantity is involved a minimum of 10% to be inspected).

Random checking of clearance of drainages.



# Site Instruction

- Given by Engineer's Representatives for any changes of works originally described in a **works order**.
- The certification and payment of works are solely upon the works instructed in **the Works Order** and any additional work without a proper covering Site Instruction will result non-payment of the works completed.
- If works cannot commence within a reasonable time for reasons not due to the contractor's fault, **Site Instruction** can be issued to cancel the Works Order.
- **Site Instruction** can be given verbally followed by a covering written instruction as soon as practicable.



# Variation Order

- The Engineer may issue a **Variation Order** if he may consider necessary to any works or material ordered under a works order. Such variation may include :
  - additions, deletion, substitution, alternations, change in quality, form, character, kind, position, dimension, level or line
- **Variation Order** can be applied to a particular works order or to the contract as a whole .
- The valuation of the rate shall accompanied by a clear description of the works, method of measurement and item coverage.
- The **Variation Order** shall not be ordered without good justification and prior approval from a senior officer of Director level.



# Certification of Works

- WS to certify the **completion** of works.
- IOW to assess the application of **extension of time (EOT)** ,should it requires.
- WS to certify **Hidden Works Records** and endorsed by IOW and E/CTO.
- **Highways Maintenance and Accounting Information System (HyDMAINS)** will check **dimension book** submitted by the Contractor and form batches make up of many works orders.
- Payment will be released to the Contractor after sample site check of dimension book for each batch of not less than 10% by number and agreed the adjustment /correction with the Contractor accordingly.



# Management and Maintenance (M&M) Approach



# Traditional Approach

	Role	Responsibility
Engineer	<b>Supervisor</b>	Inspect the public roads, identify and plan the maintenance works
Contractor	<b>Works Agent</b>	Carry out the maintenance works



# M&M Approach

## Purpose of M&M Approach

- To maintain and up keep the performance standard of all road network in achieving the performance pledge to the community by Highways Department **through the actual site inspection** .
- To provide data to facilitate planning, programming, inventory data collection, maintenance history recording, data storage, compliant handling, preparing management reports and retrieval of all aspects of the maintenance, inspection, remedial and repair works **through the Electronic Maintenance Management System (EMMS)** .



# M&M Approach

## Purpose of M&M Approach

- To retrieve data of all inventories such as the location and number of traffic sign post / railing/ crash cushion / beam barrier,etc , date of installation, date of repair and total number of repair within a certain period of time.

It also contains data of assessment of the defects recorded for the carriageway and footway regarding the extent and degree of each defect collected from the detailed inspection. It enhances the client to formulate and programme the maintenance works needed in accordance to the rating of the defects in the analysis and report.



# M&M Approach

In 2004, the HyD introduced M&M provisions in the term maintenance contracts to achieve efficiency and staff cost saving.

	Role	Responsibility
Engineer	<b>Auditor</b>	Conduct audits and inspections of Contractor's work
Contractor	<b>Asset Manager</b>	Manage and maintain the road network within the contract areas up to the performance standards specified in the contract



# Mechanism for Measuring and Monitoring Contractor's Performance

## Engineer's Audits

- Check the maintenance works completed by contractor on a sample basis;
- Percentage check is about 3-5% of the M&M works;
- Measure the contractor's performance by ascertaining the number of defects in the selected samples.



Audit to M&M works

# Mechanism for Measuring and Monitoring Contractor's Performance

## Engineer's Inspections

- Carry out inspections on work items not included in Engineer's audits (e.g. check the adequacy of lighting, signing and guarding);
- A default notice (DN) will be issued for non-compliant items found;
- A fixed sum will be deducted from the contract payments due to non-compliant items .



# Payment for M&M Works

- **Monthly lump sum fee** for each type of services provided under M&M provisions.
- **Performance-linked Payment.** Payment deductions will be made according to the achievement of the performance standards.



# Performance Standard

Performance Standard(%)	Entitlement to monthly sum
0	Full
1-5	90%
6-10	80%
11-15	70%
16-20	50%
21-25	30%
>25	0



# Performance Standard

- Performance Standard (%)

$$= \frac{\text{Total number of non-compliant defects identified by the Engineer in the relevant 3 month period}}{\text{Total number of inspected items by the Engineer in the relevant 3 month period}}$$



# Performance Standard

## Advantage of M&M approach

Client can **reduce** the number of the site staff due to the works load of inspection and issuance of works order for **minor maintenance works** has been transferred to the responsibility of the Contractor.

Existing site staff can **focus on enhancing the improvement works**, handling public compliant and carry out more inspection for other works of **essential operations**.



# Performance Standard

## Disadvantage of M&M approach

- **Any non-compliant defects identified in the audit inspection** will have to be rectified and to submit completion report of rectification. This impact is adversely leading to additional inspection which will have to be conducted by the site staff to ascertain the contractor has completed all rectification satisfactorily
- The Engineer may have to **co-ordinate with surprise** check to M&M works more often due to the level of performance of the **contractor being not stable and convinced.**
- The Engineer may not feel comfortable of the other inspections which have not been sampled for audit due to the trustworthiness and quality performance of the contractor is in doubt.



END

*Thank You*

