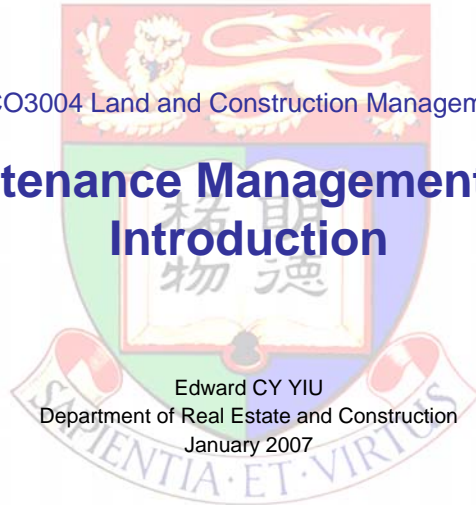


RECO3004 Land and Construction Management III

## Maintenance Management – An Introduction



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## Intended Learning Outcomes

- Case Study of MM in Shopping Centres
- What is Maintenance Management
- Major Concepts of MM



# Property Management of Shopping Mall

- Property Management
  - Day-to-day (Routine) management works of a shopping mall.
  - Mainly concern the efficient running of the premises for the enjoyment of patrons.
  - **Maintenance Management refers to how well they are maintained???**

## Case Studies

Lok Fu Shopping Centre



Chuk Yuen Shopping Centre



VS

# Background Information

	LF Shopping Centre	CY Shopping Centre
Year of completion	1985	1985
Number of storey	3	2
Property Management Company	Gold CXX Property Management Ltd. (中X物業管理有限公司)	NXX Property Management Ltd. (嘉X物業管理有限公司)

# Maintenance



fire doors to exit routes were broken and jammed open

# Maintenance



Dirty sprinkler head



Holes on wall without proper sealing up

# Routine Management

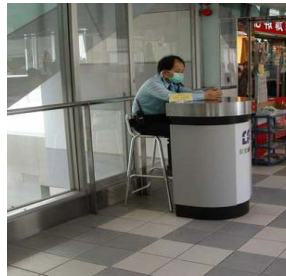
Unobstructed exit route



Clear corridors



# Security



Guard posts and security personnel



CCTV

# Cleansing and Refuse Collection



Well-maintained refuse collection chamber



Regular cleaning in the centre



# Space /Signage

Clear signages



Spacious and decoration



## What is Maintenance?

- BS 3811: 1984
  - Building Maintenance is The combination of all technical and associated administrative actions intended to **retain an item in, or restore it to**, a state in which it can perform its required function.
- HMSO (1972)
  - Work undertaken in order to **keep, restore or improve** every facility, i.e. every part of a building, its services and surrounds, to a currently accepted standard and to sustain the utility and value of the facility.

## Purposes of Building Maintenance

- Seeley (1992, p.11)
  - Protecting health and safety of occupants and public at large;
  - Retaining value of investment;
  - Maintaining the building in a condition in which it continue to fulfill its functions; and
  - Presenting a good appearance.

## What is Maintenance Management?

- BS 8210: 1986
- Guide to Building Maintenance Management
  - Scope (General)
    - Stresses the **advantages of economy and convenience** which may result from the **regular and planned maintenance** of a building and its services;
    - Provides a check list of types of construction and many of the materials and components commonly encountered;
    - Considers the bearing that the external and internal environments and the type and intensity of use will have on the frequency of inspection and maintenance;
    - Stresses the importance of up-to-date building fabric records and engineering services records and makes recommendations as to their content, preparation and use in respect of maintenance;
    - Considers the advantages of maintenance guides for individual buildings;
    - Makes recommendations as to the frequency of types of inspection, the reporting on these inspections, the planning of necessary maintenance work and the making of arrangements for the carrying out of such work;
    - Draws attention to the need for safe access for both inspection and subsequent work;
    - Discusses health and safety requirements applicable to inspection and maintenance work.

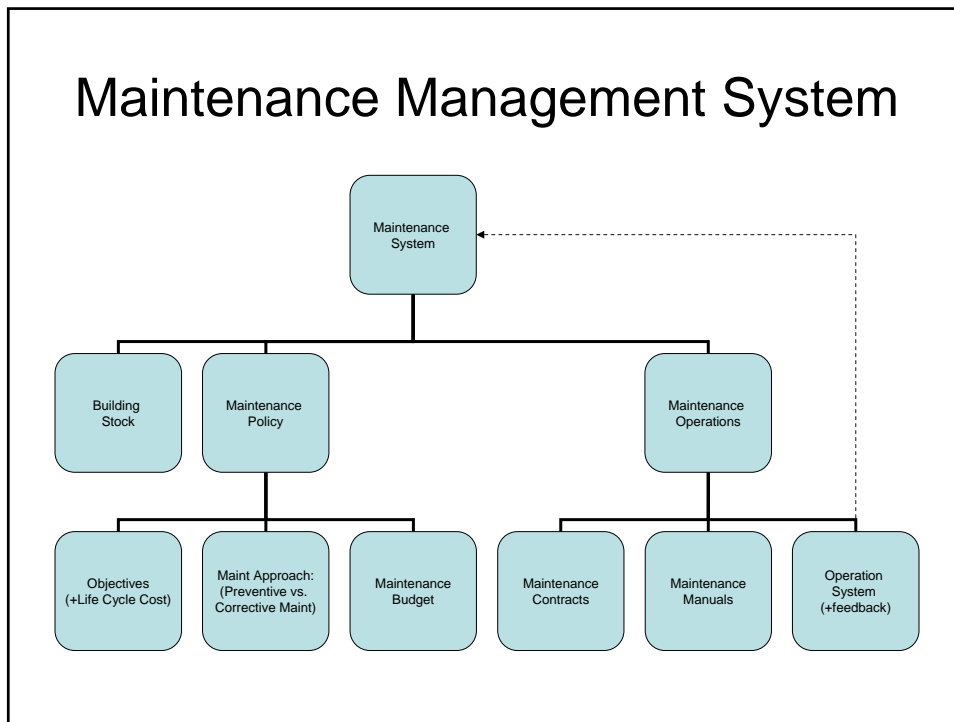
## What is Maintenance Management?

- BS 8210: 1986
- Guide to Building Maintenance Management
  - Exclusions
    - Domestic and frequent routine cleaning;
    - Detailed guidance as to how various types of maintenance work should be carried out for which reference should be made to the appropriate British Standard publication covering the product, component or type of work involved;
    - **Improvements, additions or alterations** of a building to make it suitable for a purpose other than that for which it was designed; however, it may be noted that it is frequently necessary and economically desirable to carry out maintenance at the same time as such work;
    - Maintenance of civil engineering structures.

## Improvements - Include or not?

- Bayview Mansion v. Chan Cheung Kit Mui Margaret [1995] HKLD 125
  - S.18(1)(a) Building Management Ordinance (Cap. 344) [1993 version] stipulated that the duties and powers of the owners corporation were to “maintain the common parts and the property of the corporation in a state of good and serviceable repair and clean condition.”
  - The court held that **renovation works** could **not** be described as **maintenance works** to keep the common parts in a state of good and serviceable condition.
  - The BMO was then amended in 1998 to empower the oc to “renovate, improve and decorate the common parts of their buildings.” in s.18(1)(fa)

# Maintenance Management System

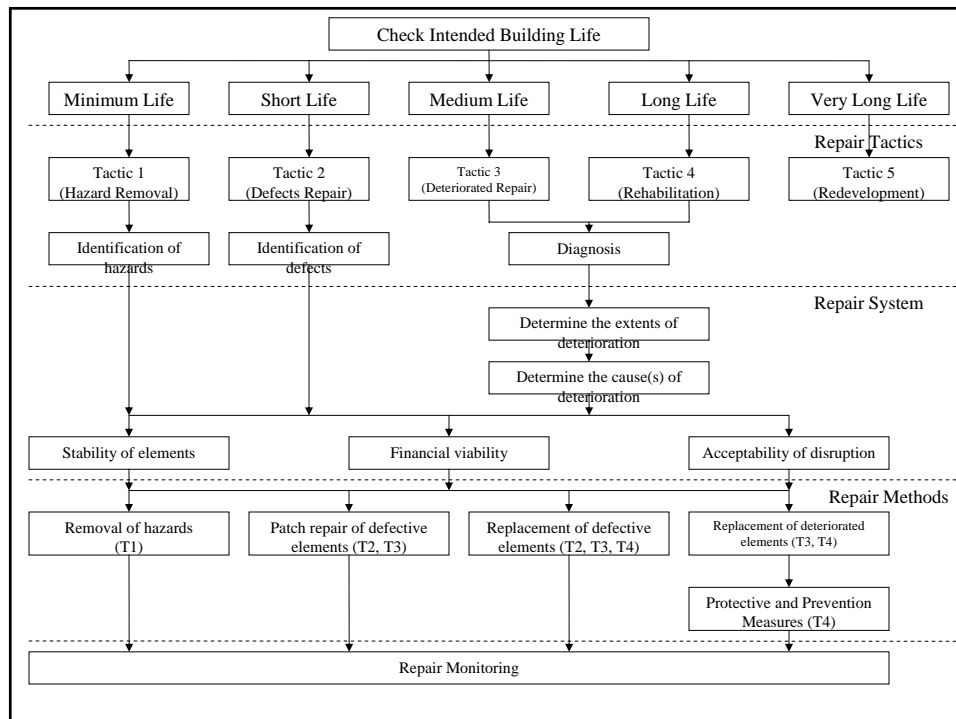


## Building Stock and Objectives

- Record of buildings must be properly maintained first!
  - All levels of ‘as-built’ drawings, photos, manuals, contracts, guarantees, maintenance and alterations records, calculations, occupation permit, certificate of compliance (lease), contacts, etc.
- Different maintenance decisions for different characteristics of building stock and objectives
  - E.g. demolition vs. maintenance?
  - Any concrete repair works for a 60-year old public housing estate, such as the So-Uk Estate in Shum Shui Po; i.e. durability assessment

# Yiu (2007)

- Repair strategy is dependent of the intended building service life.
- Very different repair tactics are devised for different intended life spans.
- Five different tactics are set out:
  - T1: hazards removal;
  - T2: Repair of defective elements;
  - T3: Repair of deteriorated elements;
  - T4: Rehabilitation; and
  - T5: Redevelopment of the whole building.



Repair Tactic Codes	Intended Further Building Life <sup>[1]</sup>	Tactics	Descriptions
T1	Minimal life (< 2 years)	Hazard removal only	<ul style="list-style-type: none"> <li>○Remove hazards</li> <li>○Apply cosmetic repair</li> <li>○Fulfill statutory / minimum requirements</li> </ul>
T2	Short life (2 - 10 years)	Repair of defects	<ul style="list-style-type: none"> <li>○T1</li> <li>○Removal of defective elements</li> <li>○Repair / make good the defects</li> </ul>
T3	Medium life (11-20 years)	Repair of deteriorated elements	<ul style="list-style-type: none"> <li>○T1 + T2</li> <li>○Repair / replacement of deteriorated elements</li> <li>○Remove all carbonated and chloride contaminated concrete</li> <li>○Minimize the source(s) / cause(s) of deterioration</li> </ul>
T4	Long life (21-50 years)	Rehabilitation	<ul style="list-style-type: none"> <li>○T1 + T2 + T3</li> <li>○Upgrade to the latest / a better standards</li> <li>○Apply preventive / protective measures</li> </ul>
T5	Very long life (> 50 years)	Redevelopment	<ul style="list-style-type: none"> <li>○Demolish the building</li> <li>○Rebuild the building to the required standards</li> </ul>

<sup>[1]</sup> For a 50 years old building in reinforced concrete framed structure

## Objectives - Maintenance Needs

- Legal – requirements of the law
- Technical – the condition of the building and services
- Social – the environmental and working conditions expected by the user.
  
- Tutorial question – how to manage the maintenance of a building with asbestos containing materials?

## Maintenance Requirements by Laws

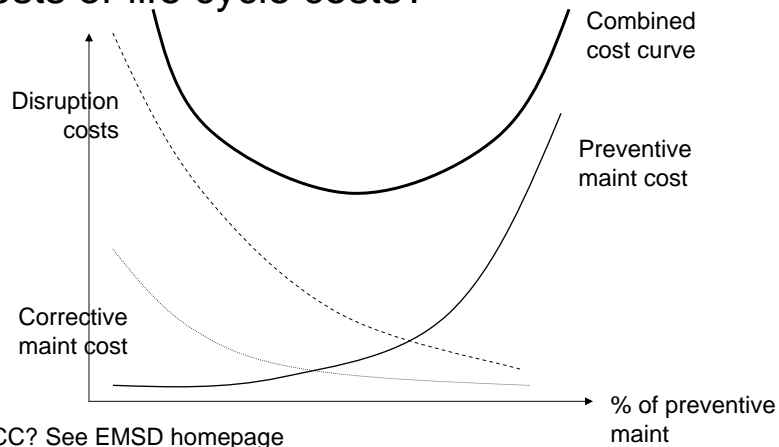
- Any such requirements in Hong Kong?
- NO?!
  - until buildings become dangerous!
  - In common areas only!
- S.26, s.26A, s.27 and s.28 of the Buildings Ordinance (Cap. 123)
- S.18(1) of the Building Management Ordinance (Cap. 344)
- Building Mandatory Inspection Scheme – after consultation, to be tabled to LegCo in 2007

## Maintenance in BO

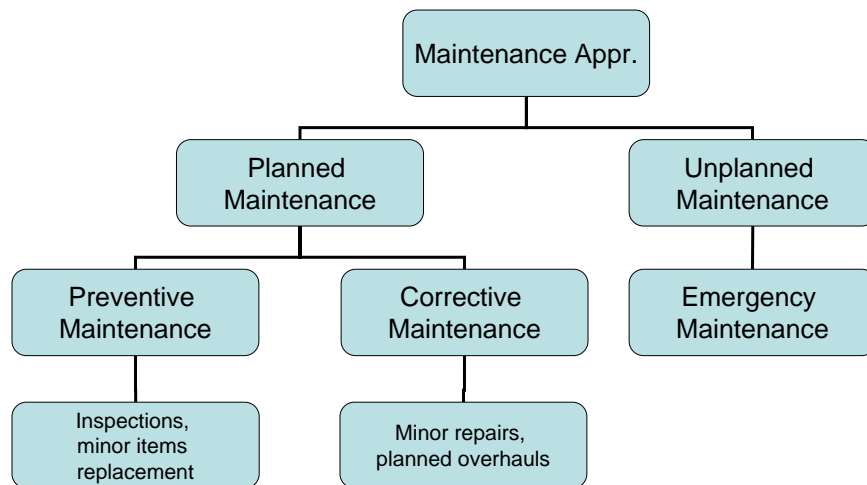
- S.24: Demolition order - ...
- S.26: Dangerous buildings – where in the opinion of the BA any building has been rendered dangerous or liable to become dangerous by ..., the BA may by order in writing served on the owner declare such building to be dangerous...;
- S.26A: Defective buildings – where, on inspection, the BA finds any dilapidation or defect in a building he may by order in writing served on the owner of such building require (a) such works as may be specified in the order to be carried out or (b) an AP to be appointed to carry out such investigation in relation to the building ...;
- S.27: Closure order – ...
- S.28(3): Drainage - ...

## Objectives – minimization of costs

- Minimization of initial costs, operation costs or life cycle costs?



## Hierarchy of Maintenance Approach



## *Planned Maintenance*

- *BS3811: 1984 – Maintenance Terms in Terotechnology*
  - *Maintenance organized and carried out with forethought, control and records to a predetermined plan.*
  - *Maintenance Management*

## *Preventive Maintenance*

- *BS3811: 1984 – Maintenance Terms in Terotechnology*
  - *Maintenance carried out at predetermined intervals, or to other prescribed criteria, and intended to reduce the likelihood of an item not meeting an acceptable condition.*
  - *E.g. Replacement of light bulbs even if they are still functioning.*
  - *Probability of failure is a common accepted criterion for durability assessment for a serviceability limit state. For example, Eurocode 1 (EN, 2000) specifies the acceptable failure probability of not exceeding 7%, and that in the NS-3490 (Norwegian Standards, 1999) of not exceeding 10%.*

## *Corrective Maintenance*

- *BS3811: 1984 – Maintenance Terms in Terotechnology*
  - *Maintenance carried out to restore (including adjustment and repair) an item which has ceased to meet an acceptable condition.*

## *Emergency Maintenance*

- *BS3811: 1984 – Maintenance Terms in Terotechnology*
  - *Maintenance which it is necessary to put in hand immediately to avoid serious consequences.*
  - *How to make sure emergency maintenance can be handled immediately?*
  - *How to balance the costs and the risk?*

## Maintenance Contracts

- Lump Sum?
  - The quantity of emergency works cannot be known before the works
  - The quantity of repair works (e.g. patch repair of external wall tiles) cannot be known before hammer tapping, or other expensive inspections
  - It takes several months for tendering or quotation process, which may result in downtime

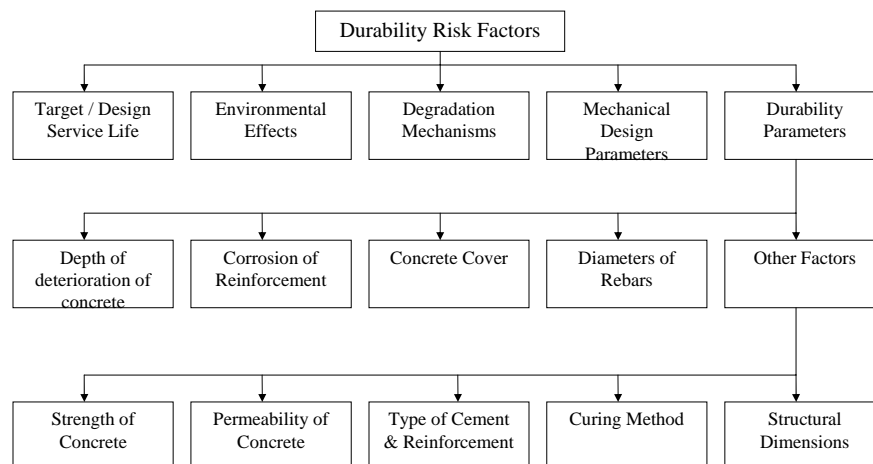
## Maintenance Contracts

- Alternatives:
  - Cost reimbursement
  - Term contract
  - Fixed price maintenance contract (insurance)
  - Schedule contract (Schedule of Rates)
  - Direct labour (esp. for emergency maintenance)
  
  - Which one is commonly used for washing machines?
  - How to choose? See Yiu (2006) Procurement for A&A
  - Tutorial question: What is the procurement strategy suggested for external wall tile debonds repair works?

# Maintenance Programme

- How to work out the schedule of maintenance?
  - Durability assessment (how long the components can sustain)
  - How much does it cost if maintenance works are deferred? (LCC, disruption costs, maintenance costs)
  - Running maintenance or shut down maintenance?
- Unknowns!!!
- When will you recast the concrete columns?

## Sarja and Vesikari (1996, p.68)



## Maintenance Budgets

- How do you estimate maintenance costs?
  - Quantity unknown!
  - Time unknown!
  - Quality unknown!
  - Cost unknown!
- Probability of failure (area, time) x material and labour costs
- Any unit cost data for maintenance works?
- Would you employ a QS for maintenance works? Does a QS hold unit cost data?

## References

- HMSO (1972) Report of the Committee on Building Maintenance, Department of the Environment, UK.
- Sarja, A. and Vesikari, E. (Eds) (1996) Durability Design of Concrete Structures, RILEM Report 14, E&FN Spon, London, UK.
- Seeley, I.H. (1992) Building Maintenance, 2<sup>nd</sup> Edition, Macmillan
- Yiu, C.Y. (2006) Procurement Strategies for Alterations and Additions Works, HKIS CPD 20 March 2006, Hong Kong.
- Yiu, C.Y. (2007) Durability Assessment, A chapter in a Consultancy Report for Structural Assessment of Ageing Buildings in Mongkok, REC, HKU, Hong Kong.

**The End**

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