



# Chapter 3

**Chapter 3** UNDERSTANDING BUILDING  
**MAINTENANCE & MANAGEMENT**



### 3.1 General



**Problems** that building owners usually encounter in the maintenance or management of their properties, and their possible causes are described in this Chapter. Having acquired the relevant background knowledge, building owners can be in a better position to assess the conditions of their properties.

**Solutions** to some common problems described in this Chapter are provided in Chapter 4. Detailed steps, alternatives, rectification measures and methods have also been included. After reading through these two Chapters, building owners can gain a further insight on the concerned subject matters facilitating their selection of suitable rectification measures.

**Maintenance and Management** are two closely related issues. Building management, apart from covering the basic security and cleanliness aspects of buildings, should also coordinate or even include implementation of maintenance plans to ensure a safe and pleasant living environment. As explained in the coming sections of this chapter, surveillance can be strategically combined with inspection for maintenance. It would be beneficial to owners in engaging the same personnel in carrying out both duties.

### 3.2 Timely Maintenance

**Prevention is better than cure.** Defects create hazards leading to serious or fatal injuries. Most defects can, at their early stages, be discovered through visible or detectable symptoms. If not promptly rectified, minor defects can develop into serious ones, causing failure or sudden collapse, endangering lives and becoming more costly to rectify. While Chapter 3 gives readers some hints on preventing the problems and foreseeing the needs, Chapter 4 provides solutions for early actions or rectification, thus avoiding hazards and Government orders. This is the spirit of timely maintenance.

## 3.2 Timely Maintenance

### 3.2.1 Common Building Defects and Their Symptoms

#### (a) Background

Defects occur in various forms and to different extents in all types of buildings, irrespective of age. The followings all contribute to the occurrence of defects in buildings:

- the large varieties of building materials used that may not be well congruent with one another;
- construction techniques that may not be defect proof, inconsistent or sub-standard workmanship;
- use of unsuitable construction details;
- extreme site conditions undermining performance standards;
- natural deterioration;
- attacks by pollutants; and
- improper uses of the completed buildings.

#### (b) Defects in Buildings

Summary of common defects in the buildings:

##### (i) Defective concrete, spalling or loose plaster in ceilings

###### Symptoms/Phenomenon

- Surface with water/rust staining, water leakage
- Patterned cracking
- Bulging, falling off of concrete patches with reinforcement exposed, often rusty
- falling off of plaster/tiles



## 3.2 Timely Maintenance

### (i) Defective concrete, spalling or loose plaster in ceilings (continues)

#### Possible Causes

Defective concrete as a result of ageing is commonly found in old buildings. Persistent water leakage may affect the steel reinforcement. Weak concrete caused by the use of salty water in concrete mix, or overloading are also common causes in spalling.



#### Relevant Section in Chapter 4

- 4.1.1(a)(i)

### (ii) Water seepage from external wall, window, roof, or from ceiling

#### Symptoms/Phenomenon

- Water staining
- Peeling off of paint or wall paper
- Water dripping
- Growth of fungus
- Defective concrete, plaster or tiles
- Rust staining



#### Possible Causes

External water seepage could be due to a variety of reasons including cracks on external wall, honey comb concrete, defective sealant at window, defective waterproofing membrane at roof, defective external water and drainage pipes, etc.



#### Relevant Section in Chapter 4

- 4.1.3

## 3.2 Timely Maintenance

### 3.2.1(b) Defects in Buildings (continues)

#### (iii) Structural cracks in walls

##### Symptoms/Phenomenon

- Cracks that penetrate through finishes into the concrete or bricks
- Long, continuous cracks across width of wall
- Diagonal cracks at corners of window or door
- Cracks with rust staining



##### Possible Causes

Structural cracks may be caused by many factors, e.g. excessive movement of the building structure, unwanted ground settlement, serious overloading, weaknesses caused by corrosion/deterioration of materials, or damage by accidents, or poor design/ construction, etc. Detailed investigation must be carried out to identify the cause(s) which must be removed or rectified before the cracks are repaired.\*



##### Relevant Section in Chapter 4

- 4.1.1(a)(ii)

#### (iv) Structural cracks in columns & beams

##### Symptoms/Phenomenon

- Cracks that penetrate through finishes down to the concrete or bricks
- Spalling



##### Possible Causes

Same as item (iii) above.



### 3.2 Timely Maintenance

#### (v) Non-structural cracks (usually in plaster or other finishes with cement sand rendering as base)

##### Symptoms/Phenomenon

- Hairline cracks
- multi-directional cracks (shrinkage cracks)
- Cracks between panel walls and structural elements e.g. brick wall and beams/columns



##### Possible Causes

Cosmetic shrinkage cracks in plaster or other forms of finishes will affect the appearance only and do not pose any safety concern. They are small hairline cracks developed within the finishes layer not penetrating down to the reinforced concrete structure.



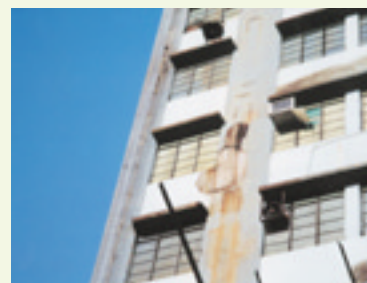
##### Relevant Section in Chapter 4

- 4.1.1(b)(ii)

#### (vi) Defective external wall finishes/mosaic tiles/ceramic tiles/stone cladding/curtain wall

##### Symptoms/Phenomenon

- Debonding of finishes/tiles from wall structure resulting in "hollow sound" when tapped with a hammer
- Cracking of wall surfaces
- Bulging with hollow base
- Falling off
- Cracks
- Loosening of parts



## 3.2 Timely Maintenance

### 3.2.1(b) Defects in Buildings (continues)

(vi) Defective external wall finishes/mosaic tiles/ceramic tiles/stone cladding/curtain wall (continues)

#### Possible Causes

The defects could be due to ageing, structural movements, defective workmanship during installation, thermal movement, defective or missing expansion joints, damage by external factors (e.g. falling objects during typhoon), ingress of water into the gap between the finishes or tiles and the structure, etc.



#### Relevant Section in Chapter 4

- 4.1.1(b)

*For repairing the above defects, please refer to Chapter 4 Section 4.1.1 onwards.*


*\* Structural cracks deserve immediate attention. They indicate that the structure of the building, or at least a part of it, is overstressed. A structure, when stressed beyond its capacity, may collapse without further warning signs. When such cracks suddenly develop, or appear to widen and/or spread, the findings must be reported immediately to the Buildings Department. A building professional such as a Registered Structural Engineer is usually required to investigate the cause(s) of the cracks, to assess their effects on the structure, to propose suitable rectification and remedial works, and supervise the carrying out of such works.*

### (c) Defects in Building Services Installation

Most of the mechanical components of the building services installations have a relatively shorter life span than the building structure. Defects in the mechanical components usually lead to failure requiring repair or servicing. It is therefore necessary to have a planned schedule for foreseeable servicing and replacement for components. Avoid exhausting the designed life-span of such components can prevent sudden breakdown of services that causes undesirable or even disastrous consequences. For more detailed descriptions on building services installations and their maintenance, please refer to Chapter 4 Section 4.1.2. Common defects in building services installations are summarized as follows:





### 3.2 Timely Maintenance

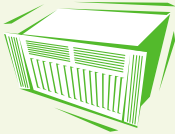
System	Symptoms/Phenomenon	Possible Causes
<b>Water Supply</b>  	<ul style="list-style-type: none"> <li>• Insufficient water pressure or flows</li> <li>• Brownish water/grit and deposit</li> <li>• Stoppage of supply</li> <li>• Water seepage</li> </ul>	<ul style="list-style-type: none"> <li>• Blockage or leakage of components of the supply system such as pipes or valves</li> <li>• Rusty pipes or dirty supply tanks</li> <li>• Pump failure, breakage of supply pipe</li> <li>• Defective water tanks, pipes (pipe joints) or valves</li> </ul>
<i>Relevant Section in Chapter 4 :</i> <ul style="list-style-type: none"> <li>• 4.1.2(d)</li> </ul>	<ul style="list-style-type: none"> <li>• Unclean water, algae growth, dirt and deposit</li> <li>• Sudden rise in consumption</li> <li>• Noisy water pumps, noisy water inlets</li> </ul>	<ul style="list-style-type: none"> <li>• Defective or missing water tank cover</li> <li>• Leakage in the system after water meters</li> <li>• Defective water pumps, undue water pressure</li> </ul>
<b>Electricity Supply</b>  	<ul style="list-style-type: none"> <li>• Stoppage of supply/system breakdown</li> <li>• Sudden or frequent fuse or circuit breaker cut off leading to stoppage</li> <li>• Heating of switches &amp; wires</li> <li>• Sudden or frequent stoppage and larger power consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Failure of fuse or circuit breaker</li> <li>• Earth leakage, overloading</li> <li>• Overloading</li> <li>• Uneven distribution of phases</li> </ul>
<i>Relevant Section in Chapter 4 :</i> <ul style="list-style-type: none"> <li>• 4.1.2(a)</li> </ul>	<ul style="list-style-type: none"> <li>• Electric sparks or shocks, electrocution</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate earth bonding</li> </ul>

## 3.2 Timely Maintenance

### 3.2.1(c) Defects in Building Services Installation (continues)

System	Symptoms/Phenomenon	Possible Causes
<b>Fire Services</b>   <i>Relevant Section in Chapter 4 :</i> <ul style="list-style-type: none"> <li>4.1.2(b)</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate water pressure</li> <li>No water supply</li> <li>Water leakage, rusty stains</li> <li>Alarm not working (when tested), false alarm or warning lights on signal panels</li> <li>Portable equipment lost or misplaced glass panels of alarm switch- box broken</li> <li>Non-functioning of equipment</li> </ul>	<ul style="list-style-type: none"> <li>Blockage or leakage of components of the supply system such as pipes or valves</li> <li>Failure of pump, breakage of the supply system</li> <li>Damage, corrosion or failure of pipes, joints or valves</li> <li>Alarm wiring defect, short circuit</li> <li>Inadequate protection or poor management</li> <li>Inadequate maintenance or servicing</li> </ul>
<b>Lift and Escalator</b>   <i>Relevant Section in Chapter 4 :</i> <ul style="list-style-type: none"> <li>4.1.2(c)</li> </ul>	<ul style="list-style-type: none"> <li>Stoppage, excessive noise during operation, indicator lamps off, unstable lifting, malfunction of buttons and indicator lamps</li> <li>Occasional overrun</li> <li>Doors not closing properly</li> <li>Defective mechanical parts, frequent stoppage, alarm signals</li> </ul>	<ul style="list-style-type: none"> <li>Ageing of parts, mechanical failure</li> <li>Landing misalignment</li> <li>Parts ageing, mechanical failure, rubbish obstructing operation</li> <li>Inadequate servicing</li> </ul>

### 3.2 Timely Maintenance

System	Symptoms/Phenomenon	Possible Causes
Air Conditioning/ Heating  	<ul style="list-style-type: none"> <li>• Not cool enough, not warm enough</li> <li>• Noisy, no air movement</li> <li>• Engines sound normal but no air movement</li> <li>• Noisy blowers or propellers movement</li> <li>• Poor indoor air quality</li> <li>• Dripping and substandard output of cool or warm air</li> <li>• Noisy blowers or propellers movement</li> </ul>	<ul style="list-style-type: none"> <li>• Poor efficiency, leakage of refrigerant dust and dirt at heat transmission fins</li> <li>• Loosen parts, blowers or propellers breakage</li> <li>• Dust screens blocked, air ducts and grilles needs cleaning</li> <li>• Misalignment of motor shafts</li> <li>• Insufficient fresh air intake, mal-function of intake air filter</li> <li>• Insulation failure</li> <li>• Misalignment of motor shafts</li> </ul>

Other building services installations that require regular checking and maintenance include gas supply, security system and alarm, radio, telephone and television signaling systems, etc.

#### (d) Defects in Slopes and Retaining Walls

- (i) Maintenance responsibility of slopes or soil retaining structures within private boundaries rests with the owners. However, it is not uncommon that the maintenance responsibility of slopes and retaining walls on Government land adjoining or in the vicinity of the lot is also placed on the land owners under lease.



## 3.2 Timely Maintenance

### 3.2.1(d) Defects in Slopes and Retaining Walls (continues)

- (ii) Natural, cut and man-made slopes should be regularly inspected to clear loose stones and boulders as well as undesirable vegetation that may damage the slope surface cover or drainage. Retaining walls should be monitored, in particular the integrity of structure and the performance of its drainage system. Some retaining walls may have monitoring devices installed which should be checked by competent persons regularly. Strengthening of slopes and retaining walls, if required, should be carried out promptly and whenever possible completed before the rainy seasons.



- (iii) Most slope or retaining wall failures are associated with water. Slopes adjoining water courses have to be more frequently monitored. Prolonged rainfall, blocked subsoil drainage, broken surface channels, deteriorated surface coverings, surge of ground water table are contributing factors to slope or retaining wall failure.

(iv) Defects of slopes or soil-retaining structures are:

- Accumulated debris in drainage channels
- Vegetation causing cracking of slope surface cover and drainage channels
- Missing or deteriorated pointing in masonry retaining walls



- Blockage of weepholes
- Cracked / damaged drainage channels or pavements along crest and toe of slopes and retaining walls
  - Cracked or damaged slope surface
  - Ground subsidence in slopes, retaining walls or in roads or pavements at the crest and toe of slopes and retaining walls
- Falling objects from slopes and retaining wall surface
- Excessive overflowing of water from weepholes or wall surface of slopes and retaining walls



#### (v) Signs of landslip danger

- Landslip debris on roads and footpaths
- New large cracks or ground subsidence in slopes, retaining walls or in roads or pavements at the crest or toe of slopes and retaining walls
- Mud, rocks, fragments of concrete/brick and uprooted vegetation, falling from slopes and retaining walls
- Sudden change in colour (from clear to muddy) of water flowing from slopes or retaining walls
- Water overflowing onto slopes and retaining walls

## 3.2 Timely Maintenance

### 3.2.1(d) Defects in Slopes and Retaining Walls (continues)

- Cement or concrete surface of slopes bulging or being dislodged or signs of soil erosion appearing
- Breaking of catchwaters, serious overflow from catchpits or drains
- Flooding of water in hilly areas
- Sudden increase in seepage over an extensive area of a slope or retaining wall

(vi) Preventive maintenance of slopes and soil retaining structures comprising the full process of investigation, analysis, monitoring and formulation of remedial proposals, requires the professional services of Geotechnical Engineers. There are also detailed geotechnical guidelines published by the Government. Appendix 7 of this Guidebook provides details on the maintenance responsibility and scope of maintenance in this regard. Timely maintenance not only helps save lives, but also save the repair costs in the long run.



### (e) Water Seepage and Drainage Nuisance


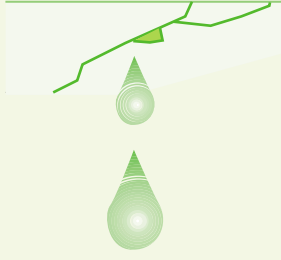
They are common defects in Hong Kong causing nuisances to occupiers across floors. Though it is obvious that water migrates downwards by gravity, it is sometimes very difficult to identify the source or cause of water seepage. An extensive investigation may be necessary with the use of special detectors or apparatus to track down the source of leakage. Colour dyes, samples collection for analysis, tests to the possible sources or the



specific spots, etc., are usual means adopted in identifying the source. It can be a long and enduring process which requires patience and co-operation from all parties concerned. Some examples are listed as follows:


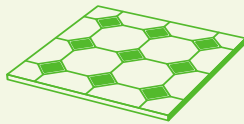
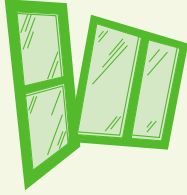
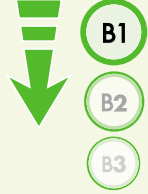


### 3.2 Timely Maintenance

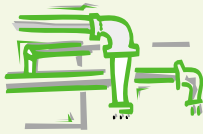
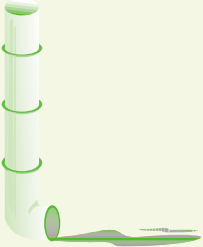
Location of Leakage or Seepage	Possible Causes
<p>Underside of roofs (such as flat roof, podium roofs) and bottom of light wells</p>  <p><i>Relevant Section in Chapter 4 :</i></p> <ul style="list-style-type: none"> <li>• 4.1.3(a)</li> </ul>	<ul style="list-style-type: none"> <li>• Damage or deterioration of waterproofing layer</li> <li>• Leakage at access doors or top hatch doors</li> <li>• Deterioration of corrugated steel roofing materials and joints</li> <li>• Defective enclosure for water tanks</li> <li>• Cracks of parapet walls affecting the waterproofing membrane</li> <li>• Inadequate protection/improper installation of sleeve around openings through roof slab</li> <li>• Excessive movements of construction joints</li> </ul>
<p>Ceiling with internal areas above</p> 	<ul style="list-style-type: none"> <li>• Leakage from bathroom or kitchen above usually caused by seepage from fittings, bathtubs, shower trays, buried pipes or drains due to improper construction of joints, installation of sealants or occurrence of cracks</li> <li>• Waterproof cement rendering underneath floor tiles for the floor above not installed/specified or such waterproofing features damaged by installation of sockets or conduits</li> <li>• mal-function of waterproofing in nearby external features such as balconies or external walls above</li> </ul>

### 3.2 Timely Maintenance

#### 3.2.1(e) Water Seepage and Drainage Nuisance (continues)

Location of Leakage or Seepage	Possible Causes
<p>Wall</p>  <p>Relevant Section in Chapter 4 :</p> <ul style="list-style-type: none"> <li>• 4.1.3(c)</li> </ul>	<ul style="list-style-type: none"> <li>• Water penetration through external wall defects such as cracks, joints, honeycombs, spalling, weak points, holes, punctures, leftovers of debris and movement of external wall components</li> <li>• Water penetration through defective external wall finishes such as loosened mosaic tiles, cracked ceramic tiles &amp; paint surface; through poor cladding or curtain walls constructions; or weaknesses in water-resisting components</li> <li>• Water leakage through party walls between units of pre-fabricated elements, or between buildings</li> </ul>
<p>Floor</p>  <p>Relevant Section in Chapter 4 :</p> <ul style="list-style-type: none"> <li>• 4.1.3(e)</li> </ul>	<ul style="list-style-type: none"> <li>• Seepage from defective pipeworks or sanitary fitments</li> <li>• Temporary floods and overflows</li> <li>• Defective bathroom fitments such as bathtubs, shower trays or hand wash basins, or the improper installation of pipeworks or necessary sealants</li> </ul>
<p>Window</p>  <p>Relevant Section in Chapter 4 :</p> <ul style="list-style-type: none"> <li>• 4.1.3(d)</li> </ul>	<ul style="list-style-type: none"> <li>• Improper fillings around frames</li> <li>• Deformation of frame and sashes, defective gasket, sealant or putty for window glass setting or frames</li> <li>• Air conditioning box or platform tilting inwards</li> <li>• Insufficient sealant around air conditioning units</li> </ul>
<p>Basement</p> 	<ul style="list-style-type: none"> <li>• Inadequate or damaged waterproofing tanking (may be due to movements or punctures)</li> <li>• Deterioration of water stops at construction/ movement joints.</li> </ul>

### 3.2 Timely Maintenance

Location of Leakage or Seepage	Possible Causes
<p>Buried or underground drains or pipes</p>  <p><i>Relevant Section in Chapter 4 :</i></p> <ul style="list-style-type: none"> <li>• 4.1.3(b) &amp; (g)</li> </ul>	<ul style="list-style-type: none"> <li>• Seepage through defective joints or pipes caused by poor installation or differential movements/settlements, movement of building structures or ground or water table</li> <li>• Corrosion of pipes at junctions with floors or walls</li> <li>• Invasion of water into conduits and distribute throughout the network</li> <li>• Blockage leading to excessive pressure built up</li> <li>• Attack by rodents or roots of plants</li> </ul>
<p>Exposed (or in pipe ducts) supply pipes or drains</p>  <p><i>Relevant Section in Chapter 4 :</i></p> <ul style="list-style-type: none"> <li>• 4.1.3 (f)</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequacy in design of drains such as insufficient diameter of drains, bends being too sharp, etc.</li> <li>• Blockage of drains by rubbish/sand collected in the system especially in bends or traps</li> <li>• Insufficient number or deterioration of brackets leading to hammering and breakage of supply pipes</li> <li>• Blockage of open joints such as hoppers of down pipes by plants or rubbish</li> <li>• Unauthorized additions overloading the drainage system</li> </ul>

Many different techniques for investigation and repair for the above defects are available in the market. Readers should consult a building professional especially when the cause of the problem is not obvious or cannot be easily identified.

Construction or repair of waterproofing components requires specialist materials and applicators. Normally, long-term warranty will be provided after application. Once the sources of the leakage are diagnosed, appropriate repair methods and suitable materials may be used to tackle the problem. Some typical situations are provided in Section 4.1.2(d) and Section 4.1.3 of Chapter 4.

## 3.2 Timely Maintenance

### 3.2.1 Common Building Defects and Their Symptoms (continues)

#### (f) Defects in Windows and External Appendages

##### (i) Common defects in windows

Windows are perhaps the most vulnerable building element in external building envelopes, and the need for some windows to be openable further aggravates the problem. Glass panels should always be replaced once cracks occur.

Common defects in traditional steel windows usually arise from rusty frames, and deterioration or loss of putty or sealant to hold the glass panels.



Aluminum windows have been widely used in new developments and as replacement of steel windows in existing buildings but recent incidents of their failure have aroused safety concerns.

Aluminum window system involves assembly of a certain number of components by rivets, screws, hinges and fixing anchors. These accessories, which are prone to failure, require regular servicing and maintenance to prevent failure. The friction slide hinges are delicate parts of the window which demand close attention to avoid accumulation of dirt that obstruct the sliding motion and mild lubrication to reduce friction of the moving parts. Without the required servicing and maintenance, hinges may become too tight to operate, rivets may loosen up and screws may be corroded that



shorten their life-span. When excessive forces are applied to operate such windows or when they are subject to wind load, distortion or dislodgement of the window sashes or even the frame may result, causing fatal or serious injuries to the public.

Details on the repair methods are provided in Section 4.1.1(c) of Chapter 4.

### 3.2 Timely Maintenance

#### (ii) Common defects in external appendages

External appendages are usually cantilevered structures which include eaves, mouldings, projections, architectural projecting features, air-conditioning hoods, canopies and balconies, drying racks, projecting panels and claddings. Although the structural designs of these elements have already



catered for their cantilevered performance, lack of maintenance and repair to combat natural weathering would attract development of defects, unduly shorten their life-span and eventually result in collapse. Worst still, such collapse might be sudden without prior obvious symptoms such as deflections leading to catastrophic consequences.

There are two main reasons why cantilevered structures demand close monitoring. Firstly, they are often exposed to weather attack or weakened by unauthorized building works. Secondly, unlike the conventional reinforced concrete structures that the main reinforcements are placed near the bottom to the element, reinforcements are placed near the top surface of such structures where cracks will also first start to develop. Therefore, if waterproofing at the top is inadequate or damaged by the cracks allowing ingress of water, corrosion of the reinforcements will result. The corrosion will reduce the effective cross-sectional area of the reinforcement bars resulting in sudden collapse.



Common defects are:

- Cracking at junctions
- Bulging (gaps occurring between finishes and parent wall) or peeling-off of finishes
- Spalling of concrete or uncovering of steel reinforcement

## 3.2 Timely Maintenance

### 3.2.1(f) *Defects in Windows and External Appendages (continues)*

- Rusting of metal parts
- Damage by fungus or vegetation growth
- Water seepage through the features
- Corrosion or loosening of attachments

Except for canopies which are mostly found in podium levels, other appendages are usually thin and small in sizes but large in numbers which are difficult to check and monitor. Therefore, adequate resources should be allocated for regular inspection and repair in order to prevent them from becoming falling hazards.

Windows and balconies of individual units usually provide vantage points for inspection of the defects in the exterior of the building. Owners spotting any defects in the exterior of the building should report to the property manager or the Owners' Corporation (OC) for their action, irrespective of whether the defects are at the exterior of their own units or other units.

### 3.2.2 Areas for Special Attention

#### (a) Storage of Dangerous Goods

##### (i) Proper handling and storage of dangerous goods

In accordance with the Dangerous Goods Ordinance, dangerous goods exceeding the exempted quantity should be stored in a licensed dangerous goods store. Common examples are spirit, some essential oils, LP gas and kerosene. Other examples involve mostly commercial and industrial usage.

Dangerous goods must be handled with extreme care. When they are being in use, no naked fire is allowed in the vicinity in order to avoid the outbreak of fire and explosion.

**DANGEROUS**



## 3.2 Timely Maintenance

### (ii) Categories

In the Dangerous Goods Ordinance, dangerous goods are divided into categories. The following are some examples:

Category 1:	Explosives	(The Authority is the Commissioner of Mines.)	
Category 2:	Compressed Gases	C1.1 C1.2 C1.3	Permanent Gases Liquefied Gases Dissolved Gases
Category 3:	Corrosive Substances		
Category 4:	Poisonous Substances	C1.1 C1.2	Substances giving off poisonous gas or vapour Other poisonous substances
Category 5:	Substances giving off inflammable vapours	C1.1 C1.2 C1.3	Flash point below 23°C Flash point of or exceeding 23°C but not exceeding 66°C Flash point of or exceeding 66°C (applicable to diesel oils, furnace oils and other fuel oils only)
Category 6:	Substances which become dangerous by interaction with water		
Category 7:	Strong supporters of combustion		
Category 8:	Readily combustible substances		
Category 9:	Substances liable to spontaneous combustion		

### (iii) Advice, complaints and enquiries

Queries on dangerous goods can be directed to Dangerous Goods Division of the Fire Services Department. Useful telephone contacts are provided at Appendix 2.

## 3.2 Timely Maintenance

### 3.2.2 Areas for Special Attention (continues)

#### (b) Buildings with Single Staircase

##### (i) General

Single staircase buildings are buildings that do not exceed 6 storeys in height and the level of the floor of the uppermost storey is not more than 17m above ground level at the staircase exit. Since there is only one staircase, the escape route is vital to the occupiers and deserves protection and maintenance in the highest order.



##### (ii) Use restrictions

Only domestic or office use may be permitted on the upper floors, and the ground storey may be used for the purposes of a shop or carparking. Other uses in the building will become incompatible uses, and may give rise to danger. If in doubt, advice from an Authorized Person (AP) should be sought.

##### (iii) Escape route requirements



Adequate access should be provided at ground level to enable a rescue ladder/appliance to reach at least one window of every different occupancy on each floor above the ground storey. Therefore, sub-division of a floor into separate units may become dangerous.

For buildings in which the level of the highest floor is more than 13m above ground level (about 4 storeys high):

- access to the staircase at each storey should be through a smoke lobby. Such lobby was provided and should be maintained as an integral part of the staircase, and it should not be removed or incorporated as part of any adjacent unit(s).
- the staircase should be continued to roof level; the roof should be available for refuge of persons of the building. Such roof should be accessible directly from the staircase, clear of any obstruction, and is readily accessible by fire fighters for rescue purposes.

## 3.2 Timely Maintenance

### (iv) Unauthorized building works

There are many common types of unauthorized building works (UBW) associated with single staircase buildings. Apart from the usual external projections, many UBW actually affect the means of escape and jeopardize lives of occupiers. Common examples include:

- removing smoke lobby doors, or replacement of such doors with non fire-rated glazing doors;
- installing metal gates or doors at the smoke lobbies, staircase or landings obstructing the escape route;
- erecting roof top structures;



- locking access door to the roof;.
- adding cockloft to ground floor shops with new door opening(s) to the staircase; and
- forming other door openings at the staircase and landings for sub-division of units.

All the above, including other UBW and incompatible change in use to any floor or unit are prohibited. The Buildings Department (BD) may serve orders on these irregularities for rectifications by individual owners or all the co-owners as the case may be.

### (c) Misuse, Change in Use and Licensing

#### (i) General

All parts of a building have their designated uses usually referred to as "approved use". They may be domestic units, offices, shops, classrooms, machine rooms, corridors, carparks, caretaker's offices, factories, warehouses, playgrounds, club houses, etc. Such uses are usually shown on the approved building plans. When a building is completed, the Building Authority (BA) issues an "Occupation Permit" which briefly describes the building and the permitted uses of its different areas as shown on the approved building plans kept by the BD.

## 3.2 Timely Maintenance

### 3.2.2(c) Misuse, Change in Use and Licensing (continues)

#### (ii) Permissible use

The permissible uses of any new building are usually governed by the Town Planning Ordinance through the Outline Zoning Plans (available at the Planning Department), the Government Lease Documents (can be obtained from the Land Registry filed under the lot numbers), the building plans approved by the BD. Occupation Permits issued by the Building Authority may be a convenient reference for brief description of the subject buildings and permitted uses. However, in case of doubt, readers should always refer to the approved building plans for details and confirmation on the approved uses of specific areas.

After completion of the building, occupiers may wish to change the use of certain parts of the building. Sometimes, only minor adjustments or alterations are required and the new uses are still permissible under current legislations and restrictions. However, some other cases may require applying for a license, specific indication of "no prohibition" to change in use or approval for alterations and additions. In some extreme cases, approval for demolition and redevelopment of the subject building may be required.

#### (iii) Misuse

Misuse of a part or the whole building may include an unauthorized change in use. Some commonly found examples of such unauthorized changes are:

- office to domestic use or vice versa;
- domestic use to restaurants or other commercial uses or vice versa;
- office or domestic uses to industrial or warehouse uses or vice versa;
- industrial use to office;
- flat roof to carpark, storage, office or domestic units; or
- canopy to accessible flat roof or balcony.



The changes in some cases would lead to the increase of fire risk, overloading of any floor or structural members, or overcrowding affecting the means of escape. Care should be taken in planning for such changes or increase of capacity above the maximum permissible for a place. In case of doubt, an Authorized Person (AP) should be consulted.



### 3.2 Timely Maintenance

#### (iv) Licensing

##### Licensed premises

There are certain uses or businesses that require a licence to operate. The most common examples are:

- restaurants and food businesses;
- hotels, guest houses and bedspace apartments;
- tuition class over a specified number of students and schools;
- entertainment businesses and bath houses;
- homes for the elderly, kindergartens and child care centres; or
- clubs.



##### Application for licences

The procedures for applying the required licences are laid down by the relevant licensing authorities. Whether the proposed new uses are permissible usually depends on the existing structural design and fire safety provisions or fire service installations of the subject buildings. It is advisable to consult building professionals who will, in the first instance, assess whether the proposed building or parts of the building are suitable for the intended use, and if any alterations or additions are required to be done. If readers are in a tight schedule to operate a certain business within the purview of the licensing authorities, it is advisable to select premises which have already been designed and approved for such uses or have already been granted the required licence. For more details on proposed alteration and addition works, please refer to Section 3.2.2(c)(vii) of this Chapter and Section 4.3 of Chapter 4.

## 3.2 Timely Maintenance

### 3.2.2(c) *Misuse, Change in Use and Licensing (continues)*

#### (v) Change in use

Even though there may be no physical alterations or additions works required for a proposed change in use, approval by the Building Authority and, if necessary, by other Government Departments for such proposal may still be required. Readers should engage building professionals to assess whether the existing design and construction of the premises are suitable for the proposed change based on the following considerations:

- permissible uses under the Town Planning Ordinance and relevant zoning or development plans;
- permissible uses under lease conditions;
- structural implications of the proposed uses;
- implications of the proposal on the provisions for the means of escape in case of fire;
- adequacy of sanitary fitment provisions;
- adequacy of fire service installations and fire resisting construction requirements; and
- whether the proposed use is incompatible with the current uses of its neighbour and design of the building and whether it would give rise to any danger or nuisance to the other occupiers.

#### (vi) Partial demolition, upgrading and improvements

##### Partial demolition

Partial Demolition means the demolition of a part of a building. It usually involves the demolition of structural members, e.g. floor slabs, beams or columns. Examples are removal of:

- canopies;
- floor slabs to create voids with high headroom;



### 3.2 Timely Maintenance

- part of a floor slab to install a new staircase, lift or escalator;
- one side of a building to allow for the integration of a new extension; or
- substantial UBW is also considered a partial demolition.

This kind of alteration works or removal of UBW may sometimes involve the removal of asbestos containing materials. More details are provided in Section 3.2.2(h) of this Chapter and Section 4.1.5 of Chapter 4 in this regard.

Both total and partial demolition of a building requires the submission of a demolition plan by an Authorized Person (AP) for the approval by the Building Authority. And the work has to be carried out by a Registered Specialist Contractor (Demolition Category), under stringent site safety supervisions.

#### Upgrading and improvements

Upgrading and improvements to buildings usually include face-lifting or replacement of finishes at external walls and common lobbies; replacement of worn-out or dilapidated services, machinery or installations, etc. Advice should always be sought from an AP to ascertain whether such works require the approval and consent by the Building Authority.

The works involved are similar to those for extensions, alterations and additions. Readers should refer to Section 4.3 of Chapter 4 for more details.



## 3.2 Timely Maintenance

### 3.2.2(c) *Misuse, Change in Use and Licensing (continues)*

#### (vii) Alterations and additions

Building works to modify existing buildings are usually referred as alterations and additions although such works may not necessarily result in "addition" of building areas.

Examples of alterations and additions works are:

- constructing a new extension block to an existing building;
- adding floors to an existing building, whether on the top or not;
- constructing a swimming pool;
- linking two or more floors by removal of parts of the floor slab and/or adding internal staircases;
- constructing cocklofts;
- combining two or more units into one by removing the partition walls;
- Installing cladding or curtain wall to the facade of existing building;
- subdividing a unit into smaller units; or
- adding water tanks, lifts, escalators, curtain walls, hoists, facilities for the disabled persons, canopies and shelters, structural frames for air-conditioning or other plant, structural supports for advertisement signboards, etc.

## 3.2 Timely Maintenance

### Appointment of building professional

Owners who wish to carry out alterations and additions are always recommended to consult a building professional for advice. The professional will usually carry out a detailed study on the construction records of the subject building, lease documents, and the technical constraints associated with the proposal. If the proposal is feasible, the owner has to engage an Authorized Person (AP) (registered under the Buildings Ordinance(BO)) to prepare plans and to submit them on behalf of the owner to the Building Authority for approval. Section 4.3.4 of Chapter 4 gives more details on the required procedures.

### (d) Swimming Pools

The Swimming Pools Regulation (Chapter 132) stipulates that any person who establishes or maintains a swimming pool must obtain a swimming pool licence from the Food and Environmental Hygiene Department (FEHD). Under the legislation, a swimming pool



means any artificially constructed pool used for swimming or bathing and to which the public have access (whether on payment or otherwise) or which is managed by any club, institution, association or other organization. However, this regulation does not apply to a swimming pool serving not more than 20 residential units and to which the public have no access.

Proper maintenance of swimming pools will lengthen the life expectancy of pool decks and filtration plants. A pool left empty of water for a prolonged duration will suffer from tile cracks due to extreme temperatures.

### Routine winter maintenance

- keep normal running of filtration plant, alternate duty pumps every other week.
- use floating diffuser to kill germ and moss.

## 3.2 Timely Maintenance

### 3.2.2(d) *Swimming Pools (continues)*

- clean down the pool surrounds and bottom once a week and keep free of moss growth.
- carry out inspections and mechanical maintenance every week.
- keep all entrances shut and display the notices signifying "Pool closed - no lifeguard on duty".

Readers should note that specialist contractors are required to carry out maintenance works to the pool structure and the filtration system.

### (e) **Private Lanes, Road and Open Space**

Similar to all private buildings, private lanes, roads and open spaces are within the purview of the Buildings Ordinance. When building works are required in these areas, owners should engage an Authorized Person (AP).

#### (i) **Private lanes**

Lanes are mainly used for servicing purposes such as the laying of underground drainage, water supply, electricity and communication cables. Many urban service lanes are still used for collection and disposal of garbage as well. It is not uncommon to find staircases of buildings or exits for units at the ground floor discharging to service lanes. Service lanes in such circumstances may be regarded as part of the escape route. Lanes may be at the rear or sides of buildings. If a lane is under private ownership, owners have the responsibility to upkeep and maintain it. The following are areas of concern:

- illegal extensions by ground floor occupiers; trespasses and occupation by outsiders;
- obstructions at the lane or at the point of discharge from the building;



## 3.2 Timely Maintenance

- connections and maintenance of underground services;
- proper discharge of rain and surface water;
- maintenance of paving or ground surfaces; and
- lighting, cleanliness and tidiness.

### (ii) Private roads



Private roads are roads or streets on private land, and include all estate roads, access roads, driveways with or without pavements and emergency vehicular access (EVA). There are, however, certain streets or roads in Hong Kong that vehicular access is not possible due to physical constraints, but they are still roads or streets by virtue of their construction. It is the owners' responsibility to upkeep and maintain private roads. Apart from those mentioned above for private lanes, the following are areas of concern:

- all vehicular accesses, carriageways and EVAs should be maintained at their original or minimum standards in terms of size, headroom, turning radius, gradients, surface loading and texture, and free of obstruction;
- no projection, encroachment, fixture, or furniture on the roads shall endanger the users;
- all traffic signs and road markings shall conform to the latest standards of Highways and Transport Departments;
- common facilities shall be maintained, such as planters and flower-beds, seatings, railings, drop kerbs and ramps, road humps, rubbish bins, storm and surface water drains and culverts, lighting, traffic signals and fire hydrants;
- the road structure may include the elevated ramp ways, flyovers, footbridges, slopes and retaining walls; and
- dealing with unauthorized car parking and hawkers are responsibilities of owners and their management representatives but not the Government.

## 3.2 Timely Maintenance

### 3.2.2(e) Private Lanes, Road and Open Space (continues)

#### (iii) Private open spaces

Private open spaces include gardens, rest areas, children playgrounds, parking or loading and unloading areas, turf areas or gentle slopes, drainage reserved areas, space near top or bottom of slopes or retaining walls, or any other areas within the private land which are not built upon.



These spaces are often left uncontrolled and open to the public. The owners' responsibility is to maintain all the facilities and conditions of the open spaces, and to prevent abuses or trespasses. The building management should arrange regular patrol and report on any irregularities spotted as soon as possible.

#### (f) Commonly Found Unauthorized Building Works (UBW)

##### (i) Unauthorized building works (UBW) under the Buildings Ordinance

The Buildings Ordinance stipulates that all building works in private buildings and lands require the submission of plans by an Authorized Person (AP) for the prior approval from the Building Authority. Any building, construction, alterations and additions to private buildings and lands without prior approval and consent by the Building Authority are regarded as UBW. They are illegal and subject to the action of removal orders. Any person who instigates or owns UBW will be ordered for their removal and reinstatement to the originally approved conditions and may face prosecution, fine or even imprisonment.

##### (ii) Types of UBW and Duties to Report to the Buildings Department (BD)

The following are examples of commonly found UBW:

- cages, canopies, metal flower racks, frames supporting air-conditioning units, etc. projecting from the external walls of buildings;
- canopies and structures projecting over Government land, pavement or lanes;





## 3.2 Timely Maintenance

- structures on the roof top, flat roof, yards and light wells;
- excavation for a basement or swimming pool unless otherwise approved;



- removal of smoke lobby doors (both at common areas or at entrances to units);



- changing the fire resisting door at entrance to a unit into a non-fire resisting glass door (usually found in offices or industrial units);

- metal gates built across the escape route, or opening outwards and obstructing the effective width of escape route;



- connection or diversion of wastewater drainpipes (above ground or underground) into storm water drainage system;

- metal supporting frames for air-conditioning plants and cooling towers;

- unsafe or excessive advertisement signboards (Readers should refer to guidelines issued by the BD in this regard from time to time, a sample of the current guideline is at Appendix 10;

- excavation into hillside or earth filling to form embankment or platform; and

- unauthorized construction or modifying the height of retaining wall.

The BD maintains a hotline (see Appendix 2) for the public to report on any UBW in progress. Priority action will be taken against such UBW.

### (iii) Responsibilities of property owners or Owners' Corporations (OC)

Property owners or Owners' Corporations (OC) have the responsibility to maintain their buildings in a safe and healthy condition and ensure that their buildings are free from UBW. Where UBW are located within the confines of any unit under the title deed, it will be the owner of that particular unit (whether he built them or not) to bear the responsibility

## 3.2 Timely Maintenance

### 3.2.2(f) Commonly Found Unauthorized Building Works (UBW) (continues)

#### (iv) Exempted building works under the Buildings Ordinance

Building works that do not require the prior approval of the Buildings Authority are usually referred as "exempted works". Examples are:

- redecoration or minor fitting-out works not affecting the structure of a building;
- removal of non-structural and non-fire-resisting internal partitions;
- installation of light weight partitions such as dry walls or light weight concrete blocks;
- changing internal doors that are non-fire-resisting doors; or
- changing or relocating sanitary fittings without contravening requirements or causing nuisance to others.

If in doubt, owners are encouraged to consult an Authorized Person (AP) or the BD.

#### (v) Further details

Section 4.2 of Chapter 4 provides further details on dealing with the removal of UBW in a building.

### (g) Advertisement Signboards

#### (i) Statutory control

Erection of an advertisement signboard and its supporting structures generally comes within the purview of the Buildings Ordinance. Carrying out such works requires prior approval and consent from the Building Authority. Otherwise, it may be classified as an UBW and



subject to an enforcement order for its removal. "The Guide on Erection & Maintenance of Advertising Signs" published by the BD (at Appendix 10) provides useful reference in this respect. In addition to the Buildings Ordinance, advertisement signboards are also controlled by other relevant departments including Electrical & Mechanical Services Department, Fire Services Department, Civil Aviation Department, Transport Department, Country and Marine Parks Authority, etc.

## 3.2 Timely Maintenance

### (ii) Maintenance

Existing advertisement signboards on external walls should be inspected and maintained regularly to assure safety of the public. Any sign that is liable to cause danger to the public or the structure of its parent building may be subject to removal order under Section 24 of the Buildings Ordinance. Any abandoned advertisement signboards or their structures, when become dangerous or are liable to become dangerous, may also be removed under Section 105 of the Public Health and Municipal Services Ordinance.



### (h) Asbestos and Noise

#### (i) Asbestos-containing material in buildings



Asbestos is a generic name given to a group of naturally occurring fibrous silicate materials which are recognized to be hazardous to health. In Hong Kong, asbestos-containing materials had been extensively used before the mid-1980s in buildings such as factories, hospitals, hotels, schools and some public facilities for fireproofing, thermal and electrical insulation, as well as sound absorption.

The more commonly found example of asbestos-containing materials is corrugated asbestos sheets for roofs and canopies (very often found in UBW). Others may include some floor tiles similar to plastic, false ceiling insulation tiles, acoustic plaster to ceiling, decorative concrete blocks for parapets or boundary walls, insulation blankets, fibre cement board; etc.

When these asbestos containing materials deteriorate or are broken, the asbestos fibres will be released and air-borne for a very long period of time. Inhaling these fibres might lead to chronic illnesses.

For more details in this subject, and for locating specialist consultants and contractors, readers may refer to "Asbestos Removal of Unauthorized Building Works" published by the Environmental Protection Department at Appendix 14 and Section 4.1.5 of Chapter 4 of this Guidebook.

## 3.2 Timely Maintenance

### 3.2.2(h) Asbestos and Noise (continues)

#### (ii) Noise from ventilating or pumping system

Ventilating and pumping systems are common noise sources in a building that cause nuisances to the occupiers.

The building management should put in place a regularly scheduled equipment maintenance program so that the building services equipment or installations in the building are properly maintained and serviced without generating excessive noise or vibration.



When the building management observes abnormal or excessive noise from ventilating or pumping systems, it should immediately identify the source and the cause for appropriate remedial measures.

The building management should realize that it is likely for a normally operated powerful ventilation fan or high capacity condenser to generate irritating noise. In such circumstances, additional noise abatement measures such as acoustic panels, enclosures, silencers or acoustic louvers should be installed as appropriate to reduce the noise.

Although water pumps are mostly placed inside plant rooms housed in pump chambers, vibration of the pumps usually transmits through the mountings to sensitive parts of the building such as domestic flats or classrooms.

The building management should ensure that the pumps and the water pipes are isolated from the plant room structures by the use of springs or rubber isolators. Pipes penetrating the floor slabs or walls should be isolated by shock-absorbing materials such as rubber sleeve or glass-fibre packing.

When alteration or replacement of a ventilating or pumping system is required, noise level of pumps or moving parts should be of equal bearing as their performance. Noisy systems should be located away from sensitive uses wherever possible or suitably screened or insulated.

## 3.2 Timely Maintenance

### (i) Canopies and Balconies

Among the appendages, canopies and balconies are, in particular, susceptible to misuses.

Canopies are meant to protect the pedestrians from weather and falling objects. Balconies are for the leisure purpose of the residents. But they can collapse causing serious or fatal injuries if there is lack of maintenance/repair, misuse, addition of UBW above or below the canopies, material corrosion/deterioration, poor construction, etc. There are also cases where the collapsed canopy itself is an unauthorized addition. Overloading the approved balconies by using them for storage leading to eventual collapse have also been found.



The following are therefore of paramount importance:

- 1 avoid overloading of a canopy/balcony;
- 1 ensure the canopy/balcony is free from any unauthorized structure;
- 1 avoid ponding of water on a canopy/balcony;
- 1 ensure the drainage and any waterproofing system of the canopy/balcony are well maintained for proper protection of the structure; and
- 1 do not replace balcony parapets with glass panels unless the design has been carried out by an Authorised Person (AP) or a Registered Structural Engineer (RSE) and the installation carried out by a Registered General Building Contractor under the supervision of such AP or RSE.

Defects in canopies and balconies may not be revealed just by visual inspection. Whenever there is a concern about the safety of such features, the owner should engage a building professional to carry out an investigation. The Buildings Department (BD) may also issue orders to the registered owners of canopies/balconies requiring them to engage building professionals to investigate and make safe, where warranted, such structures.

The investigation usually includes the opening up of the key structural spots, examining the original construction material and details, testing material strength, and assessing the stability. The drainage and waterproofing aspects as well as any loose parts or attachments will also be dealt with.

If assessments by the building professionals reveal that the structures have become unsafe, remedial works such as additional strengthening, ultimately partial or even total demolition of the structures may be necessary.

For more details on the execution of the works, please refer to Section 4.2 and Section 4.3 of Chapter 4.

## 3.2 Timely Maintenance

### 3.2.2 Areas for Special Attention (continues)

#### (j) Defects Caused by Adjoining Building Works or Other External Factors

##### (i) Adjoining building works

Defects in buildings can be caused by activities carried out in adjoining sites. Examples of such activities are excavation, piling, demolition and construction. Such works should be supervised by the Authorized Person (AP), Registered Structural Engineer (RSE) and registered contractor of the subject works. In the case of Public Works, such will be supervised by the relevant Government Departments or the building professionals and contractors employed from the private sector.

The Buildings Department (BD) and other relevant Government Departments will, from time to time, inspect and check on aspects such as safety, stability, noise, dust, and water pollution problems of such works. Even though safety precautionary measures might have been taken, there are chances that such works at the adjoining buildings are somehow affecting your building.

##### (ii) Other external factors

They include inclement weather, accidents, burglaries, or negligence of adjoining owners. Accidents may be due to car intrusion, fire, landslide, bursting of public pipes, or falling of objects from adjacent buildings.

##### (iii) Common defects

The common defects caused by adjoining building works or other external factors include:

- cracks at walls, windows, doors, ceilings, floors, etc. due to vibrations or soil movement or settlement;
- tilting or slanting of part of your building due to soil movement or settlement;
- partial collapse of a wall or roof;
- water seepage at your party wall after the adjoining building was demolished; and
- flooding or mud flow from the site, or indirectly caused by the site due to blockage of public drains.



### 3.2 Timely Maintenance

#### (iv) Shoring works

Situation may arise that shoring works are required to be carried out in a property in relation to works in an adjoining site. This is usually a precautionary measure for the safety of the building affected by the works. Or it may form a part of the remedial works required when certain defects are discovered.

The shoring or supporting works are meant to strengthen and protect the structure of a building. However, it might inevitably cause damage to the decorations and finishes, and inconvenience.



The initiating adjoining owners will have to seek consent to carrying out such works in the affected building. However, even if mutual agreement cannot be arrived at, the required works should still be implemented for the sake of safety and structural stability.

Normally, the shoring and supporting works will be removed after the completion of the adjoining works. In the case if the affected property has developed structural damage, the adjoining initiating owner will be required to carry out the necessary investigation, survey and repair to your building before removing the supporting structures.

Section 4.1.8 of Chapter 4 provides more guidelines in this regard.