Understanding Common Building Defects, Solutions & Maintenance Management

[Excerpts from the website www.bd. gov. hk/english/documents/code/bmg]

1. Common Building Defects and Their Symptoms

1.1 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.

1.2 Defects in Buildings

Summary of common defects in the buildings are given in Table: 1.

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

Table: 1 Common building defects and their symptoms

Common Defects	Symptoms/Phenomenon	Possible Causes
i. Defective concrete, spalling or loose plaster in ceilings	• 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	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
ii. Water seepage from external wall, window, roof, or from ceiling	• Water staining • Peeling off of paint or wall paper • Water dripping • Growth of fungus • Defective concrete, plaster or tiles • Rust staining	External water seepage could be due to a variety of reasons including cracks on external wall, honey comb concrete, defective sealant at window, defective water-proofing membrane at roof, defective external water and drainage pipes, etc
iii. Structural cracks in walls	• 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	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
iv. Structural cracks in columns & beams	• Cracks that penetrate through finishes down to the concrete or bricks • Spalling	Same as item (iii) above.
v. Non-structural cracks (usually in plaster or other finishes with cement sand rendering as base)	• Hairline cracks • multi-directional cracks (shrinkage cracks) • Cracks between panel walls and structural elements e.g. brick wall and beams/columns	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
vi. Defective external wal finishes/mosaic tiles/ ceramic tiles/stone cladding/curtain wall	• 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	The defects could be due to ageing, structural move-ments, defective workmanship during installation, ther-mal 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.

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 Authority. 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.

1.3 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 lifespan of such components can prevent sudden breakdown of services that causes undesirable or even disastrous consequences. Common defects in building services installations are summarized in Table : 2.

Table: 2 Causes and symptoms of common defects in building services

System	Symptoms/Phenomenon	Possible Causes
i. Water Supply	• Insufficient water pressure or flows • Brownish water / grit and deposit • Stoppage of supply • Water seepage • Unclean water, algae growth, dirt and deposit • Sudden rise in consumption • Noisy water pumps, noisy water inlets	• Blockage or leakage of components of the supply system such as pipes or valves • Rusty pipes or dirty supply tanks • Pump failure, breakage of supply pipe • Defective water tanks, pipes (pipe joints) or valves • Defective or missing water tank cover • Leakage in the system after water meters • Defective water pumps, undue water pressure
ii. Electricity Supply	• Stoppage of supply / system breakdown • Sudden or frequent fuse or circuit breaker cut off leading to stoppage • Heating of switches & wires • Sudden or frequent stoppage and larger power consumption • Electric sparks or shocks, electrocution	• Failure of fuse or circuit breaker • Earth leakage, overloading • Overloading • Uneven distribution of phases • Inadequate earth bonding
iii. Fire Services	• Alarm not working (when tested), false alarm or warning lights on signal panels • Portable equipment lost or misplaced, glass panels of alarm switch- box broken • Non-functioning of equipment	• Alarm wiring defect, short circuit • Inadequate protection or poor management • Inadequate maintenance or servicing
iv. Lift and Escalator	• Stoppage, excessive noise during operation, indicator lamps off, unstable lifting, malfunction of buttons and indicator lamps • Occasional overrun • Doors not closing properly • Defective mechanical parts, frequent stoppage, alarm signals	• Ageing of parts, mechanical failure • Landing misalignment • Parts ageing, mechanical failure, rubbish obstructing operation • Inadequate servicing
v. Air Conditioing / Heating	• Not cool enough, not warm enough • Noisy, no air movement • Engines sound normal but no air movement • Noisy blowers or propellers movement • Poor indoor air quality • Dripping and substandard output of cool or warm air • Noisy blowers or propellers movement	• Poor efficiency, leakage of refrigerant dust and dirt at heat transmission fins • Loosen parts, blowers or propellers breakage • Dust screens blocked, air ducts and grilles needs cleaning • Misalignment of motor shafts • Insufficient fresh air intake, mal-function of intake air filter • Insulation failure • Misalignment of motor shafts

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

1.4 Water Seepage and Drainage Nuisance

They are common defects in 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 in Table: 3.

Table: 3 Water leakages and their causes

Location of Leakage or Seepage	Possible Causes
i. Underside of roofs (such as flat roof, podium roofs) and bottom of light wells	• Damage or deterioration of waterproofing layer • Leakage at access doors or top hatch doors • Deterioration of corrugated steel roofing materials and joints • Defective enclosure for water tanks • Cracks of parapet walls affecting the waterproofing membrane • Inadequate protection / improper installation of sleeve around openings through roof slab • Excessive movements of construction joints
ii. Ceiling with internal areas above	• Leakage from bathroom or kitchen above usually caused by seepage from fitments, bathtubs, shower trays, buried pipes or drains due to improper construction of joints, installation of sealants or occurrence of cracks • Waterproof cement rendering underneath floor tiles for the floor above not installed/specified or such waterproofing features damaged by installation of sockets or conduits • mal-function of waterproofing in nearby external features such as balconies or external walls above
iii. Wall	• 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 • Water penetration through defective external wall finishes such as loosened mosaic tiles, cracked ceramic tiles & paint surface; through poor cladding or curtain walls constructions; or weaknesses in water-resisting components • Water leakage through party walls between units of pre-fabricated elements, or between buildings
iv. Floor	• Seepage from defective pipeworks or sanitary fitments • Temporary floods and overflows • Defective bathroom fitments such as bathtubs, shower trays or hand wash basins, or the improper installation of pipeworks or necessary sealants
v. Window	• Improper fillings around frames • Deformation of frame and sashes, defective gasket, sealant or putty for window glass setting or frames • Air conditioning box or platform tilting inwards • Insufficient sealant around air conditioning units
vi. Basement	• Inadequate or damaged waterproofing tanking (may be due to movements or punctures) • Deterioration of water stops at construction/movement joints
vii. Buried or underground drains or pipes	• Seepage through defective joints or pipes caused by poor installation or differential movements/ settlements, movement of building structures or ground or water table • Corrosion of pipes at junctions with floors or walls • Invasion of water into conduits and distribute throughout the network • Blockage leading to excessive pressure built up • Attack by rodents or roots of plants
viii. Exposed (or in pipe ducts) supply pipes or drains	• Inadequacy in design of drains such as insufficient diameter of drains, bends being too sharp, etc. • Blockage of drains by rubbish/sand collected in the system especially in bends or traps • Insufficient number or deterioration of brackets leading to hammering and breakage of supply pipes • Blockage of open joints such as hoppers of down pipes by plants or rubbish • Unauthorized additions overloading the drainage system

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.

1.5 Defects in Windows and External Appendages

1.5.1 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.

1.5.2 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 occuring between finishes and parent wall) or peeling-off of finishes
- Spalling of concrete or uncovering of steel reinforcement
- 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 Society of the building for their action, irrespective of whether the defects are at the exterior of their own units or other units.
The some of the solutions to the above building defects are explained in following sections.

2. Solutions

2.1 Repair of structure

2.1.1 Defective concrete/ concrete spalling

(i) Patch repair

It is the most common repair method for minor concrete defects such as surface spalling. Damaged or defective concrete is to be hacked off down to sound substrate. After all defective concrete has been hacked off, rusty reinforcement bars should be properly cleaned, and primed with suitable cement/epoxy based primer matching the mortar used for patching and thereafter substrate should be patched up with appropriate repair mortars such as cementitious mortars and polyester-

modified cementitious mortar or Resin-based mortars such as epoxy resin mortar and polyester resin mortar.

(ii) Replacement of reinforcement bars

The process involves identification of the type of existing steel bars, assessment on the required replacement/ supplement of reinforcement bars and the required lapping of the new and old bars. Structural calculations may also be required.

2.1.2 Structural cracks

After identifying and addressing the problem causing the cracks, the repair of the cracks is usually done by pressure injection of non-shrinkage grout or epoxy resin or by open-up and refill/recast with concrete.

2.2 Repair of external walls

2.2.1 Wall tiles/finishes

Proper preparation of the exposed surfaces after removing loose parts of the existing wall for a physical key with the new mortar; use of suitable bonding agents or adhesives for the mortar; and special adhesives for the tiles are essential means for this purpose.

2.2.2 Cracks

Cracks should be repaired by injection of specially designed chemicals or through open-up and repair by mortar.

2.3 Waterproofing

2.3.1 Roof

(i) Types of waterproofing materials

The common waterproofing materials used can be classified based on their application methods, namely, liquid-applied and membrane applied. Some materials can be exposed to weather and sunlight but others require protection such as cement sand screeding or tile finishes. Some materials are more elastic and suitable for anticipated movements in the roof structure. Life spans of such materials is more than 5 years.

(ii) Workmanship

Good workmanship is vital in waterproofing works. Areas of concern include:

- Gradient of roof surfaces which should be laid to provide an adequate fall to avoid ponding;
- The thickness of the waterproofing materials applied;
- Overlapping of the material at junctions ;
- Upturns of the material at parapets and walls, protruding pipes and ducts, sharp corners are potential areas of problems;
- Downturns of the material into drain holes; and
- Prevention of excessive movement caused by equipment installed on top.

Effective waterproofing work also depends largely on whether their integrity will be damaged by pumps/ condensers of air conditioning systems causing excessive movements, unauthorized building works, pipe supports, etc.

(iii) Testing

Flooding/ponding tests and thermal scanning should be carried out after the laying of the materials to verify its waterproofing performance.

(vi) Other repair methods

There are other repair methods such as use of chemical additives to existing concrete surfaces or polyurethane (PU) injection into the cracks and voids. Since they can be applied from the negative side or floor below to stop the leakage, they are recommended as a temporary measure when the upper floor or the roof owner is not co-operative in the repair work . However, the result may not sustain as water will still find its way down via other weak points.

2.3.2 External Walls

(i) Common sources of leakage

Apart from sleeves, common sources of leakage in external walls are:

- Deep cracks/crevices penetrating the finishes and the body of the wall.
- Defective concrete found in the wall.
- Defective or loss of external finishes to protect the wall from direct attack of rain.

(ii) Common repair methods

- Cracks/crevices on external walls can either be repaired by chemical injection or opening up followed by repair with waterproofing mortar.
- Weak points in the wall such as holes, honeycombs, dirt and foreign matters should be removed and patched up by suitable waterproofing mortar.

The repair can be done internally or externally, depending on the location of the weak spot. Upon application of the repair mortar or chemical injection, the surface can be smoothened and plastered. The external wall should then be covered with finishes to match with existing ones. If considered necessary, special additives to the mortar or rendering on the external wall can be applied to improve its waterproofing abilities.

2.3.3 Bathrooms, Kitchens or Balcony Floors

(i) Sources of leakage

In bathrooms or kitchens, the source of the leakage must be identified before any repair works can be considered. If it is the loosening of components in the drainage system

such as bottle traps under the sink, basin or bathtub, simple fixing can stop the leak. However, if defective water supply pipes are identified as the culprit, licensed plumbers should be engaged to replace the defective parts or overhaul the entire system.

(ii) Repair

Before reconstructing the waterproofing layer of a floor, all the sanitary fitments and finishes should be removed to allow the formation of a continuous waterproofing construction.

Waterproof cement sand screeding or other similar materials is commonly used. The screeding should be applied to have sufficient upturns at the base of the walls, and have an adequate fall to the floor drain to prevent water ponding.

Sanitary fitments are to be installed on top of the waterproofing layer without penetrating it. The floor surface under the bathtub or shower tray should be formed with a fall to avoid trapping water at their bases if water leakage ever occurs.

(iii) Finishing

Tiles should be fully bedded with tile adhesives. After applying the floor finishes, the joints between tiles should be grouted properly with tile grouts. Junctions of wall finishes and bathtub or shower trays should be sealed with suitable silicon sealant.Gaps between marble tiles should be fixed with flexible waterproofing joint sealant to prevent long term minor movement giving rise to cracks for water penetration.

3. Need for Effective Maintenance and Management

After reading through the preceding sections of this Chapter, readers can appreciate the size and complexity of problems and the paramount importance of effective maintenance and management. Formulation of long-term maintenance as well as surveillance and control plans are initial steps to ensure a safe and pleasant living environment.

4. Principles of Long Term Maintenance

Effective maintenance of buildings not only improves the quality of living environment but is also a vital means to uphold or even raise the value of properties.

Maintenance in general can be classified into servicing, repair, replacement and upgrading. There is also a marked difference in terms of methods, management and the result of "breakdown maintenance" versus "planned or preventive maintenance".

Planned maintenance gives the owners and the property managers more time to prepare for the works and, more importantly, to secure the necessary funding. It usually starts out by a thorough condition survey to assess the current situations, identify the full extent of works required and lay down the level of expectation. Considerations include implementation programs, standard of performance and reliability, as well as maintenance strategy, budget, and life cycles of certain elements and facilities.

Daily maintenance of essential features such as cleaning of surface water channels to avoid blockage of drains, servicing of small components of equipment or easily wearable items such as children's play furniture are essential to ensure safe and smooth operation. A detailed plan for maintenance to be carried out everyday should be drawn up as per the equipment supplier's recommendations, needs and expectations of the owners and priority in allocation of resources.

5. Principles of Inspection, Surveillance and Control

5.1 Inspections

5.1.1 Day-to-day inspection

The day-to-day inspection is to ensure the proper and safe functioning of different building elements, installations, services and facilities of a building. Examples of items that should be included in the checklist are:

- Water pipes and pumps;
- Gates and locks, fire doors and closers, intercoms and TV signaling, lights and fittings;
- Hose reels, nozzle boxes and alarm glass;
- Letter boxes and breakable panels;
- Security TV and cameras, timer switches;
- Surface water channels, drains, manholes covers, oil interceptors and grease traps;
- Club facilities, flower beds and planters, playground equipment especially children's play furniture such as swings;
- Staircases, windows, lobbies, false ceiling, sprinklers;
- Air-conditioning units and pipes for coolants and condensate water;
- Building structures, external appendages and finishes

Fire has taken many lives in the past. Readers' attention is drawn in particular to the importance of inspecting the provisions in fire service installations and means of escape as follows:

5.1.2 Special inspections

(i) Means of escape

- Fire resisting doors (Fig. 1), smoke lobby doors and emergency doors (Fig. 2) should be kept closed, and the door-closers should work effectively. All such doors shall bear appropriate signs reminding people that they should always be kept close.

Fig. 1: Fire-resisting door

Fig. 2: Emergency exit door

- No alteration such as door or ventilation openings should be made to walls enclosing staircases, smoke lobbies and exit routes unless prior approval from the Authority on these alterations has been obtained.
- Staircase windows and vent openings should not be blocked. Normally, the frames should be made of steel instead of aluminum in order to comply with the required fire resisting requirements.
- Artificial and emergency lighting in staircases and exit routes including battery operated exit signs should be maintained in working order.
- The swing of doors or gates should not encroach onto exit routes, such as common corridors, staircases and rear lanes, causing obstruction to escape.
- Doors or gates in common parts should be readily openable from the inside without the use of a key.
- Doors giving access to the roof of single-staircase buildings should be readily openable from the inside without the use of a key.
- Exit routes should be free of any obstructions such as racks, shelves, cabinets, storerooms, or rubbish.
- Access from one stairway to an alternative stairway via a common corridor should best be available on each floor.
- Exit stairs at ground floor level should be separated from the rest of the building, such as storerooms, ground floor shops or other uses.
- Exit doors should open in the direction of exit when the room capacity exceeds 30 persons.
- Doors or gates should be set back at ground floor exit where there is a drop in level or a step. When they open outwards, they should not obstruct the public pedestrian flow.

(ii) Means of access for firefighting and rescue

- Fireman's lifts are used by firemen for rescue in the event of fire. Access to fireman's lift at ground level should be available directly from a street and free from obstructions.
- Fireman's lift lobbies protect the firemen in using the lift for rescue. No alteration should be made to the lobby walls and doors.
- Exit staircases are used by the firemen for both access and rescue purposes. They should be free from obstructions.

5.1.3 Inspecting fire resisting components and construction

(i) Regular maintenance

Buildings are made up of different components. Some of them are designed to be fire-rated for resisting spread of fire. Building owners should keep these fire-resisting components under proper maintenance. Unauthorized alterations to such components may affect their fire-resisting ability and thus the fire safety of the building and its occupiers. If there is unauthorized alteration or defective fire-resisting component, the advice of an Authorized Person (AP) on the conditions and remedial proposals is necessary. This section introduces the common types and functions of fire-resisting components and construction in a building. They should not be altered without proper professional advice and the prior approval by the Authority.

(ii) Walls and Floors

Most of the walls and floors in buildings serve to prevent the spread of fire and smoke from one part of a building to other parts, or from one building to another. No unprotected opening should be made in such walls and floors. If in doubt, the building owners should seek advice from an AP.

(iii) Staircases

Other than the required fire-fighting equipment and artificial lighting installations, staircases should not normally accommodate electrical cables, air ducts or similar services. Otherwise, such installations have to be properly protected by appropriate fire resisting enclosures.

(iv) Fire-resisting door (Fire door or smoke door)

Fire-resisting doors prevent the spread of fire and smoke from one part of a building to others and therefore must not be removed. They should have adequate fire-resisting properties with self-closing device to keep them in a closed position. Replacement should be avoided unless with doors of the same performance. Usually, the main entrance door to a flat or unit is a fire-resisting door. The vision panel on a fire-resisting door, if found broken, should be replaced with suitable fire-resisting.

(v) Other fire-resisting enclosures

Examples of fire-resisting enclosures include the enclosures to special hazard rooms such as commercial kitchens, dangerous goods stores, plant & machinery rooms, switch rooms, electric cable ducts, refuse chutes and refuse storage rooms. The enclosures, walls, floors and doors should be maintained as fire-resisting elements.

5.1.4 Fire service installations

The following are fire service installations and equipment commonly found in different places:

- Fire alarm system (Fig. 3),
- Fire/smoke detection system (Fig. 4),
- Fire hydrant/hose reel (Fig. 5),
- Automatic sprinkler system (Fig. 6),
- Automatic gas extraction installation,
- Emergency lighting system (Fig. 7),
- Exit sign (Fig. 8),
- Fireman's lift (Fig. 9),
- Fire extinguisher (Fig. 10),
- Dynamic smoke extraction system,
- Fire dampers in ventilating / air-conditioning control system.

Fig. 3: Fire alarm system

Fig. 4: Fire/smoke detection system

Fig. 5: Fire hydrant/hose reel

Fig. 6: Automatic sprinkler system

Fig. 7: Emergency lighting system

Fig. 8: Exit sign

Fig. 9: Fireman's lift

Fig. 10: Fire extinguisher

5.1.5 Testing and routine maintenance requirements

To ensure that these essential installations work efficiently at all times, a registered fire service installation contractor should be employed by the building owners to inspect and maintain at least once every year.

When the fire service installations are found to be not working properly or damaged, a registered fire service installation contractor should be employed immediately to inspect and repair as necessary.

If the owners have any doubt about the qualification of a contractor for fire service installations, they may consult the Fire Protection Command of the Fire Services Department.

5.2 Surveillance

Surveillance serves to prevent or stop misuses, trespasses, theft or crime in the premises. The plan should include routes and frequencies of patrol going through all accessible common areas and hidden corners. The patrol route should include staircases, roof tops, lobbies, open space, side and rear lanes, swimming pools, yards and podiums, machine rooms, switch rooms and ducts, refuse rooms and hidden corners.

5.3 Control

The surveillance, checking and inspection carried out by the management personnel help all the owners to exercise control over the building for a safe, clean and pleasant living environment. Some areas requiring control are listed as follows:

- Identify all the malfunction and defective elements and facilities for immediate attention and repairs according to the agreed strategy and standard for proper functioning
- Stop wedging open of fire doors to ensure proper protection of exit routes.
- Remove rubbish or obstructions from means of escape and other common parts, and give warnings to occupiers who have caused the irregularities as described above or violated the house rules.
- Prevent illegal extensions or misuses at the earliest possible time to prevent deterioration of environment.
- Stop any illegal connections of electricity, water, drainage, or signal cables for ensuring safety and proper functioning of utility supplies.
- Identify and prevent trespassers or any weak point in security which will lend itself to burglaries and trespasses.