Fire Safety Technical Note

DESIGN FIRE STRATEGY - UCL HALLS OF RESIDENCE NEW & REFURBISHMENT

Contents

1.0. Introduction

This document outlines the base fire strategy and Employers Requirements for all halls of residences, new build and refurbishment projects undertaken for UCL. It is to assist with initial design for new building design teams involved in UCL Residence upgrades and changes. The content considers *'lessons learnt principles'* from similar projects to date and an overall strategic approach to provision and upgrading of fire precautions in new and refurbished accommodation. The key issues are the need to maintain or improve existing levels of safety and business continuity in these buildings, whilst minimizing disruption caused by accidental fire incidents and unwanted alarms to UCL residents and the fire and rescue service.

2.0. Building Regulations (Purpose Groups)

2.1. It is UCL's preference that designs are formulated in accordance with **Approved Document B (ADB) to the Building Regulations** as opposed to other standards, such as BS 9999.

2.2. **Purpose Groups** - student accommodation is designed using the following:

- **Purpose Group 1(a) Residential (Dwellings)** - domestic houses and flats, the design of which is now often used when building new halls of residence;

- **Purpose Group 2(b) Residential (Institutional)** - *'other' residential'* such as hotel, boarding houses, residential colleges, halls of residences, hostels etc., which can be considered the more traditional halls of residence design.

2.3. **Comparison of the two approaches** - there are some key differences between the two approaches due to the contrast of fire strategy requirements between purpose-built blocks of flats and traditional design halls of residence.

2.4. We recommend that all new and existing student halls of residences should be designed to **Purpose Group 2(b):**

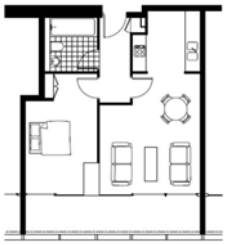
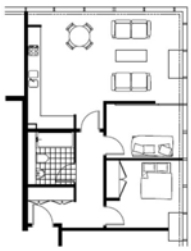
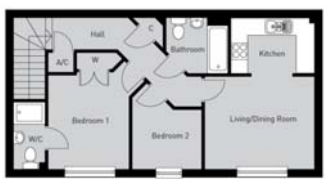
- **Purpose Group 2(b) Residential (Institutional)** - hotel, boarding houses, residential colleges, halls of residence, hostels etc. Purpose Group 2(b) provides the flexibility for future business use and the ability to function as a hotel out of university term time.

- **Purpose Group 1A Residential (Dwellings) 1(a)* Flats** - it is recommended that this design approach is not used for student halls of residences, but may be appropriate for new purpose-built staff accommodation in any UCL future development (i.e. Stratford). *This approach should be discussed and agreement reached prior to implementation. Consideration will need to be given to fire and evacuation strategies, emergency arrangements and general management principles of Purpose Group 1(a)) in consultation with the UCL Fire Safety Manager.*

Table 1 - Fire Safety Design Overview:

SPECIFIC DETAILS:	FLATS (A) Purpose Group 1(a) Students / Staff Residences	HALLS OF RESIDENCE (B) Purpose Group 2(b) Students Residences	REMARKS
Studio Flat	• Combined bedroom, living & Kitchen area; • Fire doors (2x) to form a lobby to corridor; • *BS5839-6 (Grade D) smoke / heat detector in all rooms ; • **BS5839-1 system heat detector located within lobby connected to common area fire alarm system;	• Combined bedroom, living & Kitchen area; • BS5839-6 (Grade D) smoke / heat detector in all rooms; • BS5839-1 system heat detector located adjacent to flat entrance; • Fire Action Information;	Lobby may be required depending on location Group 1A *See TN055b for BS5839-6 (Grade D) for details **See TN055 for BS5839-1 for details
One Bedroom Flat	• Bedroom area; • Living area; • Kitchen area; • Fire doors to kitchen and living area forming lobby to entrance door; • *BS5839-6 (Grade D) smoke / heat detector in all rooms ; • **BS5839-1 system heat detector located within lobby connected to common area fire alarm system;	• Cluster Flat unit; • Fire door • **BS5839-1 system multi sensor smoke & heat detector located within room; • Fire Action Information;	*See TN055b for BS5839-6 (Grade D) for details **See TN055 for BS5839-1 for details
Two Bedroom Flat	• 2 x Bedrooms; • Living room; • Kitchen; • Fire doors to kitchen and living area forming lobby to entrance door; • *BS5839-6 (Grade D) smoke / heat detector in all rooms ; • **BS5839-1 system heat detector located within lobby connected to common area fire alarm system;	N/A	*See TN055b for BS5839-6 (Grade D) for details **See TN055 for BS5839-1 for details
Three Bedroom Flat	• 3 x Bedrooms; • Living room; • Kitchen; • Fire doors to kitchen and living area forming lobby to entrance door; • *BS5839-6 (Grade D) smoke / heat detector in all rooms ; • **BS5839-1 system heat detector located within lobby connected to common area fire alarm system;	N/A	*See TN055b for BS5839-6 (Grade D) for details **See TN055 for BS5839-1 for details

Flat Layouts

			
Studio Flat	**1 x Bedroom with Lobby**	**2 x Bedroom with Lobby**	**3 x Bedroom with Lobby**

2.5. **Evacuation and Compartmentation**

Apartment/flats normally have a 'defend-in-place' strategy, in which only the flat containing the fire evacuates immediately. As each flat forms its own fire compartment, occupants of other flats are in a place of relative safety and do not need to evacuate immediately. Clearly, this only works with a high standard of compartmentation provided throughout the building.

This approach does not necessarily mean that occupants will have to remain in their flats indefinitely. Some may choose to escape as soon as they are aware of a fire and, in some circumstances, the fire and rescue service would instruct a managed evacuation of the premises.

In contrast, buildings that fall within the ***'Other Residential Purpose Group'*** do not need the same standard of compartmentation, but it is recognised that, due to the sleeping risk, it can take some time to fully evacuate this type of building.

Provision of two escape stairs would satisfy the guidance for both apartment buildings and halls of residence. However, in purpose-built blocks of flats the escape routes are protected to a much higher standard than typical halls of residence. With each flat being separated from the corridor by compartment walls achieving 60 minutes' fire-resistance (FR60) coupled with FD30S doors as a minimum; a **single staircase is permitted** where a traditional halls of residence design would generally require a **minimum of two escape** staircases.

2.6. **UCL Strategy** - the proposed fire strategy for UCL Residences incorporates the best features of both types of building. It has the high standard of compartmentation that is found in purpose-built blocks of flats. However, it also has a common fire alarm system that will raise the alarm promptly, allowing occupants to escape much sooner than would be the case in flats, where occupants may remain within the building for an extended, or, indeed, indefinite period. We believe that this approach provides flexible occupancy to maximise business opportunities outside of term time, as well as facilitating a high degree of business continuity and minimized downtime should a room be involved in a fire. Often to the high standard of fire compartmentation that is found in purpose-built blocks of flats would not increase costs markedly; as to achieve current building regulations for noise attenuation and energy efficiency much of the compartmentation infrastructure is already provided or designed.

3.0. Means of Escape (General Strategy)

3.1. **Capacity of Escape Routes** - the escape routes, including stair enclosures, will be sufficient in width and number to deal with the occupancy of the premises, as appropriate.

3.2. **Purpose Group 2(b)** provides the flexibility for future business use and the ability to function as a hotel, out of university term time.

3.3. **Future planning** - the means of escape must be of simple design, with fire-resisting lobbies to stairs as required, and consideration should be given to the potential for expansion or future development. Therefore, it is suggested that additional width over the stipulated widths in benchmark guidance be provided to accommodate future additional floor capacity and flexibility where planning will allow and to assist if the building is extended over time.

3.4. **Inclusive Design** - the provision of means of escape for disabled occupants is considered elsewhere in this document.

3.5. **Keep it Simple** - complicated and fire engineered designs for means of escape should be avoided, as it places undue maintenance and managerial burdens on the residence managers, once occupied. There is also more potential for higher costs should a problem occur, or the need to remove or reduce capacity during downtime if a key piece of fire safety equipment fails *(such as staircase pressurization equipment, smoke vents, fire curtains, etc.)*.

3.6. **Storey Exits** - the storey exits leading into the staircase at each level are required to have a minimum clear width of 950mm or wider (depending on occupancy numbers). Final exit doors at ground level should have a minimum clear width at least as wide as the associated staircase (i.e. 1100mm stair and 1100mm door width).

3.7. **Final Exits** - it should be noted that ADB recommends that any discharge paths from the staircase must be along a protected route with any access into adjacent accommodation being by way of a protected fire-resisting lobby, and that cupboards and stores are not provided in protected entrance lobbies. Building reception areas should not form part of the fire protected route, but may be provided in a suitable fire-separated location off the escape route.

3.8. **Plant Rooms** - the travel distance requirements from plant rooms are broken down into two stages i.e. escape within the room itself and the overall travel distance of the escape route. Generally, the maximum respective single and multiple direction travel distance within the plant room itself will be 9m and 35m respectively.

(a). The **maximum overall travel distances** from the furthest point in a plant room to a storey or final exit is 18m in a single direction or 45m where there is more than one direction of escape. If the escape route beyond the plant room is in the open air then the overall escape distances become 60m in a single direction and 100m where there is more than one direction of escape.

3.9. **Exit Widths** - the requirement of exit widths and staircase widths depend on the type of accommodation and type of evacuation philosophy adopted. The general recommendations are described below:

Residential Building:	Staircase / Exit:	Required minimum width:
Staircase	Fire Fighting Staircase	1100mm*
Storey Exit	Exit onto Staircase	850mm (depended on occupancy numbers and floor loadings etc.)
Final Exit from Fire Fighting Staircase		850mm (depended on occupancy numbers and floor loadings etc.)

4.0. Fire Compartmentation (General Strategy)

4.1. UCL new-build and refurbished halls of residence must provide a good level of fire compartmentation and sub-compartmentation. This level of compartmentation has demonstrated in the past that it is effective in minimizing fire damage and maintaining '*business as usual*' operations by confining fire damage within the room and surrounding areas of the incident.

(a). the following bedrooms shall be:

- surrounded in construction achieving a minimum of 30 minutes fire-resistance (**FR30**) standard in all cases;
- provided with 30 minute fire door sets, smoke seals and self-closing devices, as necessary(**FD30(S)SC**);
  - All bedrooms (including within cluster flats) = **FD30(S)SC**;
  - All cluster flat kitchens = **FD30(S)SC&VP** (with Vision Panels);
  - All studio flats = **FD30(S)SC**;
  - All cleaner cupboards = **FD30(S)**;
  - Office & reception accommodation = **FD30(S)SC&VP**;
  - All storage room or cupboards = **FD30(S)**;
  - All electrical service risers / switch rooms / switch cupboards, particularly when installed on escape routes = **FD30(S)**;
  - All plant equipment rooms = **FD30(S)SC**;
  - All information systems / server rooms = **FD30(S)SC**;
  - All laundry rooms = **FD30(S)SC&VP**;

4.2. General Fire Compartmentation:

Part of Building	Fire-Resistance Period
Compartment walls separating rooms in cluster flats:	30 minutes (FD30S doors)(1)
Compartment walls separating flats from offices:	60 minutes
Compartment walls separating flats from other flats:	60 minutes
Compartment walls separating flats from common corridors:	60 minutes (FD30S for entrance doors and cross corridor doors)
Corridors over 12 metres in length:	to provide an additional line of FR30 fire-resisting construction between external walls across the floor plate and subdivided at intervals appropriately and not exceeding 30m,
Compartment walls separating shops:	60 minutes
Firefighting stair:	120 minutes
Plant Rooms Enclosures:	30 minutes
Transformer sub-stations, oil-filled boiler rooms, oil fuel storage:	Four hours

Table 2 - General fire rating requirements

(Note 1: higher fire-resistance than is required by Building Regulations guidance due to UCL requirements).

4.3. Existing halls of residence refurbishments design:

(a). **Sub-compartment lines** - where practicable, additional sub-compartment lines should be introduced with fire-resisting cross-corridor doors and surrounding construction; this will reduce the numbers of bedrooms in sub-compartments and will consequently mean less disruption in the event of a fire incident; there will also be benefits in terms of minimizing unwanted fire alarms.

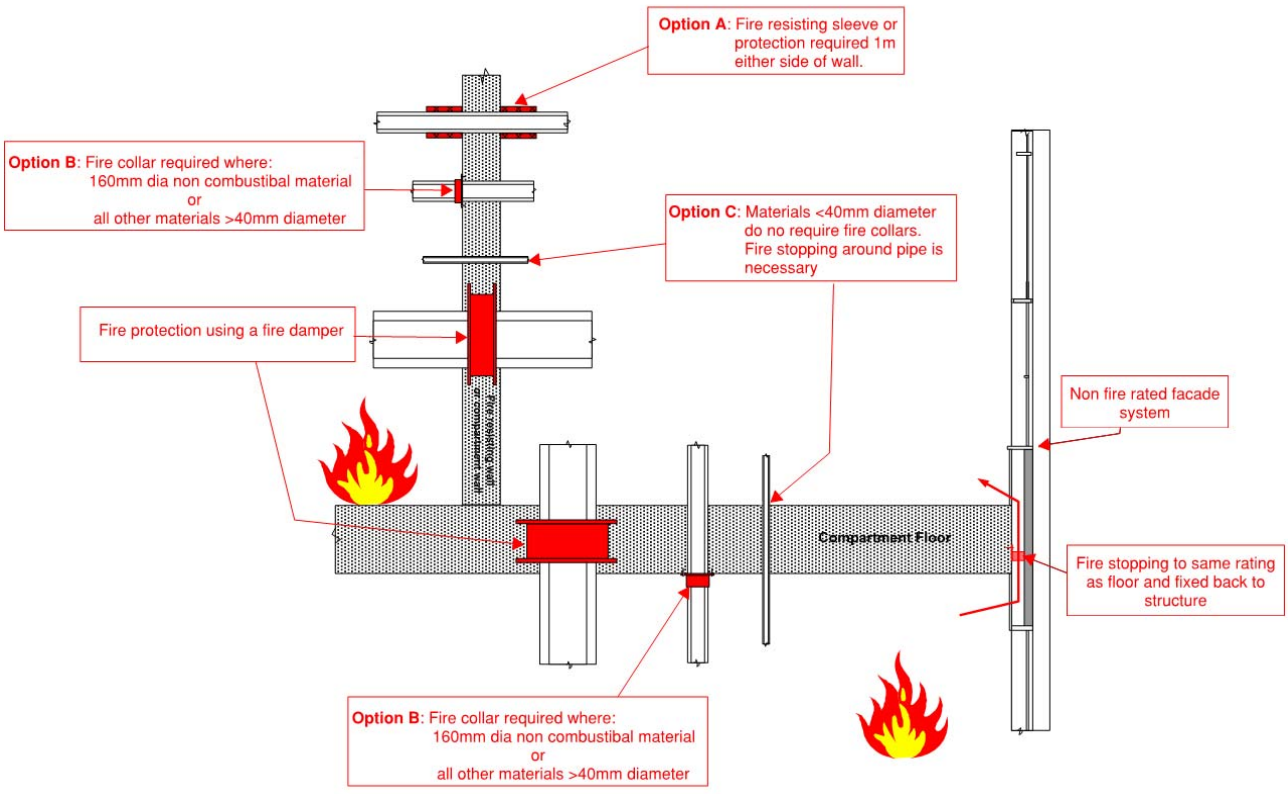
(b). **Cluster flat design in existing buildings** - inherently these have a level of sub-compartmentation that needs verification of the condition of such sub-compartmentation, with any remedial works necessary to be completed as part of the project. Experience has shown that contractors engaged in modern building methods do not always achieve effective compartmentation / fire-stopping works as part of projects.

(c). **Building size reduction** - the strategy for very large halls of residence buildings, such as Ramsay and Ifor Evans site, should seek to utilize increased compartmentation to create smaller 'buildings' (such a change may incorporate a revised fire alarm strategy to evacuate newly sub-divided 'buildings' or areas of buildings in case of fire.

4.4. **Passive and Active Fire Protection & Stopping**:

(a). Any breach in a compartment wall or floor (or a wall or floor required to be fire-resisting) for the passage of pipes and services will be protected in accordance with ADB Section 10, depending on the type of breach and size of services passing through it. This includes fire stopping and the provision of automatic active smoke or fire dampers, where necessary. The level of stopping will be the same as the fire-resistance of the wall that the service penetrates, to maintain the integrity of the construction. Service risers will be fire-stopped at each level, as well as horizontally to corridors, etc.

(b). As part of all new and refurbishment projects, the highest standards of passive and active fire protection are to be implemented. **UCL only accepts third-party accredited companies to undertake this work.** All projects must comply with UCL policy and information on passive fire protection and third-party accreditation, which can be found within UCL Fire Safety Technical Note **MI06/TN066** (Passive Fire Protection) - see www.ucl.ac.uk/fire/documents



4.5. **Fire Door (General Strategy):**

(a). Cross-corridor fire doors on sub-compartment lines may be held open during day time hours (releasing and closing at night) using directly interfaced approved hold-open devices in order to provide a more pleasant environment in the building.

(b). Where lobbies are formed onto protected stair enclosures then the innermost doors may be held open using approved interface devices. However, the **final doors to the stair may not be held open under any circumstances**.

(c). Hold-open devices should be interfaced in such a way that all will close throughout the building on detector activation anywhere in that building. A facility should also be provided whereby all door hold-open devices can be released to close simultaneously through a single point manual action (i.e. at night by security staff by pressing a button).

(d). All doors are to be provided with Vison Panels (VP) unless there is an obvious privacy requirement (i.e. bedroom door and WC/showers etc.)

- UCL Fire Safety Technical Note **TN013** (Fire Doors) - see www.ucl.ac.uk/fire/documents

5.0. Kitchen Design (Fires & Unwanted Alarm Strategy)

5.1. **Introduction** - general cooking activities and combustion products from cooking are by far the largest cause of unwanted fire alarm activations in UCL halls of residences.

5.2. To ensure, as far as is reasonably practicable, the safe design of student kitchens, follow safe principles as set out in UCL Fire Safety Technical Note **TN105** see www.ucl.ac.uk/fire/documents.

6.0. Fire Alarm Systems (General Strategy)

6.1. In standard halls of residence, a fire detection and alarm system will be provided, with coverage consistent with the recommendations contained in BS 5839-1 for a Category L2 system. Generally, multi-sensor detectors will be provided in all bedrooms and adjoining corridors, with smoke detection provided in areas forming part of the means of escape from the building, and heat detection provided in the kitchen areas.

6.2. **Cluster Flats** - multi-sensor detectors, which can detect a combination of smoke and heat, will be provided in all flat bedrooms and cluster flat corridors. Heat detection will be located in kitchens. A manual call point will be provided at exit from cluster flat to corridor and staircase to assist in preventing malicious alarms.

6.3. **Studio Flats** - will be provided with smoke detection and control unit to BS5839-6 standard for a Grade D system (i.e. mains powered alarms with a standby power supply that will give a local warning only). A Rate of Rise heat detector will be provided in all studio flats positioned in the flat within 500mm in from the door on the communal system, to provide warning throughout the building in case of a genuine fire in the room. A manual call point will be provided within 15m of the rooms.

6.4. **Corridors and Other Accommodation Areas** - smoke detection will be provided, as required, in corridors that do not contain kitchens, to achieve L2 standard fire detection, and to activate smoke vent systems (where fitted).

6.5. **Retail or Office** - any potential retail/office outlets incorporated in to future schemes should have their own separate fire alarm system and evacuate independently from the student halls. In an event of fire in the shops/offices, a managed evacuation, led by the fire and rescue service, may take place.

6.6. **Offices** - any potential office accommodation forming part of UCL sites will be part of the UCL residence fire alarm system. The office suites should be separately zoned so that activation of the detectors in the office area would not lead to simultaneous evacuation of the student cluster flats.

6.7. **Monitoring of Fire Alarm** - the alarm will be monitored 24/7 by the UCL Security Control Room via Gallagher Security System.

6.8. Any environmental ventilation system provided will shut off upon activation of the fire detection and alarm system, except where these form part of a smoke control strategy.

6.9. The provision of fire detection and alarm systems, and the fire alarm strategy for all UCL halls of residences and accommodation, is fully set out in **UCL Fire Safety Technical Note TN055/55a (Fire Alarm Systems Student Halls & Residences)** - see www.ucl.ac.uk/fire/documents.

6.10. **Specification for Smoke Alarms in Domestic Dwellings and Similar Accommodation** - the provision of fire alarm systems under BS5839-6 Fire Detection for Dwellings *(housing schemes and other sleeping accommodation that are not student halls of residences),* is set out in **UCL Fire Safety Technical Note TN055b** (specification for smoke alarms in domestic dwellings/similar accommodation) - see www.ucl.ac.uk/fire/documents.

7.0. Emergency Lighting (General Strategy)

7.1. The provision of emergency lighting for all UCL halls of residences is fully set out in UCL Fire Safety Technical Notes:

- UCL Fire Safety Technical Note **TN020** (Emergency Lighting) - see www.ucl.ac.uk/fire/documents

8.0. Mechanical & Electrical (General Strategy)

8.1. The provision and principles for fire alarm system and design interface requirements for mechanical and electrical (M&E) items are set out in TN038:

- Mechanical plant and air handling control equipment;
- Photovoltaic equipment (consultation must take place with the UCL Fire Safety Manager prior to installation of such equipment to ensure that suitable safety systems are incorporated);
- Lift equipment;
- Smoke control equipment;
- Fire Shutters (if needed);
- Information and instructions.

8.2. See UCL Fire Safety Technical Note **TN038** (M&E Guidance) at www.ucl.ac.uk/fire/documents.

9.0. Fire Brigade (General Strategy)

9.1. **General principles** - the following discusses the implications of providing facilities to meet requirements for access and facilities for the fire and rescue service within and around the premises.

9.2. **Fire and rescue service access** - ADB stipulates the following functional requirement to be met in respect of B5, access and facilities for the fire service:

(1). the building shall be designed and constructed to provide reasonable facilities to assist firefighters in the protection of life.

(2). Reasonable provisions shall be made within the site of the building to enable fire appliances to gain access to the building.

(a). Fire and rescue service access to buildings is required to provide fire personnel with a water supply to within a reasonable distance of the building entrances.

(b). Access for a fire fighting 'pump' appliance should be provided to the furthest point of each premises to within 45m. Where this is not achieved, rising mains may be provided to each stair core as a requirement for the fire-fighting shafts, which have outlets at each level to achieve the 45m hose lengths.

(c). In addition to these facilities where the top floor level exceeds 18m in height, this core will be provided with fire-fighting shafts incorporating a fire-fighting lift, dry riser and dual power supplies. Any fire-fighting shafts will be designed following the principles detailed in BS9999:2008.

9.3. **External vehicle access:**

(a). Fire and rescue service, vehicle access will be provided at the main entrance to the building. Rising / falling main inlets should be provided within 18m and in sight of a location suitable for the parking of the fire appliance.

(b). Where there are dead-end road routes within the site, these will either be limited to approximately 20m, or a turnaround (turning circle or hammerhead) facility should be provided.

(c). Fire service vehicle access will be available to the main entrance of the building. However, due care should be given to ensure that the vehicle access route meets the requirements for a pump appliance as shown in the table below (which is taken from London Fire Brigade – Guidance Note 29).

Appliance Type	Minimum width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
Pump	3.7m	3.1m	16.8m	19.2m	3.7m	14.0t

(d). any access / security measures in and around the site (especially any bollards preventing vehicle access) will need to be by passable by the fire service. The details of the bypass arrangements will need to be developed and agreed with the fire service, as applicable.

9.4. **Fire-Fighting Shafts** - where the stair cores are designed as fire-fighting shafts, the shaft (essentially the staircases themselves) will be enclosed in 120 minutes fire-resisting construction with FD60S self-closing fire doors to the stair enclosure:

(a). the fire-fighting shafts are to be designed in accordance with BS9999:2008 and each shaft will:

- Be constructed with 120 minutes' fire-resisting construction;
- Include fire-fighting staircase (at least 1100mm wide);
- Include fire-fighting lift (provided with dual power supply, water protection etc.);
- Have ventilated fire-fighting lobbies;
- Be provided with outlet from the fire main at each storey that the fire-fighting shaft serves (within the staircase or fire-fighting lobby);
- Be provided with a 1.0m^2 vent on the top of the staircase.

9.5. **Smoke venting**

(a). In the case of the staircase lobby ventilation, this can either be via natural (manually openable windows) or, where an internal staircase is provided, via a vertical smoke shaft with a minimum cross-sectional area of 1.5m^2. The ventilator into the shaft will be a minimum of 1m^2.

An automatic opening vent (AOV) of a free area of 1.5m^2 within the staircase lobby and an AOV (1m^2) at the head of the stairs should be provided.

(b). Vent shafts are to terminate at least 0.5m above roof level. If any local structure is within a horizontal 2m distance of the shaft opening, the opening of the shaft will be 0.5m above that structure.

9.6. **Dry riser facilities:**

(a). Outlets to be provided on all floors within the stair enclosure with all parts of the floor plates will be within 60m (when measured along a route suitable for laying hose) from a dry riser outlet provided within the fire-fighting shaft (where provided). All parts of the floor plate will be within 45m (when measured along a route suitable for laying hose) from a dry riser outlet, provided within a staircase which does not meet the requirements for a fire-fighting staircase.

(b). The dry rising fire main should be provided with an inlet located adjacent to the building entrance, and should be visible from the fire appliance (plus accessible within 18m of the fire appliance parking location).

9.7. **Fire hydrants:**

(a). Under the current Building Regulations, there are no requirements to provide additional fire hydrants beyond what is already provided within the public roads. However, ABD does make recommendations on the hydrant facilities needed on private sites, i.e. that private

hydrants should be provided as necessary to ensure that all dry riser inlets are within 90m of a fire hydrant.

(b). It is proposed that a site survey is commissioned to confirm whether the above criteria is achieved based on any existing hydrant provision. If this survey establishes that the existing hydrants are inadequate, it is recommended that additional private hydrant(s) are included on the site.

9.8. **Emergency power supplies:**

(a). Each life safety system provided within the building will have an independent power supply, which would operate in the event of a failure of the main supply. This will be:

- Automatic Opening Vents (AOVs);
- Mechanical Smoke Venting system;
- Fire Detection and Alarm System;
- Emergency Lighting and Illuminated Escape Signage;
- Fire-fighting Lifts;

(b). Secondary power supplies can be provided from an alternate power source or may be provided via two separate routes (remote from each other) from the mains to the substation, and then two separate routes (remote from each other) from this substation.

9.9. **Fire-fighting lifts:**

(a). Each fire-fighting lift within the fire-fighting shaft will be designed and installed in accordance with BS9999 and BS EN 81-72:2003. A summary of some of these measures is listed below.

- Dual Power Supply (i.e. emergency, stand-by or alternative power supply);
- Size of the lift should be at least 1100mm wide x 1400mm deep with a rated load of 630kg as described in ISO 4190-1;
- Fire lift switch at access level;
- Fire Service Communication System with built-in microphone and speaker;
- Provision to prevent water penetration into the firefighting lift via:
  - Drainage grid to the lift entrance, or

- A floor sloped away from the lift entrance, or
- A raised threshold to the lift entrance (at least 25mm high).

- Water protection to the electronic equipment control within the firefighting lift well / car;
- Means to prevent water level in a lift pit from reaching equipment;
- Suitable means to prevent water rising above the level of fully compressed car buffer.

10.0. Fire-Fighting Equipment (General Strategy)

10.1. The provision of fire-fighting extinguishers and fire equipment for halls of residences is set out in the following fire safety technical note:

- UCL Fire Safety Technical Note **TN023** (Fire Extinguisher Policy) - see www.ucl.ac.uk/fire/documents

11.0. Disabled Evacuation

11.1. **Design Principles** - the evacuation of Mobility Impaired Persons (MIP) plays an important role in the overall evacuation of any student residences. Generally, UCL, to discharge its duty of care, will place MIP occupants in accommodation at ground floor level where self-evacuation is possible; this due to the lack of staff available to provide assistance during an emergency, both during working and out of hours.

11.1. **Deaf Messaging System (DMS)** - as standard, a deaf messaging system will be supplied with supplementary vibrating pillows or other facilities subject to a PEEP assessment, as necessary in accordance with UCL policy.

11.2. **Refuges** - further to the design principals above, refuge locations are to be minimized and, where identified, a means of communication will be provided in the form of a phone / data point for use with a BT Big Button phone, complete with local telephone numbers, as UCL standard. At ground floor level, where direct escape to outside is available, disabled refuges will not be required.

- See UCL Fire Safety Technical Note **TN007 to TN010** (MIP Guidance & PEEP questionnaire) at www.ucl.ac.uk/fire/documents

12.0. Fire Signage (General Strategy)

12.1. Escape signage will be provided above storey exits and final exit doors from the common areas within the student accommodation, and in any other relevant area. Emergency escape signage will be required to meet the requirements of the Regulatory Reform (Fire Safety) Order 2005. Such signage will meet the recommendations of BS5499-4 and will be located as follows, except for escape routes that are in ordinary use:

- All designated escape routes or escape routes across open areas will be provided with signage, especially stairs and other changes in level and direction;
- The position of all doors and other exits sited on escape routes, including storey exits and final exits, will be identified by signs;
- Where an escape route from a room is not conspicuous or confusion could occur, the route will be indicated by a sign, including intermediate signs where necessary;
- All changes of direction in corridors, stairways and open spaces forming part of an escape route will be marked with intermediate signs;
- Each intermediate door or junction will be similarly signed.

Other Signage

12.2. **Fire door signs** - fire door signage will be provided to all doors required to be fire-rated doors, including student rooms, cluster / studios apartments; fire-resisting doors and fire exit doors and escape routes in and around the building will be provided with signage meeting the recommendations of TN090.

12.3. Equipment for fire and rescue service use will be appropriately indicated. This will include dry riser inlets and outlets; fire-fighting lifts; fire alarm and smoke venting overrides and fire service Premises Information Boxes (PIB).

12.4. **Fire Action Notices** - all rooms will be provided with fire action notices adjacent to the room entrance and may be supplemented with specific information on the provision of fire detection and its operation within the room, where necessary.

12.5. The provision of fire signage for all UCL halls of residences is fully set out in UCL Fire Safety Technical Notes TN090. Signage will be compliant to the Health and Safety (Safety Signs and Signals) Regulations 1996.

- UCL Fire Safety Technical Note **TN090** (Fire Sign Policy) - see www.ucl.ac.uk/fire/documents

13.0. Building Management

13.1. Halls of residence will be managed spaces, Residences management staff can ensure that all passive fire measures, including fire doors at the flat entrances and within the flats, are subject to adequate maintenance. Therefore, it is expected that the standard of testing, maintenance, and repair would be similar to a hotel, and therefore a higher level than a domestic dwelling environment. Clearly, this is a significant improvement to a typical residential building, in which fire doors and self-closing devices could become damaged or be removed.

- Management can also help ensure that corridors and stairs are kept free of obstructions;

- Management will be on site 24 hours a day (but this may be via a Warden or Site Security out of normal working hours);

14.0. Emergency Plans

By implementing the measures described above in relation to compartmentation and fire alarms, a new holistic strategy would incorporate an amended emergency plan. As a benchmark and aspiration, UCL should be trying to achieve one appointed person for every 100 occupants. To assist in this, the compartmentation and fire alarm strategy should focus on splitting the buildings into smaller, appropriately sized compartments. This will mean that, in a full evacuation, the numbers of people evacuating will be considerably less, and the situation will be more manageable for duty staff and fire and rescue service personnel.

Instruction to occupants in relation to Stage 1 alarms originating in bedrooms would be to evacuate the room if there is a fire or if they are unsure if there is a fire.

If there is no apparent reason for the alarm activating in the room, they will evacuate on the assumption that there may be a fire elsewhere locally. In Stage 1, it is considered likely (based on statistics) that, on exiting their room, there may be smoke in the corridor from burnt cooking.

This will mean that the Stage 1 alarm will be evacuating all rooms in the corridor. As such (if this is minor burnt cooking, as opposed to a fire) the occupants will have the same timeframe to clear the smoke from the detector before the alarm escalates to Stage 2.

If neither of these preventable false alarm situations is occurring, the occupants will evacuate completely. A very short, clear and concise emergency plan will be formulated to clearly explain this to all residents and guests prior to implementation.

15.0. Staff Training

15.1. E-learning materials on Basic Fire Safety are now available on Moodle, and can be utilized for Residents. This includes a 20-minute audio-visual presentation and a short quiz.

15.2 In future, Safety Services have plans to develop bespoke e-learning materials for Residences. Such materials would include clear instruction in relation to emergency plans, particularly where significant changes are made to these.

Appendix 1

Table A1 - Comparison of (Staff) Flats and Halls of Residence

SPECIFIC DETAILS	PURPOSE-BUILT FLAT DESIGN Flats (A) Purpose Group 1(a) Students / Staff Residences	TRADITIONAL HALLS DESIGN Halls of Residence (B) Purpose Group 2(b) Students Residences	REMARKS
Staff Accommodation Design - Advantages	• Possibly less compartmentation than in other Purpose Group designs as there is the potential to just have fire-resisting construction around the flat as a unit, rather than, say, in halls of residence, in which, generally, UCL would aim to have each bedroom as a fire-resisting box; • Individual smoke alarms as opposed to full building fire alarm system which will mean no full building evacuations through false alarms and potential for reduced maintenance burden; • Cheaper to build and manage; • Management levels and standards of fire protection equipment can be 'scaled up' if desired;	• Not a practical solution for staff accommodation;	For staff accommodation, it would be appropriate to build to a standard flat design. Purpose-built flats would be in keeping with the type of accommodation that staff would be likely to rent or buy in the private market, and, by using this design, they would not be subject to building-wide false alarms or inconvenienced by other tenant activities.
Design Disadvantages Staff Accommodation:	• Less management control within the individual units; • Reliance on tenants to test smoke alarms and manage fire safety within their flat which may be difficult to ensure; • Potential reliance on expensive fire engineering designs and solutions to maximise space and rental income;	• Not a practical solution; • Staff may be unlikely to wish to live in communal corridors associated with traditional student halls; • More expensive to manage than purpose-built flats; • Greater management and maintenance burden;	For staff accommodation, even following a purpose-built flat design strategy would mean a loss of some control of safety within the flat. Consideration would have to be given to how fire safety within individual flats would be managed, although this is the case in all flats throughout the country and is not insurmountable
Design Advantages Under Graduate Accommodation:	• Building as purpose-built flats would not generally fit with undergraduate accommodation use, however it may be cheaper to build; • Less management control would translate to reduced costs;	• Traditional Halls design would fit in with students expectations of halls of residence experience; • On-site management control would be more appropriate for managing younger students and looking after their welfare; • Common fire detection and alarm systems throughout would provide a clearer indication of the location of any fire to the fire and rescue service, which is arguably important with younger, less experienced, higher risk students;	Traditional halls of residence design would arguably better cater for the social university experience, with open corridors that could be usefully sub-compartmented into smaller 'cluster flats'. It will result in fewer problems in terms of access arrangements for inspection by staff and will allow better control of corridors.

Table A1 - Comparison of (Staff) Flats and Halls of Residence (Cont.):

SPECIFIC DETAILS	PURPOSE-BUILT FLAT DESIGN Flats (A) Purpose Group 1(a) Students / Staff Residences	TRADITIONAL HALLS DESIGN Halls of Residence (B) Purpose Group 2(b) Students Residences	REMARKS
Design Disadvantages Under Graduate Accommodation:	• Younger students may be vulnerable living in flats practically on safety grounds; • Less management control could translate to higher risk;	• Maintenance costs associated with fire precautions; • Staffing costs associated with site management;	Whilst there are more costs associated with managing a traditional-design halls of residence, the more vulnerable and arguably higher risk of younger, inexperienced students arguably warrants a design that suits a higher level of management control, rather than relying on under graduates to take suitable care in a flat on their own. A blended 'cluster flat' design within the traditional hall of residence is arguably the most suitable design
Design Advantages Post Graduates Accommodation:	• Possibly less compartmentation than in other Purpose Group designs as there is the potential to just have fire-resisting construction around the flat as a unit, rather than, say, in halls of residence, in which, generally, UCL would aim to have each bedroom as a fire-resisting box; • Individual smoke alarms as opposed to full building fire alarm system which will mean no full building evacuations through false alarms and potential for reduced maintenance burden; • Cheaper to build and manage; • Management levels and standards of fire protection equipment can be 'scaled up' if desired;	• Traditional Halls design would fit in with students expectations of halls of residence experience; • On-site management control would be more appropriate for managing younger students and looking after their welfare; • Common fire detection and alarm systems throughout would provide a clearer indication of the location of any fire to the fire and rescue service, which is arguably important with younger, less experienced, higher risk students;	There is an argument for both types of design for post-graduate students. There is a consideration that should be made in respect of the type of post-graduate students that could be expected to reside in the halls; if these are paid researchers, they are perhaps more similar to staff and a purpose-built flat design may be more suitable, whereas if they are, effectively, students who are studying, a traditional halls of residence design may be more appropriate
Design Disadvantages Post Graduates Accommodation:	• Less management control within the individual units; • Reliance on tenants to test smoke alarms and manage fire safety within their flat which may be difficult to ensure; • Potential reliance on expensive fire engineering designs and solutions to maximise space and rental income;	• Maintenance costs associated with fire precautions; • Staffing costs associated with site management;	The disadvantages associated with each type of building for post-graduate accommodation are effectively lack of management control in flats, and greater costs associated with increased staffing and more robust fire protection systems in halls of residence design.
Hotel or Other Use Student Residences	• Would not really fit hotel use, but may be suitable to let out as flats in the summer;	• May be used readily as a hotel with only simple changes to staffing levels and emergency arrangements etc. needed;	Traditional halls of residence design, readily fits the hotel model, as, effectively, the design between the two occupancies is the same. However, flats may be lettable in a different form.

Table 2 - Fire Safety Design Comparison of (Staff) Flats / Halls of Residence

SPECIFIC DETAILS:	FLATS (A) Purpose Group 1(a) Students / Staff Residences	HALLS OF RESIDENCE (B) Purpose Group 2(b) Students Residences	REMARKS
Design Advantages:	• Cheaper to build with potential for higher return as less space lost to stairs (could provide single staircase only); • More compartmentation offers better protection; • Individual smoke alarms in flats are less complex and even with a BS 5839-6 Grade C, LD2 communal system, fire alarm costs should be much cheaper;	• Arguably less risk due to provision of alternative exits; • Less compartmentation required; • Less compartmentation; • Arguably higher standard of protection offered by more comprehensive fire detection and alarm system ;	There are benefits to both designs, although the design should suit the purpose for which the building is intended.
Design Disadvantages:	• Potential for reliance on expensive fire engineering designs and solutions to support means of escape; • Costly M&E equipment, maintenance required to be provided; • Potential for a larger fire involving the whole flat and not just the room of fire origin;	• Possibly more expensive to build / less return to be made due to facilitating a greater means of escape requirement; • More expensive and complex fire detection and alarm system required;	Each design has associated disadvantages, but, again, each is arguably more suitable to the different groups that UCL will house in the premises.
Management Implications:	• Fewer management controls; • No 24/7 managements duties; • Less control over premises;	• Greater management controls • 24/7 management duties; • More control over premises;	It should be noted that greater management control is arguably part of meeting UCL's duty of care, particularly to students perceived as a higher risk.
Cost Implications:	• Potential to be cheaper to build; • Potential for cheaper life safety systems; • Potentially less space to let; • Possible better return on money;	• Potential to be more expensive to build; • Potential for more expensive life safety systems including maintenance of these systems, although these may offer higher degree of protection; • More use of lettable space; • Possible better return on money;	Potential savings made by following a purpose-built flats design may be offset by loss of future revenue through more space taken up by compartmentation (although savings could be made in staircases). Ongoing costs should be considered.
Fire Strategy Principal:	***'Stay Put'** - an evacuation strategy based on the principle that only the residents of the flat of fire origin need to escape initially, while other residents may remain in their own flats until being directed by the fire brigade; This means that those who are not within the affected area will be safe to remain inside and will consequently not be inconvenienced by false alarms or put at risk by having to go out onto the street;	**Simultaneous evacuation** - an evacuation strategy based on all persons evacuating on activation of a communal fire alarm system, although it may be possible to configure the alarm and the premises to minimize areas that are evacuated; There is an increased likelihood for a degree of false alarms which will result in residents being inconvenienced and having to go out onto the street;	Clearly, there are advantages, particularly for staff or post-grads, to Stay Put, as disruption is minimized. Hybrid strategies are available (i.e. New Hall). Stay Put relies on high standards of compartmentation, and it will therefore be important to ensure that this is completed effectively in premises adopting this strategy.

Table 2 - Fire Safety Design Comparison of (Staff) Flats / Halls of Residence (Con.):

SPECIFIC DETAILS:	FLATS (A) Purpose Group 1(a) Students / Staff Residences	HALLS OF RESIDENCE (B) Purpose Group 2(b) Students Residences	REMARKS
Evacuation:	• Defend-in-place; • Based on individual alarms within each room of each flat, with the potential to incorporate heat detection on a communal system within each flat entrance corridor and smoke detectors on a communal system within common parts;	• Simultaneous evacuation; • Based on a building-wide communal system with detection in each room that provides alarm signal throughout building when one detector is activated. There is some scope for intelligent configuration based on fire alarm cause and effect and compartmentation strategy;	There will be far less evacuations in stay-put flat designs, but safety will rely on tenants to look after themselves
Fire alarm:	• Independent interlinked smoke alarms in each flat unit; • Possible communal system which would have only heat detectors in accommodation areas to prevent false alarms; • Tenants to maintain fire alarms within their flat;	• Full L2 detection required throughout premises; • Alarm maintained by building management;	Reliance on tenants maintaining equipment in their flat may not work in all cases at UCL. Managed maintenance will have associated cost burden.
Travel distance:	• 9m in flat hallways; • 7.5m in corridor, 30m where alternative directions provided; • Total distance up to 39m, plus distance travelled in room;	• 9m in rooms; • 9m in corridor, 35m where alternative directions provided; • Total travel distance up to 44m;	Negligible differences, although purpose-built flats can rely on only one staircase for means of escape, which will have an associated financial gain in terms of increased space.
Corridor smoke venting:	• 1.5m² smoke vent;	• None required within normal design;	Maintenance burden in purpose-built flat design
Vent at head of stair:	• 1m²;	• None required within normal design;	Maintenance burden in purpose-built flat design
Compartmentation between residences:	• Each flat is a separate 60 minute fire-resisting compartment;	• No compartmentation required between rooms*; although 30 minute fire-resisting construction needed between rooms and corridors (in effect, compartmentation is likely to be provided through construction put in place for acoustic requirements anyway);	Effectively, many bedrooms in a traditional design may have compartmentation approaching purpose-built flat designs for other reasons. However, it is likely that the flats design may lead to wasted space and loss of revenue.
Protection to corridor:	• 60 minutes fire-resistance;	• 30 minutes fire-resistance;	
Number of stairs:	• Single stair permitted;	• Two stairs or more required (over 11m);	Single stair provision may need additional M&E cost and equipment
Management:	• None / Minimal – likely only cleaners as well as routine inspection of common parts by building manager;	• Staff on site 24 hours a day;	

Conclusion

As can be seen from the information contained in this document, there are both advantages and disadvantages associated with each design of building. In terms of purpose-built flat designs, there would generally not be a need for on-site 24/7 management, as these are more akin to single-family dwellings.

UCL could offset a degree of risk by incorporating good standards of detection and alarms within the flats, such as by providing Grade D, LD1 alarms in all flats. This could be matched to a communal system to Grade C, LD2 fire detection and alarm systems, which are relatively low cost solutions to providing such systems.

Whilst there would be a reduced management burden within the flats, the maintenance of the common parts would become very important, as, for example, flats tend to have the problem that people use corridors and staircases for general storage. As such, inspection regimes would have to be implemented and maintained, so the maintenance burden on UCL would not disappear fully.

Building as halls of residence would generally meet student expectations but would probably not be popular for staff flats, due to the communal living arrangements. Disadvantages to maintaining these designs are because there is little scope for reduction in running costs associated with staffing and maintenance. UCL will need to provide fire detection and alarm systems to Category L2, which will involve a complete system with detection throughout, and fire-fighting equipment as per current arrangements.

Clearly, the type of design should be based on the expected use of the premises. Stay Put flats will suit the type of people that would generally rent such premises on the private market, so these would be best for staff and some post-grads. Under graduates and some post-grads would expect the student experience associated with traditional halls of residence, and so this design may be more appropriate for them.

End