

UCL Institute of Education

Stage 3 Fire Safety Strategy - Phase 1 UCL Institute of Education

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Revision 01

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1 Introduction

1.1 Aim

BuroHappold has been appointed by UCL Estates to produce a fire strategy for the redevelopment of the existing building of UCL Institute of Education (IoE). This fire strategy report focuses on the Phase 1 alteration works which are intended to provide additional teaching spaces in the building. This report is intended to inform the design team of the fire strategy proposals, while being used as the basis for submission to the Approved Inspectors, and the London Fire Brigade. It has been developed to demonstrate how the functional life safety requirements of the Building Regulations 2010 will be met, at a RIBA Stage 3 level of detail of the Phase 1 alteration works. This report is also intended to be used as part of the planning submission.

It is the objective of this strategy to provide a risk proportionate approach that balances occupant needs with an uplift in fire precautions. The strategy is based upon information supplied and is determined on the basis of there being one fire seat in the building at any one time. Asset and property protection are not explicitly stated as design objectives and as such have not been considered within this fire strategy.

1.2 Approving Bodies

Approval of this fire strategy will need to be agreed with the following stakeholders:

- MLM - Approved Inspectors
- London Fire Brigade (LFB)
- UCL Fire Officer
- The Building Insurers

1.3 Description

1.3.1 Building Description

The 1970's Grade II* listed, UCL building has five levels above ground, a lower ground level and two levels of basements. The levels above ground (level 05 to level 09) are served by three main protected stairs A, B and C and an external stair D. The building accommodates teaching facilities/rooms; large lecture rooms, offices, laboratories, library and break out spaces.

The "wing" is the section of the building located between stair core A and D.

While several future alteration phases are proposed to UCL Institute of Education, this report only focuses on Phase 1.



Figure 1—1: UCL IoE building (Hawkins Brown image)

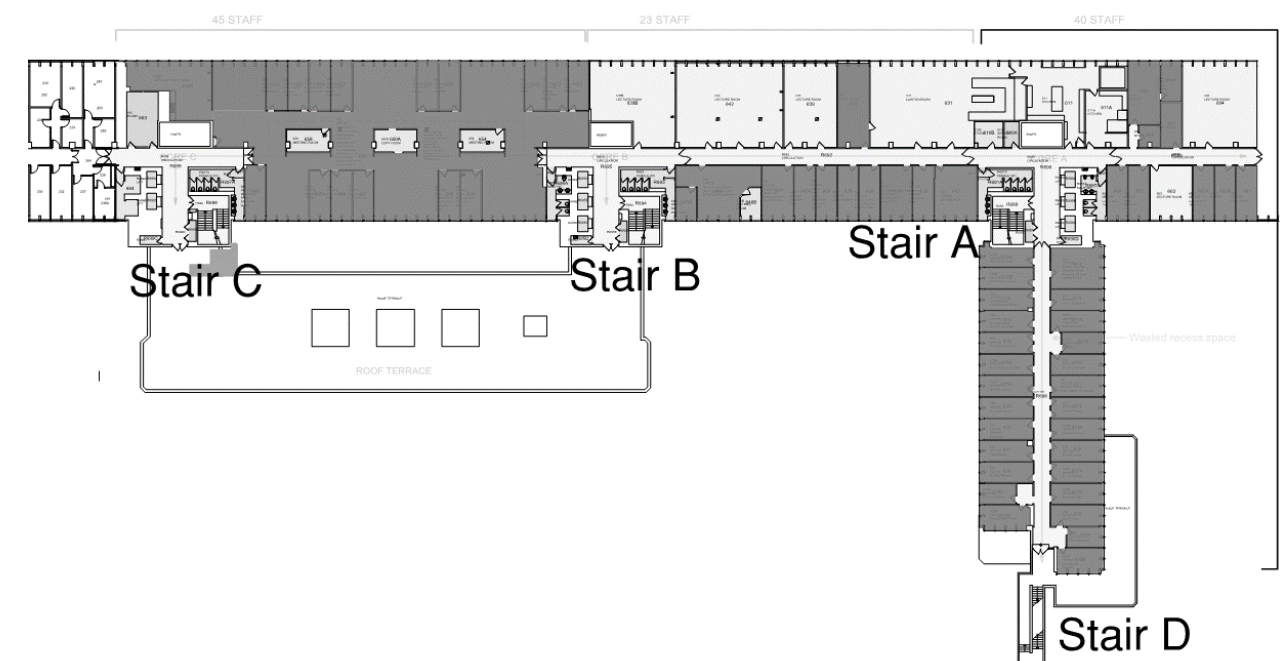


Figure 1—2: UCL IoE typical level and stair locations

1.3.2 Phase 1 Works

The proposed renovation of IoE building will be divided in design Phases. Phase 1 alteration works include the areas listed below:

- Level 2 of the Wing between cores A and D, where additional teaching spaces will be located; bar and kitchen; break out space; estate offices and an existing plant room; this level of the Wing was previously used as plant, workshop spaces and facilities for management.
- Level 3 of the Wing between cores A and D, where will be located teaching spaces and break out space; this level of the Wing was previously used as a bar/kitchen for the Student Union.
- Level 3 between cores B and C; where will be located temporary decant office spaces with workstations and finally be converted to teaching spaces. This is understood to be currently used as offices.

The Phase 1 alteration works are aimed to be completed by September 2018.

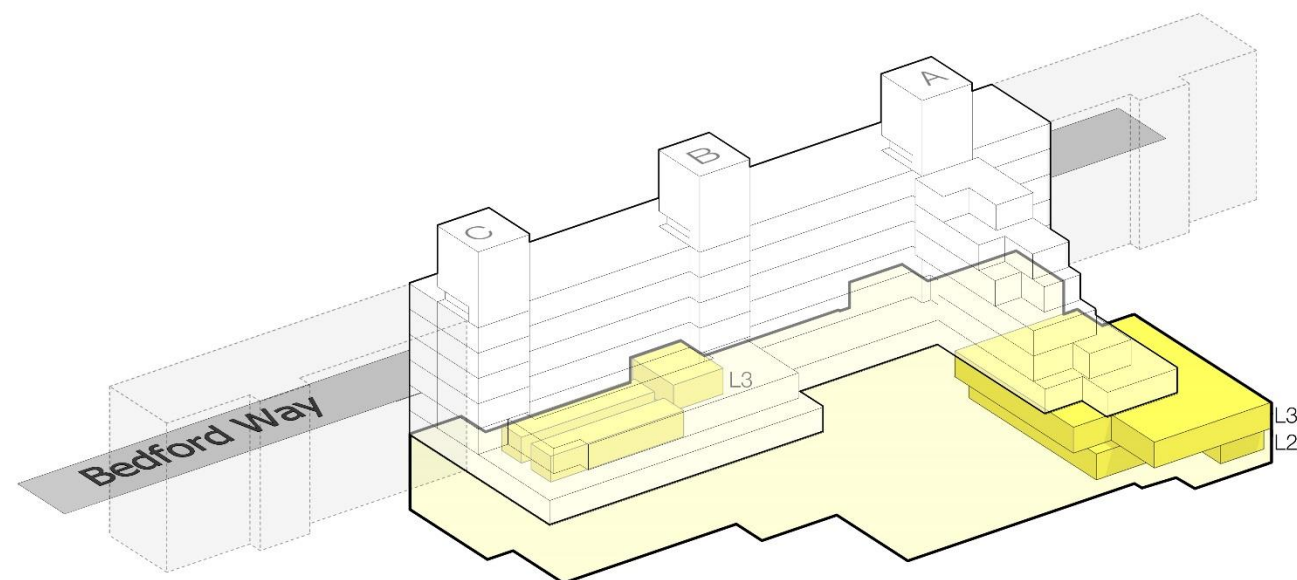


Figure 1—3: IoE building with highlighted areas of Phase 1

It is understood that these works may happen when the building is occupied/partially occupied. Therefore, as a key principle, the areas under construction should be compartmented from live occupied areas with 60 minute fire separation and that escape routes serving all live areas should remain clear and safe to use at all times for these areas that are occupied

1.4 Legislative Requirements

In order to comply with the statutory functional life safety requirements of the Building Regulations 2010, it is proposed to design these areas in accordance with BS 9999:2017 *Code of practice for fire safety in the design, management and use of buildings*.

1.5 List of Drawings

In this document have been used the drawings listed in Table

Table 1-1: List of drawings used for Stage 3 report

Drawing Title	Drawing Number	Revision Date
Level 2- Core A Wings Proposed GA	1655_DWG_00_201	21.03.2017
Level 3- Core A Wings Proposed GA	1655_DWG_00_202	21.03.2017
Level 3 (Core B & C- ISD Area) Proposed GA	1655_DWG_00_205	21.03.2017

2 Executive Summary

2.1 Summary of maximum occupancies that can be catered for in each area of Phase 1

Please see below and executive summary of the maximum occupancies that can be provided in each of the Phase 1 areas, taking into account means of escape from the remainder of the building where stairs/exits are shared:

Level 2 Wing Section

Total maximum occupancy of 400 limited by exit capacity.

Level 3 Wing Section

Total maximum occupancy of 559 limited by exit capacity

Level 3 between Cores B and C:

The total maximum occupancy of upper levels served by cores A to D i.e. Level 3, and 5 to 9, inclusive, should not exceed 1938 at any one time due to limited total stair capacity.

For example, assuming an even distribution of occupants per floor this equates to 323 occupants in total per floor for each of floors 3 and 5 to 9. For example, assuming an even distribution of occupants on either side of Core B at level 03 this equates to a maximum of 161 occupants in Phase 1 at level 3.

If there is not an even distribution per floor, i.e. more of this total maximum 1938 occupancy is located at Level 03 when compared with other levels, then the occupancy of L03 can increase to a total of up to 372 occupants on either side of Core B, but this subject to an overall total maximum occupancy throughout floors 3, and 5 to 9, inclusive, of 1938 occupants not being exceeded.

In order to tie down exactly what the maximum occupancy permitted in the Phase 1 area at Level 3, confirmation would be required from UCL Estates of the total maximum occupancy per floor, and on either side of Core B at each level, and also taking into account future increases in occupancy in other areas. This should take into account occupancy waiting outside lectures.

Please note that in future if all stairs are provided with a protected lobbies (not currently achieved) then the total overall occupancy upper levels served by cores A to D i.e. Level 3, and 5 to 9, inclusive, could increase from 1938 to 2601 at any one time.

2.2 Risks and Opportunities – Alternative Fire Engineered solutions to code

Where the design of the building does not meet the requirements of the prescriptive code guidance, fire engineering will be used to design an alternative approach. This allows the design team to deliver the building they desire whilst ensuring that the fire safety design of the building is as safe as, or safer than it would be if designed using the prescriptive code approach. Any engineered proposals are agreed on a case by case basis with the Approved Inspectors (MLM) and the Fire Brigade and therefore carry an approvals risk until such agreements are reached. These are summarised below, and have discussed and agreed in principle with MLM subject to detailed review and comments from the London Fire Brigade.

2.2.1 Level 02 Wing- Basement smoke clearance

Following code recommendations, any basement greater than 200m², is required to be provided with natural smoke venting equivalent to 1/40th (2.5%) of floor area on opposite sides to allow cross ventilation. This therefore applies to level 02 of the "wing".

While as much smoke venting is aimed to be achieved via opening doors to external, it is not possible to achieve current recommendations such as cross venting due to existing constraints– i.e. the building is a Grade II* listed building. However the proposal significantly improves the existing firefighting conditions (i.e. this level was used as workshops areas with no venting or firefighting facilities), this is therefore considered reasonable.

Please refer to Section 6.4 for further information.

2.2.2 Inner rooms

BS 9999 recommends wherever escape from a room is only available through another room (inner room), it should be ensured that the access room is provided with detection or there are vision panels between the access room and inner room. The occupancy of these rooms should also be limited to 60 people.

It is currently proposed for some rooms accessed only from the breakout space to accommodate a potential occupancy greater than 60 people (potentially up to 100 occupants). This is considered reasonable based on at least two escape routes as remote as possible from each other with doors opening in the direction of escape, as well as increased visual awareness with automatic fire detection. Currently, it is proposed for these rooms to be provided with full glazed frontage, and L1 detection throughout, providing the highest level of awareness possible, and greater than just a small vision panel in a door required for an inner room with 60 occupants. While furniture are proposed in the breakout space (access rooms), its main purpose remain for circulation and access to these rooms, therefore escape routes are unlikely to be impeded.

3 Means of Escape

3.1 BS 9999 Risk Profile

3.1.1 Occupancy Classification

The occupants of Phase 1 will mainly comprise students and teaching staff. These areas will be addressed with risk profile B, since occupants are awake and potentially unfamiliar with their surroundings, as would be available for all students in UCL campus.

Level 03 between core B and C will be temporarily used as decant office space however it will be permanently converted to teaching facilities, therefore for providing flexibility in design from the beginning those areas will also be addressed as risk profile B.

The back of the house areas in Level 2 Wing will accommodate offices for UCL Estates staff and the plant room with access only to maintenance personnel. These areas will be addressed with an A risk profile, since occupants are awake and familiar with their surroundings.

3.1.2 Fire Growth

The building is not provided with sprinkler system therefore the growth rate is treated as medium and in high-risk areas such as plant rooms, as fast. Table 3-1 below presents in summary the fire growth rate and risk profile for each area of Phase1.

Table 3-1: Risk Profile Phase 1

Phase 1 Area		BS 9999 Risk profile
Level 02 of the Wing	Break out space Teaching Facilities Bar/kitchen	B2 with potential alcohol consumption
	UCL Estates Offices	A2
	Existing Plant room	A3
	Level 03 of the Wing	B2
Level 03- Cores B to C		B2

3.2 Evacuation Strategy

A simultaneous evacuation strategy on single knock is to be implemented, whereby in the event of a fire detected anywhere, the whole UCL IoE building will evacuate with a signal being sent to main fire alarm panel.

3.3 Travel Distances

Travel distances for the different uses are summarised below:

Table 3-2 Summary of Travel Distance Recommendations

Risk Profile (including 15% increase for Automatic Fire Detection)	Maximum Distance for Single Direction of Travel (m)	Maximum Distance when at least Two Directions of Travel Exist (m)
A2	24	63.2
A3	20.7	51.7
B2	23	57.5
B2 (with potential alcohol consumption)	17.2	43

According to BS9999, for risk profile A3, the maximum travel distance shall be within 20.7m in single direction, and 51.7m when two directions of travel are available, and including for enhanced detection provided (L1 to BS 5839-1), The travel distance in single direction within the plant room servicing zone is extended (42.3m in single direction), however this is reasonable given this is as per existing situation, and provided the access is limited to maintenance personnel under permit to work, see left corner of Figure 3—1.

Please also refer to Figure 3—2 and Figure 3—3 for other areas. Please note travel distances to other areas or Phase 1 are currently under BS 9999 recommendations.



Figure 3—1: Level 02 Wing escape routes

3.4 Occupancy

The maximum capacity of each level is calculated based on the available exits as detailed below for each level in Phase 1. At least two escape routes, remote from one another, should be provided to all rooms, or areas, that may accommodate more than 60 occupants.

Level 2 Wing Section

Two horizontal exits are provided, one through Stair V of 1400mm wide and one door of 1600mm leading to outside. Assuming the largest exit is discounted due to a fire, the exit capacity is 400 people (including 15% increase due to the L1 alarm and detection system provided, 3.5mm/pp). It should be noted that there is no merging through this stair for this fire scenario, since occupants at level 03 are sized for the largest exit to be discounted and is only fully utilised for a fire at level 03 blocking an exit direct to outside.

Level 3 Wing Section

Three horizontal exits are provided, the 1500mm door leading to Stair V, a 1000mm wide exit route near Stair D, and an 1100mm wide door leading to the outside. By discounting the wider exit, the two available exits capacity is 314 people through the 1100mm door (including 15% increase due to L1 alarm and detection system provided, 3.5mm/pp) and 245 people through the 1000mm wide route near Stair D (including 15% increase due to L1 alarm and detection system provided, 4.08mm/pp). Thus, the total exit capacity is 559 people; it should be noted that the 1000mm route has a small number of external steps, and has been sized as a stair serving 1 floor to give a conservative estimate.

Level 3 between Cores B and C:

The occupancy on Level 03 between cores B and C depends on the stairs capacity in the existing building. This has been determined and included within the *Stage 1 Feasibility Fire Safety Strategy Report* (UCL IOE Masterplan report) and is repeated here for clarity.

The total capacity of Cores A to D for Levels 03 to 09, excluding level 04 with protected lobbies at every level, is 1938 people, see Figure 1—2 for stairs location on typical level. Level 01 (mainly lecture halls) is served by separated protected stairs. Level 02 is mainly including plant and store rooms, and has a very limited occupancy. Level 04 is provided with escape routes direct to external, however their capacity should be assessed at a later stage for the future phases including renovation of Level 04 (and additional/larger doors may be investigated if necessary).

The above are based on BS9999, L1 detection, and no protected lobbies being provided to the stair cases. It has been confirmed by UCL IoE Fire Officer that the stair lobbies are not compartmented properly due to previous works performed in the building. During Phase 1 protected lobbies will only be provided in Level 03 stairs B and C, where works are to be taken place. Protected stair lobbies in all levels will be provided as part of later planned phases of works whenever the occupancy for these floors would exceed the 1938 occupancy, to increase the limit to 2601 people, see Table 3-3.

Based on an even distribution of occupants across levels using the staircases, a maximum occupancy of 323 people can be accommodate at Level 03. The maximum existing occupancy for level 5-9 should not exceed 1615 occupants (or 323 occupants per floor), and is acknowledged by UCL.

The horizontal escape capacity of the entire Level 03 is greater than the stair capacity because by discounting one exit, two are available of 1300mm, providing capacity for 372 people each (L1 alarm and detection system provided, 3.5mm/pp).

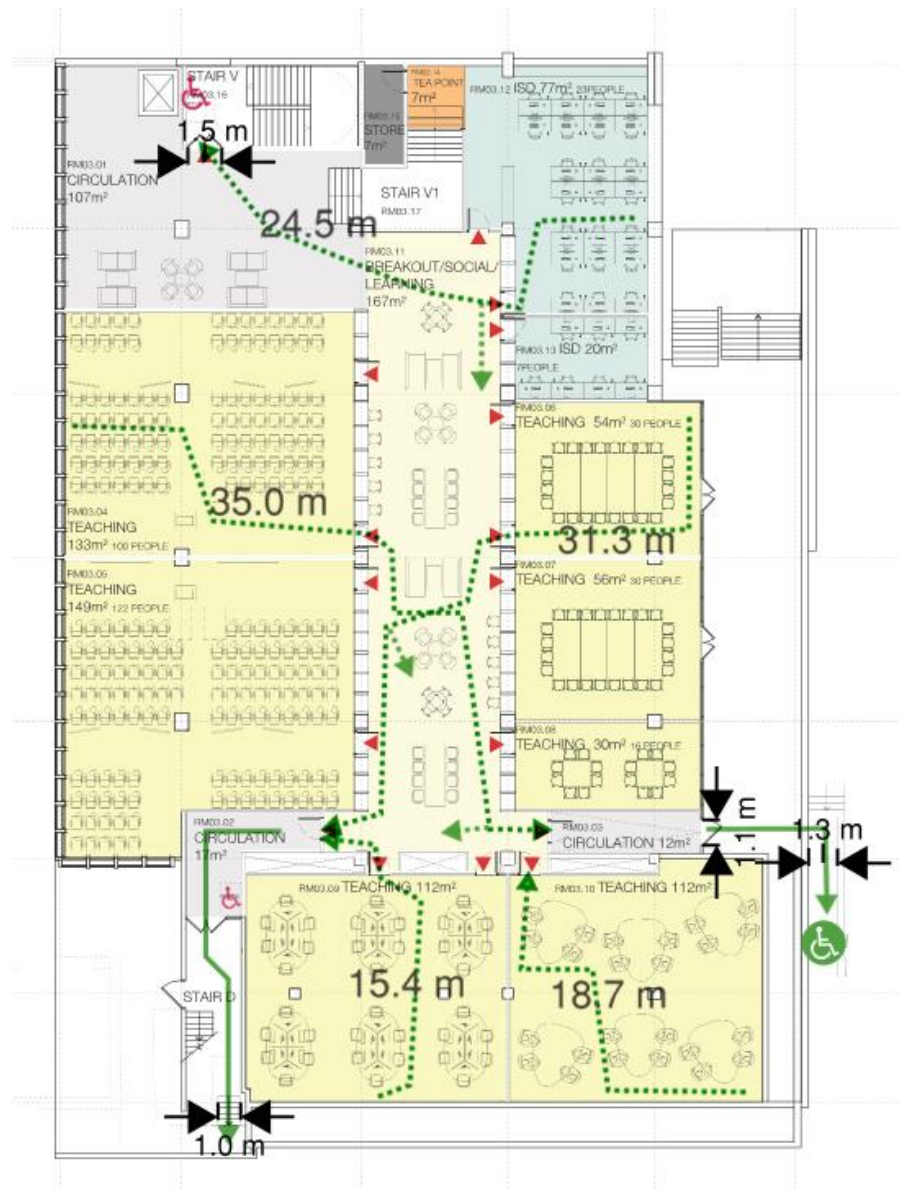


Figure 3—2: Level 03 Wing escape routes

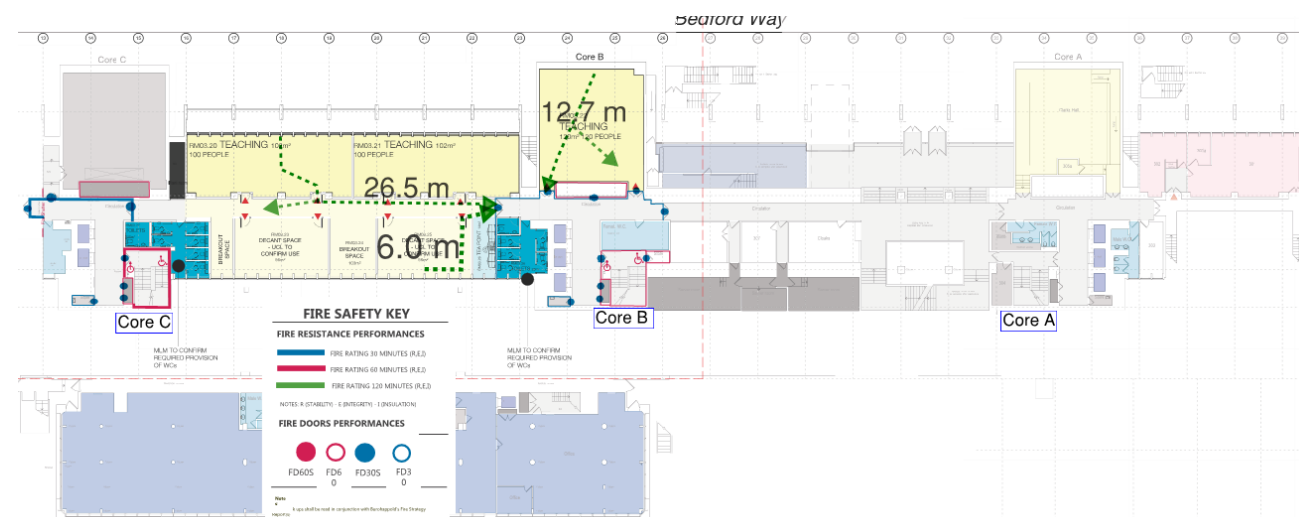


Figure 3—3: Level 03 between cores B and C escape routes

Table 3-3: Cores A to D maximum capacity with and without protected lobbies

Stairs	Effective Stair width at pitch point (mm) ^{Note 1}	No of upper levels serving (excluding Level 02) ^{Note 2}	Occupancy Capacity per stair	
			All Stairs Lobbied	No Lobbies provided
A	1300	6	663	Discounted
B	1300	6	663	663
C	1300	6	663	663
D-External stair	1200	6	612	612
Total stair capacity			2601	1938
Total capacity per storey for each Level 05-09 and 03 ^{Note 3}			433	323

Note 1: Based on minimum stair width or final exit width, whichever is smaller.

Note 2: For the purposes of this analysis, stairs not counted for capacity at level 4 as this level has exits direct to outside independent to the stairs A, B C and D. Based on BS 9999 as stair serving 6 storeys of a B2 occupancy is assess at having a capacity of 1.96mm/person 15% decrease due to Automatic Fire Detection being provided.

Note 3: Please note that this is an indicative maximum occupancy per level assuming an even distribution of occupants per level. It is possible to have a larger occupancy on some levels provided the total occupancy of the upper levels 3, and 5 to 9 does not exceed the total stair capacity. Assuming an average floor occupancy, it should therefore be confirmed by UCL that the maximum existing occupancy for level 5-9 does not exceed 1615 occupants (or 323 occupants per floor).

To summarise the maximum capacity of upper levels served by cores A to D:

The total maximum occupancy of upper levels served by cores A to D i.e. Level 3, and 5 to 9, inclusive, should not exceed 1938 at any one time due to limited total stair capacity.

For example, assuming an even distribution of occupants per floor this equates to 323 occupants in total per floor for each of floors 3 and 5 to 9. For example, assuming an even distribution of occupants on either side of Core B at level 03 this equates to a maximum of 161 occupants in Phase 1 at level 3.

If there is not an even distribution per floor, i.e. more of this total maximum 1938 occupancy is located at Level 03 when compared with other levels., then the occupancy of L03 can increase to a total of up to 372 occupants on either side of Core B, but this subject to an overall total maximum occupancy throughout floors 3, and 5 to 9, inclusive, of 1938 occupants not being exceeded.

In order to tie down exactly what the maximum occupancy permitted in the Phase 1 area at Level 3, confirmation would be required from UCL Estates of the total maximum occupancy per floor, and on either side of Core B at each level, and also taking into account future increases in occupancy in other areas. This should take into account occupancy waiting outside lectures.

Please note that in future if all stairs are provided with a protected lobbies (not currently achieved) then the total overall occupancy upper levels served by cores A to D i.e. Level 3, and 5 to 9, inclusive, could increase from 1938 to 2601 at any one time.

3.5 Inner Rooms

BS 9999 recommends wherever escape from a room is only available through another room (inner room), it should be ensured that the access room is provided with detection or there are vision panels between the access room and inner room. The occupancy of these rooms should also be limited to 60 people.

It is currently proposed for some rooms accessed only from the breakout space to accommodate a potential occupancy greater than 60 people (potentially up to 100 occupants). This is considered reasonable based on at least two escape routes as remote as possible from each other with doors opening in the direction of escape, as well as increased visual awareness with automatic fire detection. Currently, it is proposed for these rooms to be provided with full glazed frontage, and L1 detection throughout, providing the highest level of awareness possible, and greater than just a small vision panel in a door required for an inner room with 60 occupants, see Figure 3—1, Figure 3—2, and Figure 3—3.

While furniture are proposed in the breakout space (access rooms), its main purpose remain for circulation and access to these rooms, therefore escape routes are unlikely to be impeded.

This has been discussed and agreed in principle with UCL Fire officer and MLM Approved Inspectors, and should be discussed and agreed with London Fire Brigade.

3.6 Exit Doors

The following will apply to doors where applicable:

- All doors used for means of escape should be design in accordance with UCL Fire Technical Note TN001;
- All escape doors serving more than 60 occupants should open in the direction of escape;
- Door fastenings: All doors will be capable of being readily opened in direction of escape in the event of an emergency without the use of a key;
- Panic hardware will be used along escape routes from areas with more than 60 occupants (e.g. from the teaching faculties rooms; break out spaces);
- Electronically locked doors on escape routes will failsafe open on fire alarm and power failure. This will also be provided with Green Break Glass Units (BGUs).

3.7 Final Exits

Final exits should be provided at least as wide as the stairs they serve. If this is not met as per existing building constrains, the stair width will be assumed to be the final door width.

3.8 Mobility Impaired Persons

It should be noted that under the Regulatory Reform (Fire Safety) Order 2005, it is the duty of the responsible person along with their appointed safety assistants to assist everyone to a place of ultimate safety outside the building in the event of an emergency.

In order to meet Building Regulations, Any disabled member of staff should have a Personal Emergency Evacuation Plan (PEEP) and the procedures should be practiced. A Generic Emergency Evacuation Plan (GEEP) will need to be written for members of the public who would need assistance to escape.

Refuge spaces will be provided in all the protected stairs serving the Levels of Phase 1.

To comply with BS9999 each refuge should be:

- Provided with clear space of at least 900 mm x 1400 mm for the refuge space, which should not impede evacuation of other occupants.
- Provided with a two way communication device in compliance with BS 9999 and UCL Technical Note TN054, which communicates with a central monitoring station(off site main security room) and to reception at ground floor.

4 Compartmentation

4.1 Structure Fire Resistance

UCL Institute of Education has a basement is less than 10m deep (approximately 9.15m), and has the topmost occupied floor level less than 18m without sprinkler protection, therefore, loadbearing structural elements should be protected for at least 60 minutes in accordance with BS 9999.

As such any new loadbearing elements of the structure for Phase 1, will have 60 minute fire resistance.

The existing structural frame is concrete. For the phase 1 works it is not considered necessary from a Building Regulations point of view to upgrade or confirm 60 minutes is achieved to the existing concrete structure. However it is strongly recommended that the fire resistance period achieved by the actual existing concrete frame be confirmed in order to inform design of future phases of work

4.2 Compartmentation

The compartmentation requirements given in Table 4-1 are for Phase 1 works. The below is for integrity and insulation unless otherwise stated:

Table 4-1: Compartmentation requirements

Part of Building	Fire resistance (minutes)
Compartment Walls	60 (FD 60s fire doors)
Compartment Floors (all floors)	60
Service road wall	120 (FD 60s fire doors)
Stair	60 (FD 30s fire doors)
Lift	60 (FD 30 fire doors)
Protected lobbies	30 (FD 30s doors)
Plant and refuse rooms	60 (FD 30s doors)
Store rooms/kitchen areas (excluding tea points)	30 (FD 30s fire doors)

If existing construction elements are being used to achieve these fire ratings noted it is recommended that this be confirmed by survey that these fire resistance periods are achieved and where necessary that the fire resistance period is increased accordingly by upgrading or replacing the element. Any new or existing penetrations through fire rated walls and floors should be fire stopped as part of these works, in the areas subject to these works.



Figure 4—1: Level 02 Wing compartmentation



Figure 4—2: Level 03 Wing compartmentation

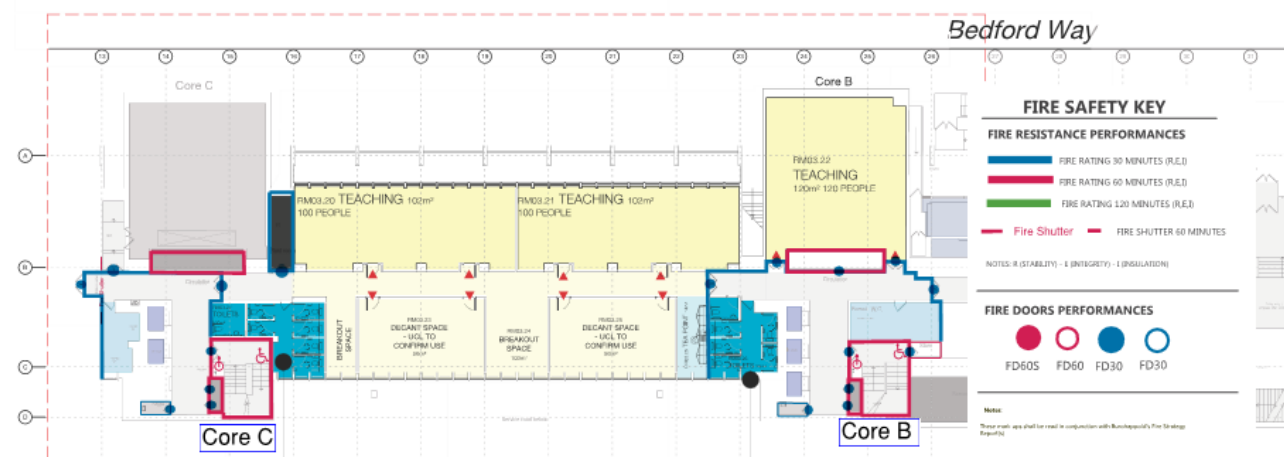


Figure 4—3: Level 03 between cores B to C compartmentation

4.3 Tea Points

Tea points should be provided for tea making and heat up only, without cooking, and will be designed in accordance with UCL Fire Technical Note TN105.

4.4 Fire Stopping

Within the areas subject to these works, Fire stopping should be provided on the line of compartment walls and floors where gaps exist that could allow smoke and flames to breach the compartment wall or floor. Joints between elements that serve as a barrier to the passage of fire should be fire stopped and all openings for pipes, ducts, conduits or cables to pass through any part of an element that serves as a barrier to the passage of fire should be:

- Kept as few as possible;
- Kept as small as practicable; And,
- Fire stopped (which in the case of a flue or duct should allow thermal movement).

Fire stopping should be provided in accordance with BS9999 and UCL Technical Note TN066.

As a general note, fire and smoke dampers should be provided in duct that passes through compartment walls forming protection to an escape route (e.g. discharge routes from stairs). Fire dampers should be provided in ducts passing through other fire compartment walls.

4.5 Surface Linings

Any new internal linings for all walls and ceiling surfaces will achieve the following:

Table 4-2: Internal fire spread (linings) classifications

Location	National class	European Class
Circulation routes in common areas	Class 0	B-s3, d2
Rooms (excluding small rooms), and circulation spaces	Class 1	C-s3, d2
Rooms less than 30m ² in area.	Class 3	D-s3, d2

For the purposes of surface spread of flame wall surfaces facing onto the central main breakout space should be Class 0- i.e. main space treated as a circulation route/common area.

The National classifications do not automatically equate with the equivalent classifications in the European column, therefore, products cannot typically assume European class, unless they have been tested accordingly, When a classification includes “s3, d2”, this means that there is no limit set for smoke production and/or flaming droplets/particles.

5 External Fire Spread

Given that the risk associated with the proposed changes is reduced or equivalent (from offices or plant/workshop areas to teaching spaces), and that compartmentation between floors will not be reduced, the existing conditions will be improved from an external fire spread point of view. In fact by providing confirmed compartmentation in areas subject to these phase 1 works, the existing situation for compartmentation and hence external fire spread will be improved.

It is therefore not necessary to assess external fire spread in line with current code guidance.

5.1 External Faces of Buildings

It is currently understood that there is no external façade works being carried out as part of the proposed refurbishment works for Phase 1.

6 Fire-Fighting Access and Facilities

6.1 Fire-fighting Access Overview

The existing strategy for Fire Brigade Access is via Bedford Way where the dry riser inlets in Cores A to C are located. It should be noted that the dry risers do not serve all levels of staircases and do not serve the “wing”. It is proposed to provide Fire Brigade access to Level 02 and Level 03 of the Wing via the service road. This service road is 6.2m wide and should be managed to be kept clear at all times to comply with the access road criteria as Table 6-1 below.

Table 6-1: Fire Brigade access road as per London Fire Brigade Fire Safety Guidance Note 29

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

As per BS 9999 recommendations, hose coverage should be provided such that every part of each level is within 45m from the fire main outlets measured on a route suitable for laying hose from either a fire appliance parking location or a dry main outlet. The indicative location of dry riser outlets of Phase 1 as well as hose coverage are shown in Figure 6—1, Figure 6—2 and Figure 6—3.

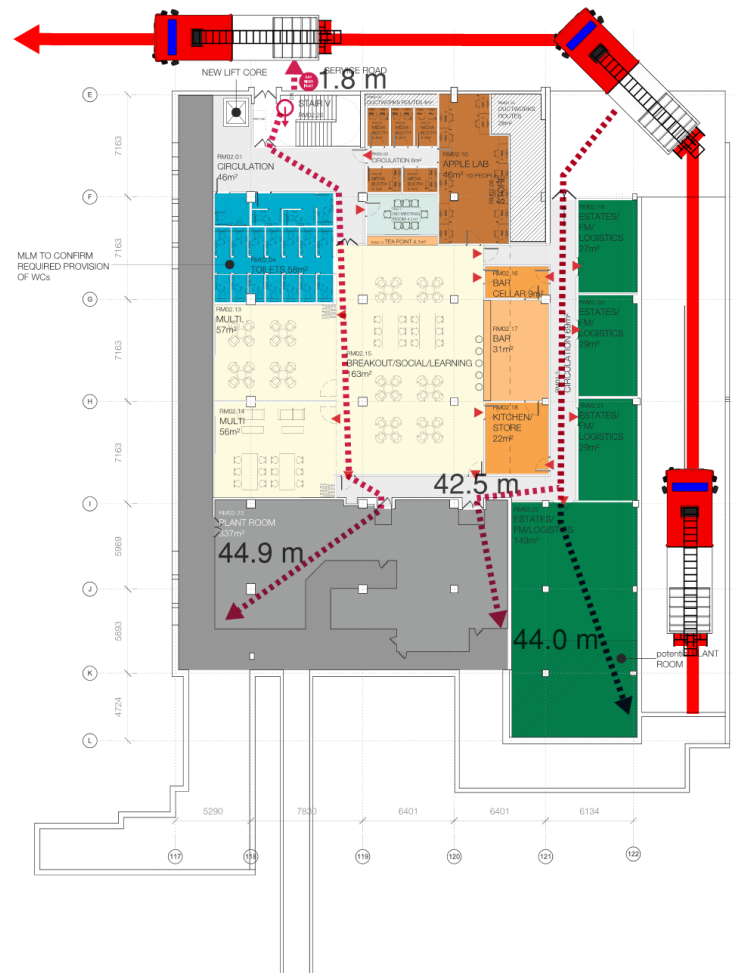


Figure 6—1: Level 02 Wing Fire brigade access and hose coverage

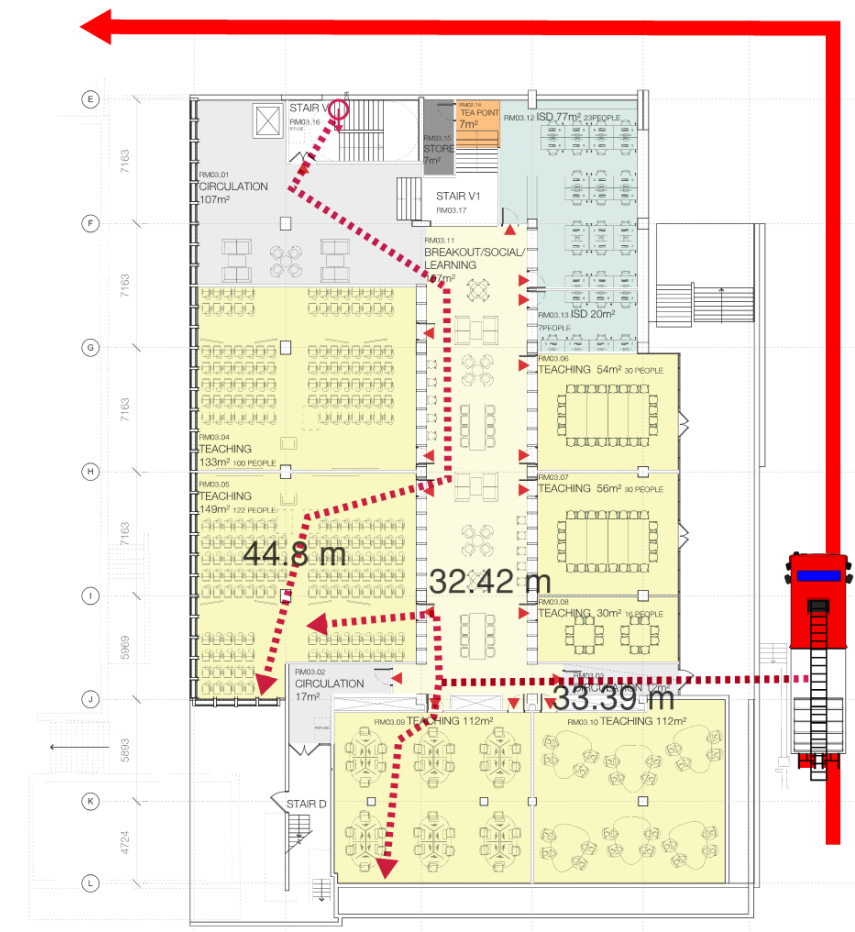


Figure 6—2: Level 03 Fire Brigade access and hose coverage

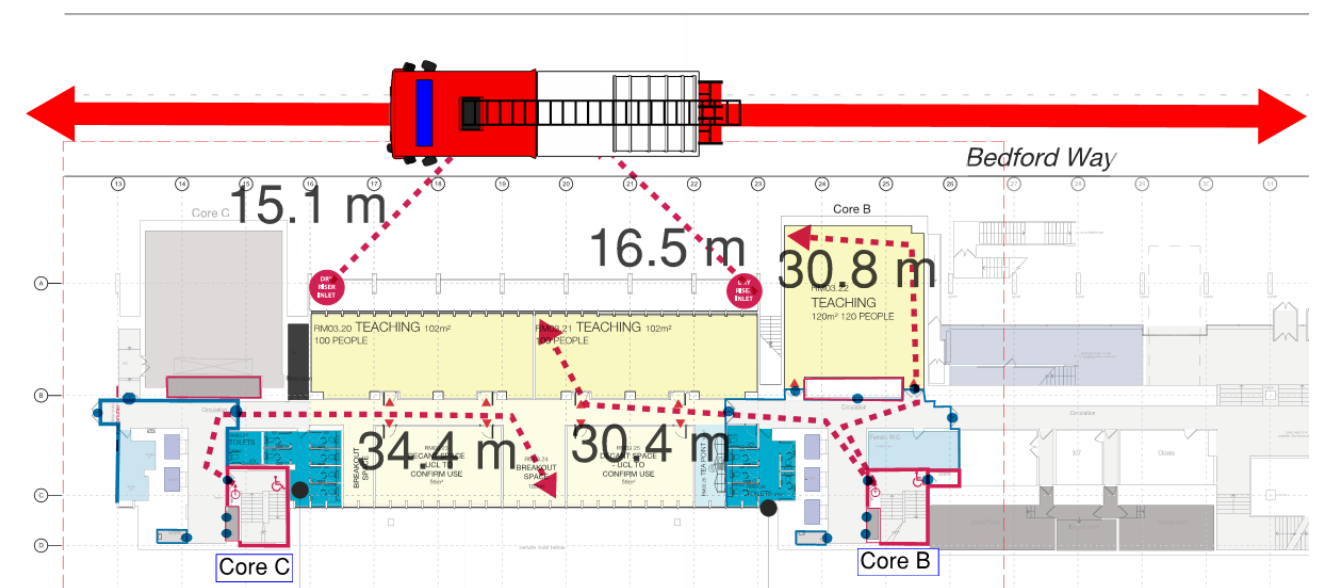


Figure 6—3: Level 03 between cores B to C, existing fire brigade access and hose coverage by providing dry riser outlets in Cores B and C

6.2 Dry Risers

A dry riser/falling main will be provided in Stair V serving the 'Wing' at all level to assist the Fire Brigade services designed in accordance with BS 9990. The inlet should be located by the service road – see Figure 6—1.

In the existing situation dry riser outlets are located in stairs A to C at every two levels. During Phase works, 1 it will be ensured that dry riser outlets are provided in stairs B to C at Level 03. It is recommended for dry riser outlets to be provided at all levels for the final design i.e. as each future phase is complete on a phase by phase basis.

6.3 Fire Hydrants

Existing locations of fire hydrants should be confirmed near Bedford way and the service road. These should be located within 90m of dry fire main inlets.

6.4 Basement Smoke Clearance

Following code recommendations, any basement greater than 200m², is required to be provided with natural smoke venting equivalent to 1/40th (2.5%) of floor area on opposite sides to allow cross ventilation. Therefore, natural smoke clearance should be provided at Level 02 of the Wing to comply with code. It is not practical to comply fully with code given the existing situation in terms of cross ventilation.

The Level 02 is proposed to be separated into fire compartments being vented via fire service opening doors to external for assisting the smoke clearance strategy, see Figure 6—4 . The proposed smoke clearance strategy is improving significantly the existing situation (i.e. this level was used as workshops areas with no venting or firefighting facilities), by providing fire service access, compartmentation and as much smoke venting as practicably possible. The below is considered reasonable given existing constraints but will need to be discussed and agreed with the London Fire Brigade.

The break out space compartment is 327.2m² excluding low risk spaces such as toilets and protected lobby, thus 8.2m² of smoke vent area should be achieved to meet the recommended 2.5%. It is proposed for this venting area to be provided via fire service opening doors to the permanently vented circulation corridor and through opening the doors in Stair V into the service road. Assuming that the doors height is 2m, one door 1400mm wide and three doors 900mm wide, a total area of 8.2m² is achieved. The cross venting criterion is also met. The back-of-house circulation corridor is considered as an external space since it is permanently vented via the last room being meshed/grilled walls.

The Apple Lab and Media Booth rooms form a 74.9m² compartment, therefore 1.8m² of smoke vent area should be achieved to meet the recommended 2.5%. This is proposed to be provided via the opening the doors into the circulation space and doors of Stair V, thus a total area of 2.8m² it is achieved. No cross venting would be achieved unless smoke is vented through the breakout space. This is considered reasonable for this compartment since in this corner, the risk associated with these rooms from heat and smoke build-ups are no different than ground floor rooms.

The plant room compartment is 172m² total area therefore a smoke vent area of 4.3m² is required based on achieving the recommended 2.5%. This is proposed to be achieved via doors opening into the existing exhaust plenum, and doors to the back of house corridor. The back-of-house circulation corridor is considered as an external space since it is permanently vented via the last room being meshed/grilled walls.

The UCL Estates offices are of total area 198.3m² thus a smoke vent area of 5.0m² is required based on achieving the recommended 2.5%. This is proposed to be achieved via doors opening to the permanent ventilated corridor. The doors are 1300mm wide and 2m height and a total area of 7.8m² is provided.



Figure 6—4: Level 02 Wing smoke clearance requirements

7 Fire Active Systems

7.1 Automatic Fire Detection and Alarm System

The fire detection and alarm system should be designed as per BS5839-1:2013. It is recommended that the building be provided with an automatic fire warning and detection system with manual call points sited adjacent to exit doors. The assumed risk profiles require a Type M system as a minimum; however, it is proposed to enhance this to an L1 system in accordance with UCL Fire Technical Note 54 to all areas subject to these proposed works.

In accordance with UCL requirements there will be no investigation period.

In accordance with UCL Fire Technical Note TN054, combination voice and tone alarm sounders will be considered in all areas where a large numbers of students or public could be present in the space (e.g. open plan studios/workshops, break out spaces, lecture theatre, seminar rooms, exhibition and café spaces). Any omission of this voice alarm sounders should be explicitly agreed with UCL Fire Officer.

All other areas can be provided with standard sounders.

Visual alarms meeting BS EN 54-23 to be provided in the following locations:

- In all areas where the level of noise might cover the alarm sounders (Workshops, plant rooms, etc),
- In all areas where audible alarms are not acceptable (sound or anechoic booths, etc)
- In all disabled facilities (WC, showers, etc) and in all disable refuges to allow good communications through intercom,
- In all areas where a main fire panel is located to help find it.

The alarm panel installed for Phase 1 will be connected with the main building alarm panel.

Other requirements in UCL Fire Technical Note 54 (i.e. sound levels etc.) should be met unless otherwise agreed with UCL Fire Officer.

7.2 Hose Reels

Hose reels are no longer required within Building Regulations and guidance, therefore, with agreement from UCL, it is reasonable for them to be removed. These should be appropriately replaced by Fire Extinguishers as per UCL Technical Note 023. Fire extinguisher number and location will need to be reviewed as part of UCL fire risk assessments.

Careful considerations should be in place to ensure that the removal of these fire hose reels during Phase 1 works does not affect the operation of existing fire hose reels serving other areas.

7.3 Emergency Power Supply

A suitable secondary power supply serving the life safety systems of the building should be installed. This system should be independent of the primary power supply.

7.4 Emergency Lighting

Emergency lighting shall be provided in accordance with BS9999 and designed in accordance with BS 5266 Part 1 and UCL Fire Technical Note TN20. All escape routes should have adequate artificial lighting and should be on a separate circuit from that supplying any other part of the escape route. This system includes an emergency escape route lighting system, an open area (anti-panic) lighting system, and an emergency lighting for high risk task area lighting system.

7.5 Emergency Signage

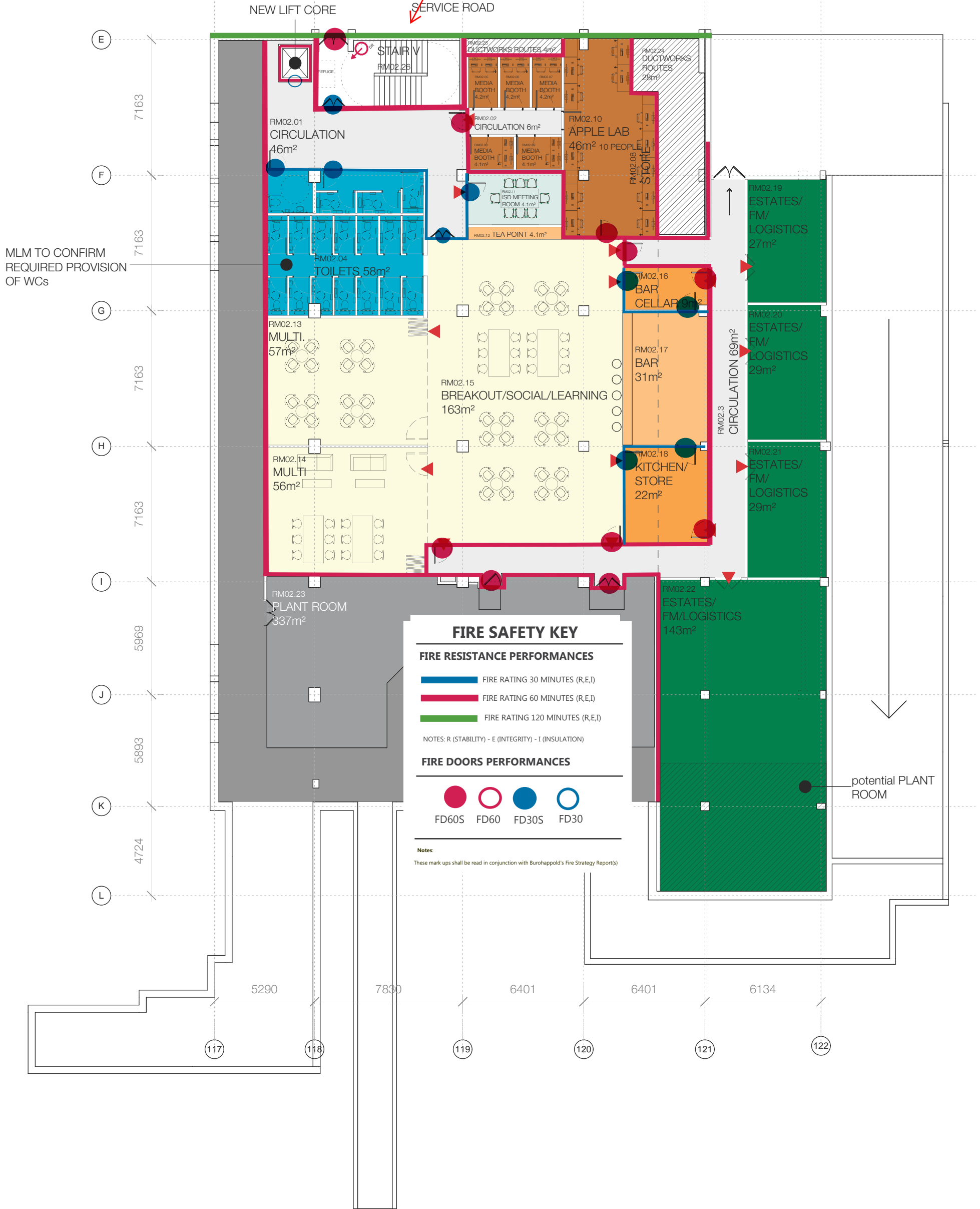
Escape routes shall be marked with suitable exit signage complying with the Health & Safety (Safety signs and signals) Regulations 1996. An exit sign will mark every doorway or other exit providing access to a means of escape. The position of such signs will be agreed between the architect and the fire service as part of Building Regulation Approvals, and will then be reviewed as part of the RRO fire risk assessment.

Exit signs will comply with BS 5499: Part 1 and European sign directives; and according with UCL Fire Technical Note TN090.

Appendix A Typical Compartmentation Drawings for Phase 1 works

To assist Hawkins Brown in the preparation of fire drawings for Phase 1 work, the following mark-ups are provided.

indicative inlet position to be added at later stage near stair access door.



Revisions	
23.02.17	Stage 2 Issue
03.03.17	Comments DTM 08
21.03.17	Layouts agreed by UCL

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 No implied license exists. This drawing should not be used to calculate areas for the purposes of valuation. Do not scale this drawing. All dimensions to be checked on site by the contractor and such dimensions to be their responsibility. All work must comply with relevant British Standards and Building Regulations requirements. Drawing errors and omissions to be reported to the architect.

Job Number	Date	Scale
HB1655	March 2017	1:200@A3
Drawn by	Checked by	Status
AA	TN	Stage 3
Drawing No. & Revision		
1655_DWG_00_201		

Project	20 Bedford Way Phase 1
Drawing	Level 2-Core A Wing Proposed GA

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