34 - 35 FITZROY SQUARE

MECHANICAL AND ELECTRICAL SERVICES ENGINEER'S REPORT

This report was prepared by Skelly&Couch, Building Environment & Services Engineering Consultants in February 2008 for the Planning Application and Listed Building Consent Application for the restoration and refurbishment of two Georgian townhouses by Robert Adam, Nos. 34 and 35 Fitzroy

MECHANICAL AND ELECTRICAL ENGINEER'S REPORT

Introduction.

This report has been prepared to inform the planning and listed building submission for the refurbishment of Numbers 34 and 35 Fitzroy Square into two self contained town houses. It will present the overall servicing strategy in order to demonstrate an approach that is sympathetic to the historic nature of the original buildings ensuring that the integration of mechanical and electrical services will have a minimal impact on the existing fabric. The implications of compliance with the Building Regulations using the guidance in the Approved Documents and the implications for external noise are included in separate reports.

Plant location and services distribution strategy

Plant.

To minimise the impact on the internal layouts and fabric of the original buildings the main items of plant will be housed within the below pavement stores off the area to Fitzroy Square and the more recent extension to the rear of the building. Both houses will have completely independent statutory supplies and plant.

Below pavement stores.

The stores will contain: gas intake and meter in an enclosure ventilated to the bin store (so that the louvre is not visible on the facade); electrical intake meter and main distribution board; water intake to a cold water store and boosted water plant to ensure an adequate water pressure; telecommunications and cable TV intake.

Rear extension.

A dedicated plant cupboard will be run along the partition walls between the houses within the rear extension building at lower ground floor. This will house: boilers and ancillaries; hot-water storage; Jacuzzi and sauna plant and electrical and lighting distribution boards. The sprinkler tank will also be housed within the elevated Jacuzzi enclosure to avoid the need for excavation within the original building footprint.

Services

Distribution. To enable a vertical route up through the building a main riser will be integrated carefully in the chimney breast within the rear rooms of the original buildings to avoid as much as possible an interface with the existing wall fabric and to minimise horizontal distribution. From this riser small bore pipework and power and data cabling will be run horizontally in chases to the plaster that will made good to match the existing finish.

As far as possible the vertical distribution of serves has been run in the main riser. Some localised vertical chasing of brick walls will be required where horizontal distribution would otherwise be required. This will be done within the shutter reveal from ground to first floor in order to avoid an interface with the cornice. This will avoid notching of the existing floor joists and beams. The chasing requirements will be fully detailed on wall elevations. The chase will be carried out in a careful and controlled way to avoid any possible damage. Upon completion of the installation the chase will be made good to match the existing wall finish.

The main horizontal distribution of services will be within a below floor duct at lower ground floor level. This avoids the need for lowered ceilings, wall penetrations and suspension of plant off existing floor joists and beams. Where horizontal distribution of pipes is required it will be run parallel and between floor joists. The existing floor boards will be carefully lifted locally and replaced upon completion of the installation.

Drainage

Foul drainage above ground will run from bathrooms and kitchens via vertical stacks run within the main internal riser. Where appliances cannot drain to these stacks due to the floor joist direction (bath and hand basin drainage to the second floor bathroom) it will run between floor joists with local careful raising of the floor boards. The drain will run to the external wall to the rear of the original buildings where it will join a new external soil vent pipe that will run parallel with the existing rain water pipe. The main soil vent pipe will penetrate the roof at high level in each house. Soil vent pipes to the second floor bathroom will run externally to a termination 900mm above the nearest window.

MECHANICAL AND ELECTRICAL ENGINEER'S REPORT

Rainwater drainage to the rear of the building will follow the existing route via valley gutters to an existing external hopper and rainwater downpipe. The existing valley gutter to the Fitzroy Square elevation will remain with the existing pipe run to the rear valley gutter being incorporated into the stud wall between the study and bedroom. Rainwater from the original roofs will discharge onto the rear extension roof from which it will run to the below ground drainage system via internal downpipes. Rainwater drainage to the front area will be run to a sump pump chamber from where it will be pumped to an above surcharge level entry to the drainage installation in order to protect the lower ground floor from sewer surcharge.

A new below ground drainage system will be installed. To avoid the risk of sewer surcharging in the lower ground floor the foul drainage will be diverted to a sump pump chamber within the rear extension from where drainage will be pumped to an above surcharge level entry to a stack within the rear extension and entry to the public sewer.

Hot/cold water

From the cold water store and pressurisation pump in the front area mains cold water will be distributed within a below ground duct to the main riser and rear extension. Where appliances are remote from the main riser in order to avoid horizontal chasing of the joists a horizontal chase will be made in the plaster to a drop into the void between the floor joists. Hot water will be distributed from the plant cupboard along a similar route.

Sprinkler

A dedicated sprinkler tank will be housed within the aised platform to the Jacuzzi in the rear extension. Pipework will be run via the below ground ducts to the main riser and to the vertical chases. Rooms to the second and third floor will be served by the main riser with horizontal distribution in ceiling voids to avoid the need for distribution through the front elevation first floor rooms. Pipework will run horizontally between floor joists to serve sprinkler heads from above. The intention is to adopt a mister system to minimise water damage to original fabric through activation.

Ventilation

The lower ground floor bathroom extract duct will run horizontally within the lower ground floor ceiling void to the heat reclaim unit. The kitchen extract will drop to the ceiling void in the lower ground floor and follow a similar route. Bath and shower ductwork to the second and third floors will run vertically from dedicated extract grilles, via the mechanical ventilation heat reclaim unit, to a roof mounted louvred enclosure. All of the ventilation ductwork will therefore be run within a new building fabric without the need for intervention to the existing. Extract ductwork to the bathrooms, WCs, sauna and Jacuzzi to the rear extension will run vertically to a louvered roof enclosure which will also house the external condenser. A local extract fan will be installed to the utility room with an external louvre above the external door to the wine cellar thereby avoiding a penetration in the facade to the store.

Heating

To minimise the visual impact of the heating installation radiators are to be avoided as much as possible. Underfloor heating was considered as a solution with the least visual impact however its inclusion would have required the lifting of all floor boards and an increase in the overall floor building up that would have lead to a clash with the existing skirting and doors. The fact that the existing single glazed windows are to be retained means there is a benefit in having a heat emitter directly below the window to lower the local humidity and minimise the potential for internal condensation on the glass. For this reason trench heaters have been adopted. The floor boards will be carefully lifted locally with the trench heater run between floor joists beneath windows in the front and rear rooms of the original buildings. The visual impact of the emitter is therefore reduced. Where increased output is necessary and acoustic amenity suitable the trench heater will incorporate a fan. In bedrooms and rooms containing risers the heat output of the trench heaters will be supplemented by recessed radiators within the main riser construction. A radiator will be located within the stair well at lower ground floor level. Room thermostats will either be wall mounted with local chasing for cableways or wire-less to avoid chasing. Distribution pipework will run from the boiler cupboard within the below ground trench to the

MECHANICAL AND ELECTRICAL ENGINEER'S REPORT

main riser and vertical chases to serve the trench heaters in order to avoid notching of the original floor joists and beams. Rooms to the second and third floor will be served by the main riser with horizontal distribution in ceiling voids to avoid the need for distribution through the front elevation first floor rooms.

Cooling

Comfort cooling will be provided to the bedrooms and AV room with a concealed, acoustically attenuated, indoor split cooling unit incorporated into the bathroom ceiling void. Again this will avoid an interface with the original wall fabric. There will also be cooling to the gym which will be sealed off from the Jacuzzi area. Due to the visual impact of cooling plant on the ground floor and first floor spaces they will not include comfort cooling.

Electrical

Sub-main cables will be distributed via the below ground floor ducts to distribution boards in boiler cupboard and the main riser ground floor. Cableways will be locally chased in the floor joists where required with vertical chasing in the walls to accessories. Lighting will generally be discrete up-lighting thereby avoiding pendant light fittings in order to minimise their visual impact. A fitting that is concealed flush with the wall when off is proposed for wall and ceiling washes.

AV/Data

From the main AV/Data cupboard cable ways will run in similar way to the electrical cabling.

Fire/Security

Main cableways will be run within the ground floor trench and main riser. Local chasing in the floor joists will be minimised. Where required there will be local vertical chasing in the walls to accessories. To minimise the visual impact of the fire detection system an aspirating smoke detection system will be used where detection is required to comply with the requirements of the building regulations and fire strategy with sounders discretely mounted. The pipework to aspirating detection points will be run between joists so that they are concealed. Security detectors will generally be door and window contacts will PIRs in rooms with external access: lower ground and ground entry hall to the Fitzroy Square facade and lower ground and ground to the rear.

CCTV

CCTV cameras will be wall mounted externally to cover the lower ground floor entrance. The camera will be mounted within the door alcove to the door entry to the wine cellar so that it is not visible from street level. A camera will be mounted on the rear extension to cover the external courtyard and roof.

Access control

A door bell will be integrated into the main ground floor entrance door. It will be carefully selected for minimum visual impact and will be offered for approval. There will be an intercom at the lower ground level entrance hall off the area.

REV	DATE	DESCRIPTION
P2	19/02/08	CENTRAL RISER OMITTED
P1	14/02/08	PLANNING

SKELLY&COUCH
BUILDING ENVIRONMENT & SERVICES ENGINEERING CONSULTANTS

3rd FLOOR SOUTH
10a BELMONT STREET
LONDON
NW1 8HH
T 020 7424 7770

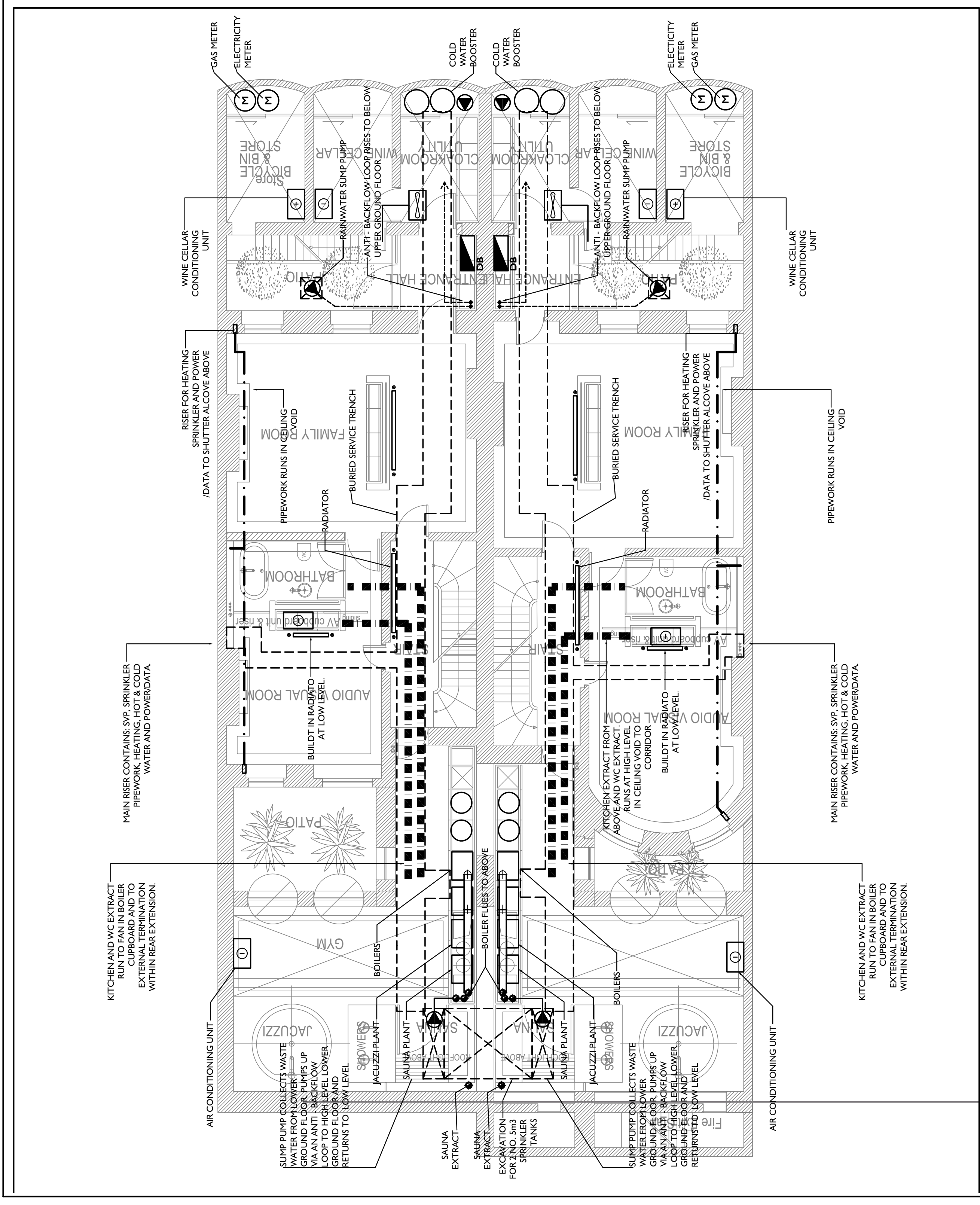
Skelly & Couch LLP is a Limited Liability Partnership Registered in England No. OC 328 943

PROJECT
34 - 35 FITZROY SQUARE

ARCHITECT
EMOLI PETRUSHKA ARCHITECTS

DRAWING
BASEMENT SERVICES

SCALE	DATE	DWN BY	CHCKD BY
1:100 (@ A3)	FEB 08	STEVE	CHCKD BY
PJT NO.	DWG NO.		REV
1023	Z[-]000		P2



REV	DATE	DESCRIPTION
P2	19/02/08	CENTRAL RISER OMITTED
P1	14/02/08	PLANNING

SKELLY&COUCH
BUILDING ENVIRONMENT & SERVICES ENGINEERING CONSULTANTS

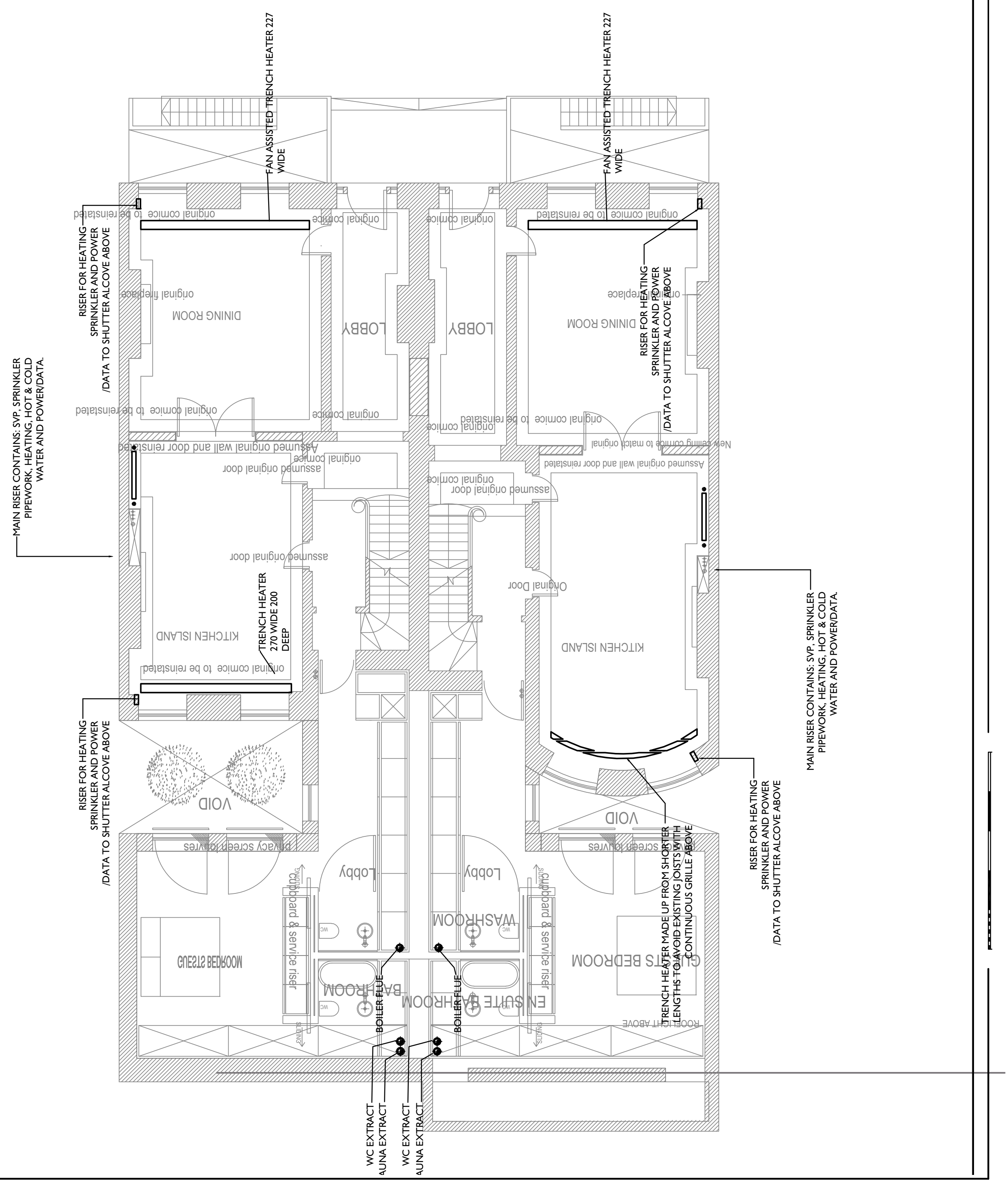
3rd FLOOR SOUTH
10a BELMONT STREET
LONDON
NW1 8HH
T 020 7424 7770

PROJECT
34 - 35 FITZROY SQUARE

ARCHITECT
EMOLI PETRUSHKA ARCHITECTS

DRAWING
GROUND FLOOR SERVICES

SCALE	DATE	DWN BY	CHCKD BY
1:100 (@A3)	FEB 08	STEVE	CHCKD BY
PJT NO.	DWG NO.	REV	
1023	Z(-)001	P2	



REV	DATE	DESCRIPTION
P2	19/02/08	CENTRAL RISER OMITTED
P1	14/02/08	PLANNING

SKELLY&COUCH
BUILDING ENVIRONMENT & SERVICES ENGINEERING CONSULTANTS

3rd FLOOR SOUTH
10a BELMONT STREET
LONDON
NW1 8HH
T 020 7424 7770

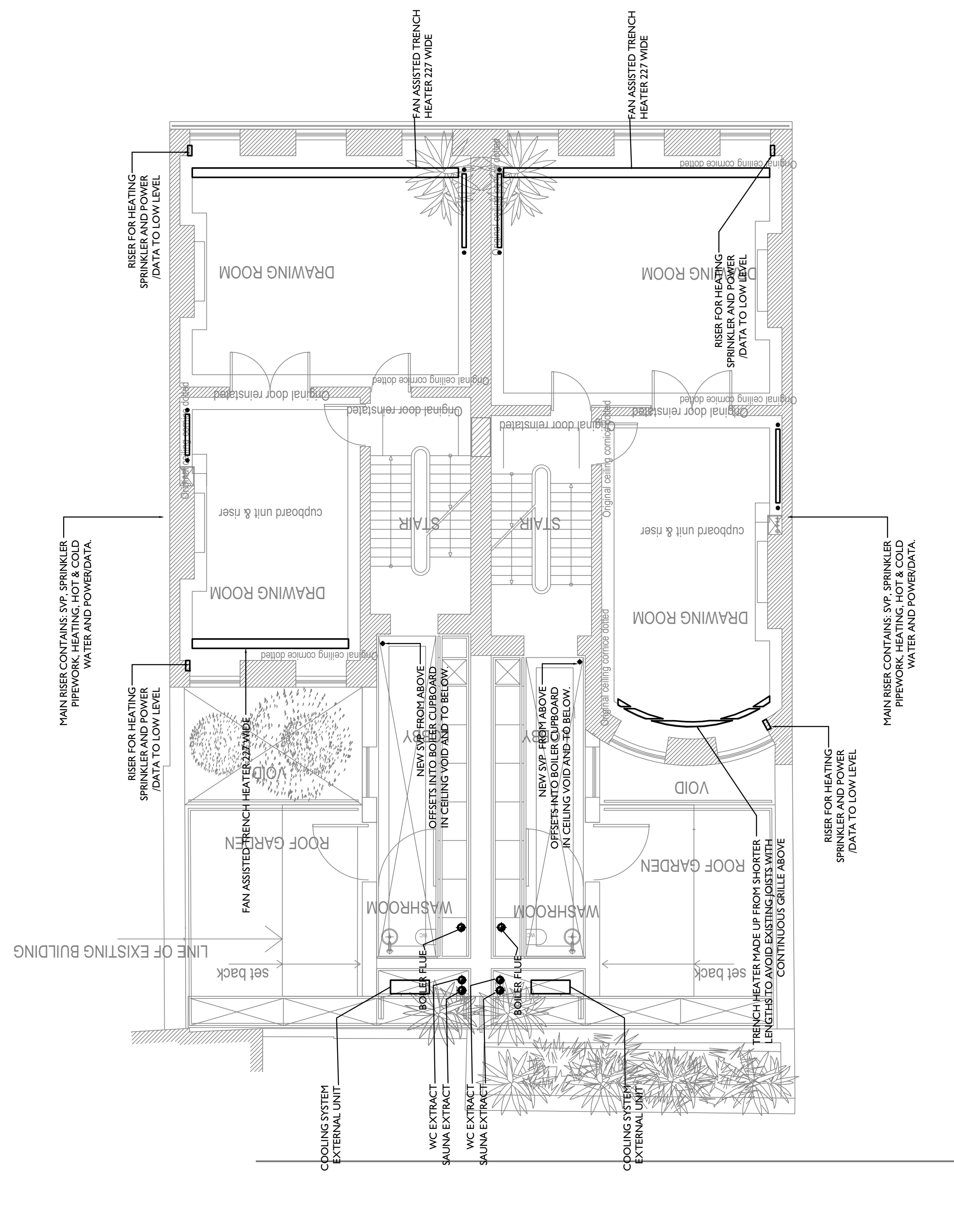
Skelly & Couch LLP
is a Limited Liability Partnership
Registered in England No. OC 328 943

PROJECT
34 - 35 FITZROY SQUARE

ARCHITECT
EMOLI PETRUSHKA ARCHITECTS

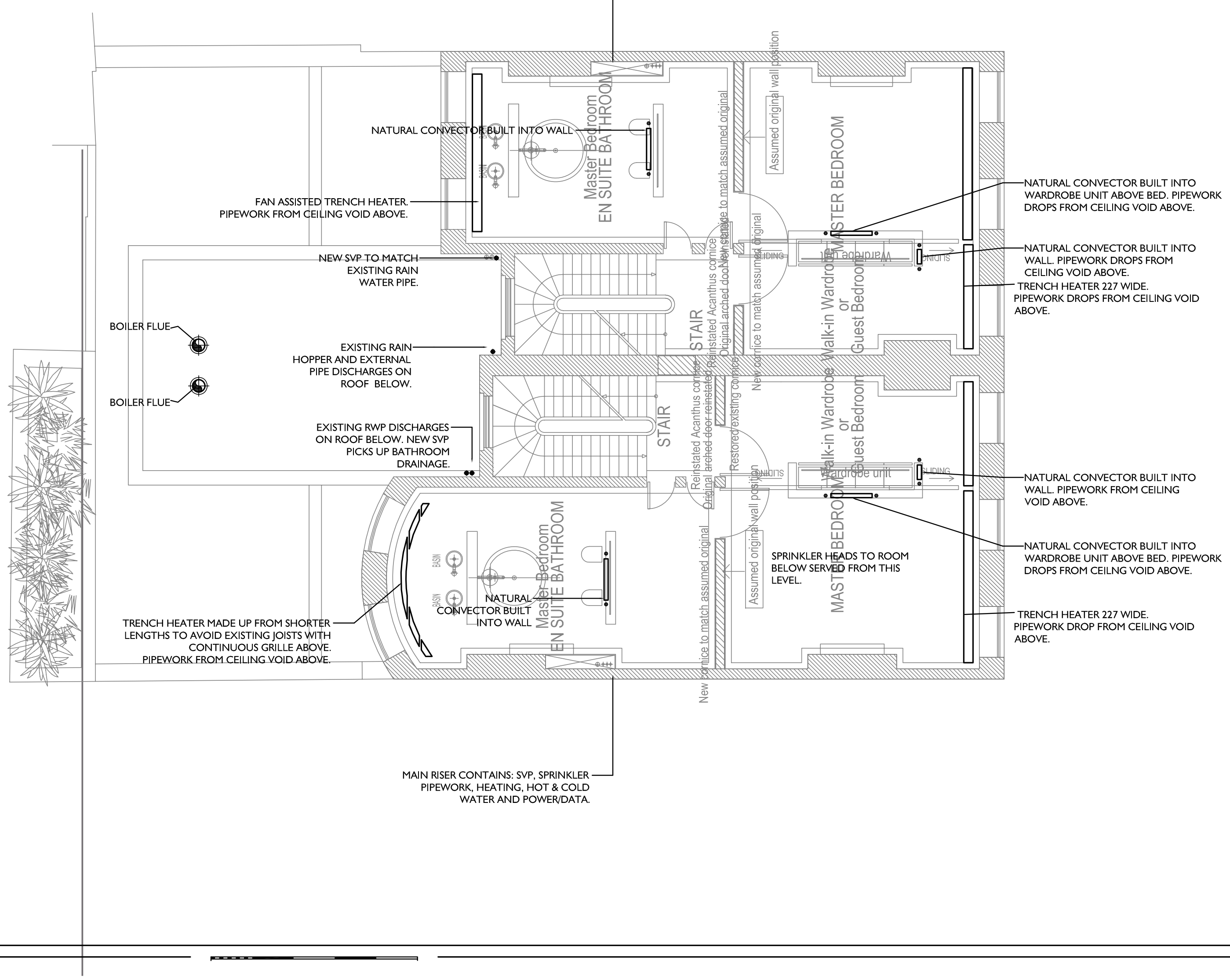
DRAWING
FIRST FLOOR SERVICES

SCALE	DATE	DWN BY	CHCKD BY
1:100 (@A3)	FEB 08	STEVE	CHCKD BY
PJT NO.	DWG NO.		REV
1023	Z[--]002		P2



emoli petroschka architects
no. 4 Plantain Place Crosby row London SE1 1YN
tel 020 7403 1880 mail@emolipetroschka.co.uk

34-35 FITZROY SQUARE



REV	DATE	DESCRIPTION
P2	19/02/2008	CENTRAL RISER OMITTED
P1	14/02/2008	PLANNING

SKELLY&COUCH
BUILDING ENVIRONMENT & SERVICES ENGINEERING CONSULTANTS

3rd FLOOR SOUTH
10a BELMONT STREET
LONDON
NW1 8HH
T 020 7424 7770

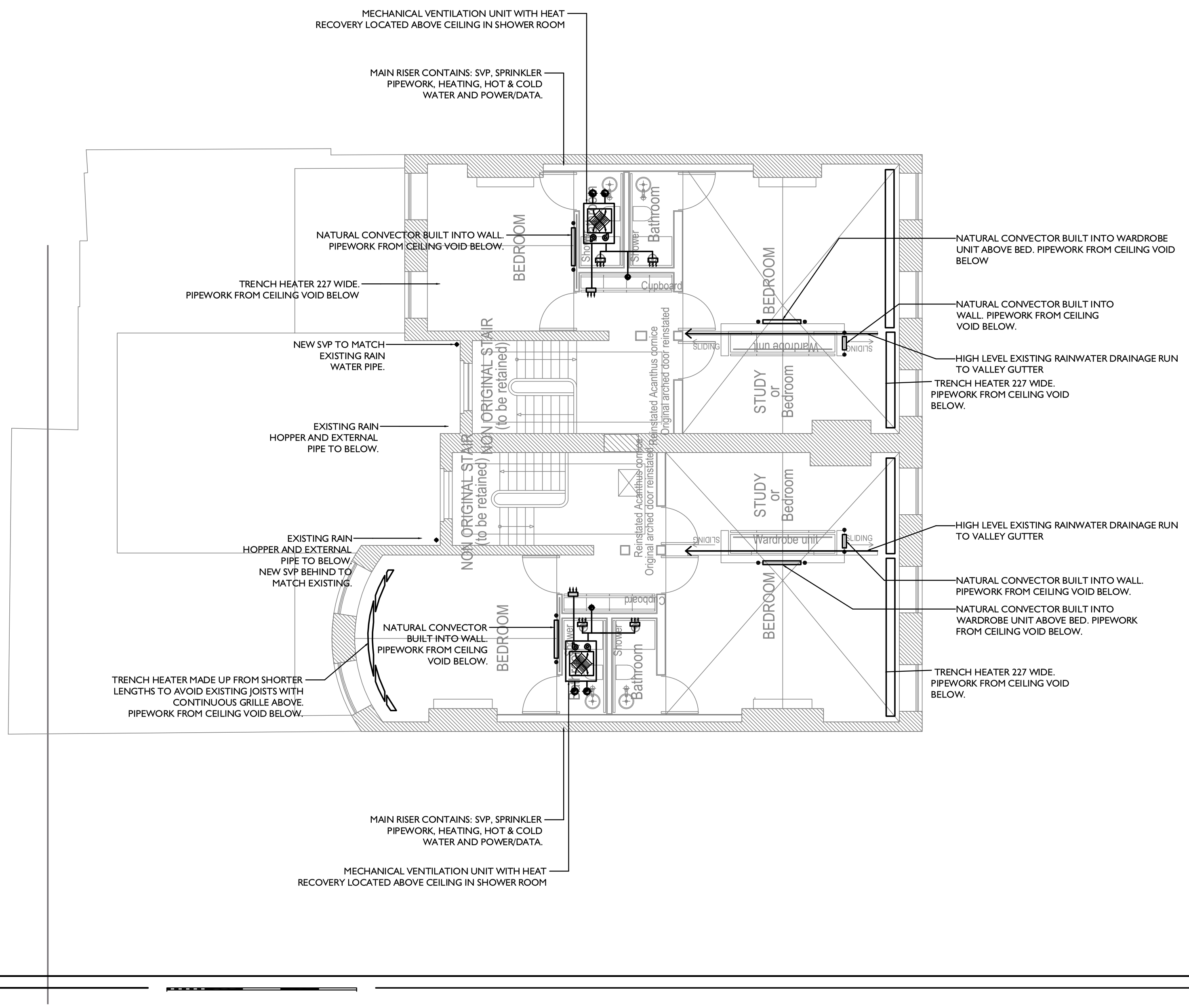
Skelly & Couch LLP
is a Limited Liability Partnership
Registered in England No. OC 328 943

PROJECT
34 - 35 FITZROY SQUARE

ARCHITECT
EMOLI PETRUSHKA ARCHITECTS

DRAWING
SECOND FLOOR SERVICES

SCALE	DATE	DWN BY	CHCKD BY
1:100 (@ A3)	FEB 08	STEVE	CHCKD BY
PJT NO.	DWG NO.		REV
1023	Z[--]003		P2



REV	DATE	DESCRIPTION
P1	14/02/08	PLANNING
P2	19/02/08	CENTRAL RISER OMITTED

SKELLY&COUCH
BUILDING ENVIRONMENT & SERVICES ENGINEERING CONSULTANTS

3rd FLOOR SOUTH
10a BELMONT STREET
LONDON
NW1 8HH
T 020 7424 7770

Skelly & Couch LLP is a Limited Liability Partnership Registered in England No. OC 328 943

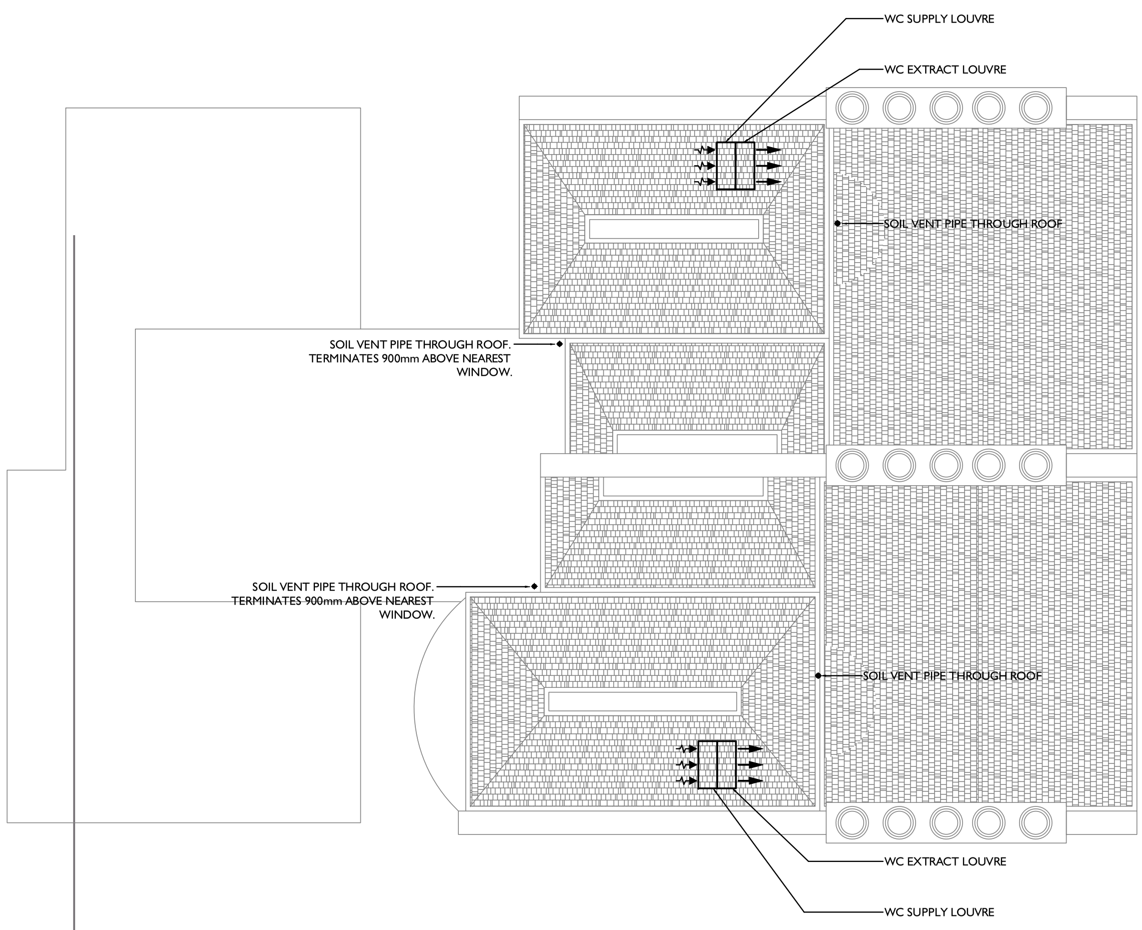
PROJECT
34 - 35 FITZROY SQUARE

ARCHITECT
EMOLI PETRUSHKA ARCHITECTS

DRAWING
THIRD FLOOR SERVICES

SCALE	DATE	DWN BY	CHCKD BY
1:100 (@ A3)	FEB 08	STEVE	CHCKD BY
PJT NO.	**DWG NO.**		**REV**
1023	Z[--]004		P2

PROPOSED ROOF P
(as exis



REV	DATE	DESCRIPTION
P2	19/02/08	CENTRAL RISER OMITTED
P1	14/02/08	PLANNING

SKELLY&COUCH
BUILDING ENVIRONMENT & SERVICES ENGINEERING CONSULTANTS

3rd FLOOR SOUTH
10a BELMONT STREET
LONDON
NW1 8HH
T 020 7424 7770

Skelly & Couch LLP
is a Limited Liability Partnership
Registered in England No. OC 328 943

PROJECT
34 - 35 FITZROY SQUARE

ARCHITECT
EMOLI PETRUSHKA ARCHITECTS

DRAWING
ROOF SERVICES

SCALE	DATE	DWN BY	CHCKD BY
1:100 (@ A3)	FEB 08	STEVE	CHCKD BY
PJT NO.	DWG NO.		REV
1023	Z[--]005		P2

SUSTAINABILITY REPORT

SKELLY&COUCH
BUILDING ENVIRONMENT & SERVICES ENGINEERING CONSULTANTS

J1023
13/02/2008

34-35 Fitzroy Square.
Building Regulations Report

Building Regulations Part L1B: Conservation of Fuel and Power in Existing Dwellings.

In order to demonstrate compliance with the Building Regulations the guidance of the approved document Part L1B will be followed.

Original Buildings.

As the original buildings are listed in accordance with section 1of the Planning (Listed Buildings and Conservation Areas) Act 1990 they are exempt from the energy efficiency requirements for builder's work where they would unacceptably alter their character and appearance. Where possible the intent of the building regulations will be adopted in the original buildings. This will mainly be limited to the specification, design, and installation and commissioning of efficient 'controlled services' (high efficiency condensing gas boilers, thermal insulation of pipe-work and efficient lamps).

Given the historic nature of the original buildings there is little scope to improve the thermal fabric performance without having a significant visual impact. The existing timber frames single glazed windows will not accommodate double glazed units without a significant visual impact and the single glazing will therefore be retained. The addition of dry lining on the internal face of external walls will impact on skirting and cornicing and is not therefore proposed. The extent of excavation in the lower ground floor for floor trenches and below ground drainage will mean there is scope for improvement of the floor insulation. A floating screed above an insulation layer is therefore proposed to improve thermal performance. The alterations to the 3rd floor ceiling profile will enable the incorporation of an insulation layer to improve its thermal performance.

Rear extension.

As the rear extension is not listed the building work and refurbishment will be done in accordance with PartL1B.

- Where thermal elements are to be installed or replaced their thermal performance will be in accordance with Table 4 of the approved document.

Table 4 **Standards for thermal elements W/m²·K**

Element[1]	(a) Standard for new thermal elements in an extension	(b) Standard for replacement thermal elements in an existing dwelling
Wall	0.30	0.35[2]
Pitched roof – insulation at ceiling level	0.16	0.16
Pitched roof – insulation at rafter level	0.20	0.20
Flat roof or roof with integral insulation	0.20	0.25
Floors	0.22[3]	0.25[3]

Notes:

1. Roof includes the roof parts of dormer windows and wall refers to the wall parts (cheeks) of dormer windows.
2. A lesser provision may be appropriate where meeting such a standard would result in a reduction of more than 5% in the internal floor area of the room bounded by the wall.
3. A lesser provision may be appropriate where meeting such a standard would create significant problems in relation to adjoining floor levels. The U-value of the floor of an extension can be calculated using the exposed perimeter and floor area of the whole enlarged dwelling.

SUSTAINABILITY REPORT

- Reasonable effort will be undertaken to ensure the continuity of insulation and air-tightness of the external fabric in accordance with Clause 52 and 53 of the approved document.
- Where thermal elements are to be retained and renovated (to more than 25% of their area) their thermal performance will be in accordance with Table 5 of the approved document.

Table 5 Upgrading retained thermal elements

Element	(a) Threshold value W/m²·K	(b) Improved value W/m²·K
Cavity wall*	0.70	0.55
Other wall type	0.70	0.35
Floor	0.70	0.25
Pitched roof – insulation at ceiling level	0.35	0.16
Pitched roof – insulation between rafters	0.35	0.20
Flat roof or roof with integral insulation	0.35	0.25

* This only applies in the case of a wall suitable for the installation of cavity insulation. Where this is not the case it should be treated as for 'other wall type.'

The below pavement stores that will become part of the thermal envelope so the walls, floors and ceilings will be lined with insulation.

Building Regulations Part F: Means of Ventilation.

The approved document suggests that with historic buildings the intent should be to improve the ventilation to the extent that is necessary taking into account the need not to prejudice the character of the building nor to increase the risk of long term deterioration to the building fabric or fittings.

The main intervention into the original buildings is the addition of bathrooms and kitchen. The bathrooms being wet rooms will require particular attention to ensure that humidity levels are controlled to a suitable level to avoid any damage to the building fabric and mitigate internal condensation of the single glazed windows. Although the existing fabric is likely to be quite leaky (providing beneficial infiltration) this can only be confirmed by air pressure testing. To ensure that moisture build up from showers/baths and occupants is controlled as much as possible an extract fan will be incorporated in the ceiling void above the 3rd floor shower room and within the boiler cupboard to provide continuous mechanical extract from all bathrooms, shower rooms and kitchen in the original building. There will be a boost facility activated by the light switch in each space and boost to the kitchen. In order to ensure adequate make up air (as trickle vents are not an option in the existing windows) the unit will incorporate a heat reclaim facility with supply to the stairwell at high and low level from a shadow gap detail. New bathroom and WC doors will incorporate an undercut to enable 7600mm^2 of open area for make-up air to the bathroom. A similar separate system will be provided to the rear extension to provide ventilation to the wet rooms. Windows to the rear extension will be provided with trickle vents. There will be a dedicated extract fan to the utility room.

SUSTAINABILITY REPORT

J1023
14/02/2008

SKELLY&COUCH
BUILDING ENVIRONMENT & SERVICES ENGINEERING CONSULTANTS

Building Regulations Part E: Resistance to Passage of Sound.

The approved document stipulates minimum sound insulation requirements for walls and floors that separate dwellings formed by a material change of use. There are also performance requirements for new internal walls and floors within each dwelling.

However, the approved document also recognises that it is not always practical to achieve the sound insulation standards in the case of historic buildings. In this case, the aim should be to improve the sound insulation performance as much as practically possible whilst preserving the special characteristics of the historic building.

It is expected that all new internal partitions will be designed to meet ADE requirements. Improvements are proposed to the sound separation between floors within each house to improve performance without impacting on the character of the original fabric. The existing and resulting sound separation will be established via a suitable schedule of testing.

Building Regulations Part J: Combustion Appliances and Fuel Storage Systems.

The proposal is to reinstate the original fire places. Further investigation of the condition of the existing flues will be required to determine whether they are appropriate for reuse. On the basis that they are adequate and decorative fuel effect gas fires are installed their output will be limited to 7kW in accordance with clause 3.12 to eliminate the need for dedicated open air vents in the external facade of the room.

Sustainability

In context of the listed status of the original buildings the options for minimising the environmental impact of the building is somewhat limited. Where possible the design has incorporated installations and interventions that reduce the environmental impact without compromising the character of the original buildings:

- Gas has been adopted as the fuel for space heating and hot water generation to minimise CO_2 (compared to electricity). This also avoids the possible impact of the need for an electrical substation.
- Where possible (without causing a detrimental impact on the building character or fabric) the thermal performance of the external envelope is to be improved.
- Mechanical ventilation will incorporate a heat reclaim facility to reduce heat loss due to ventilation requirements.

ACOUSTIC REPORT

J1023
11/2/08

SKELLY&COUCH

34-35 Fitzroy Square

Environmental Noise Survey and Assessment

11th February 2008

Introduction

The proposal is to convert the existing Grade 1 listed Georgian townhouses into multiple dwellings. The development may require the installation of external plant equipment such as rooftop chillers.

The key issues to be considered for planning are:

- The suitability of the existing noise environment for dwellings. This can be assessed by reference to the Noise Exposure Categories (NEC's) defined in Planning Policy Guidance Document 24 (1994).
- The effect of noise from the new dwellings on neighboring properties. This can be assess using the methodology described in BS 4142 (1997) in accordance with the requirements stipulated by Camden Council and/or Mayor of London.

Both factors depend on the existing background noise levels which must be surveyed over at least a 24 hour period.

Environmental Noise Survey

Measurement Procedure

An environmental noise survey of the site was undertaken between 09:00am 7th February and 16:00 on 8th February 2008.

The weather during the survey was fine, with light cloud-cover on the 7th February and a clear sky on 8th February. There was no rain during the survey. The average temperature was about 10°C and the wind-speed was always below 5m/s (see Figure 1). The conditions were suitable for making representative noise measurements.

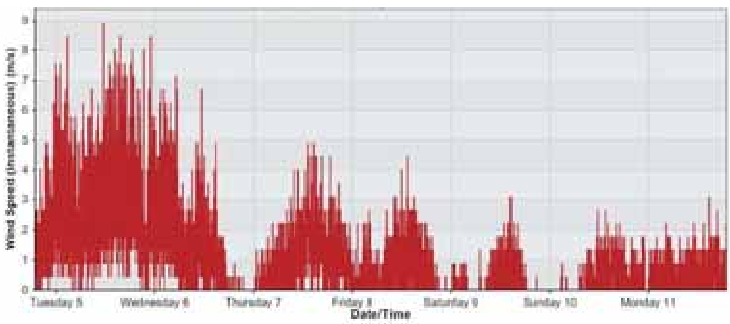


Figure 1: Instantaneous wind speed between 5th Feb and 11th Feb measured at Kensington, London.
(Data from Atomwide Weather Monitoring System)

ACOUSTIC REPORT

J1023
11/2/08

SKELLY&COUCH

The principal sources of noise were:

- traffic noise and aircraft noise
- noise from activity in the square (such as street cleaning and passing groups of pedestrians)
- construction noise from 33 Fitzroy Sq and roofing work on Conway St

Figure 2 shows the locations at which noise measurements were made.

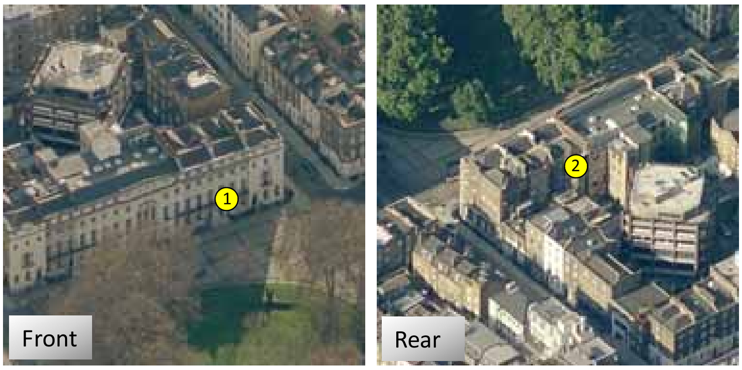


Figure 2: Survey Locations. Location 1 - 1st Floor, Front, No34. Location 2 - 3rd Floor, Rear, No35.

Location 1 was approximately 30cm in from the front façade (see Figure 3) and Location 2 was approximately 10cm from the rear façade. In both cases the microphone was approximately 30cm above the supporting ledge. As a result both measurements will include the effect of the sound reflected from the façade.

All measurements were made using a Norsonic 118 Sound Level Meter (serial number 30519) conforming to BS EN IEC 61672 Class 1. Calibration certificates are available on request.

Figure3: Survey Location 1. View from front and from above.

Skelly & Couch LLP
is a Limited Liability Partnership
Registered in England No. OC 328943
3rd Flr South, 10a Belmont St, Chalk Farm, London NW1 8HH

ACOUSTIC REPORT

The microphone was a Gras-41 outdoor microphone (serial number 36015) with windshield, bird-spike and lightweight tripod. The microphone and meter were calibrated both before and after the survey using a Norsonic 1251 Calibrator (serial number 30753). No significant change in the equipment calibration was observed over the course of the measurement. The 12V lead-acid batteries used to power the equipment were also checked both before and after the measurements.

Data was logged at 1 second intervals and statistical values were calculated and stored every 30 minutes.

Measurements were made for a 24-hour period at Location 1 and for a 6-hour period at Location 2.

Measurement Results

Figure 4 shows the values of L_{Aeq}, L_{AF10} and L_{AF90} recorded at Location 1. The definitions of these acoustic parameters is given at the end of this report but, on a basic level, L_{Aeq} is the average noise level, L_{AF90} is the noise level that is exceeded for 90% of the time (i.e. a background level) and L_{AF10} is the noise level that is exceeded for 10% of the time.

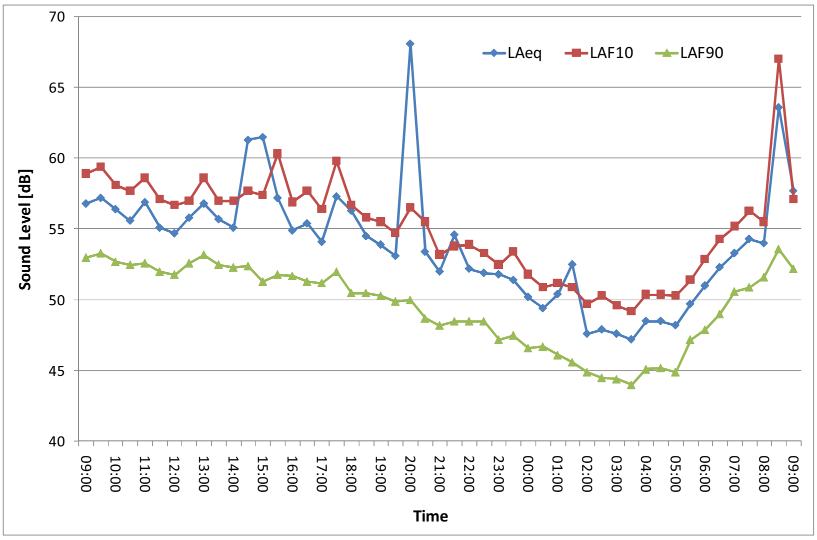


Figure 4: 24-hour noise levels measured at Location 1.

The data in Figure 4 shows a general trend across the 24-hour period. The notable exceptions are at spikes at 3.00pm, 8.00pm and 8.30am.

Looking at the detailed data for each of these three periods (refer to Figure 5) indicates that:

- The spike at 3.00pm is due to a number of very short but fairly loud events – possibly someone hammering (or another impulsive noise).
- The spike at 8.00pm is due to a single very loud but reasonably short event at 8.12pm.
- The spike at 8.30am is due to a long but steady source of noise, possibly an idling vehicle parked in the square.

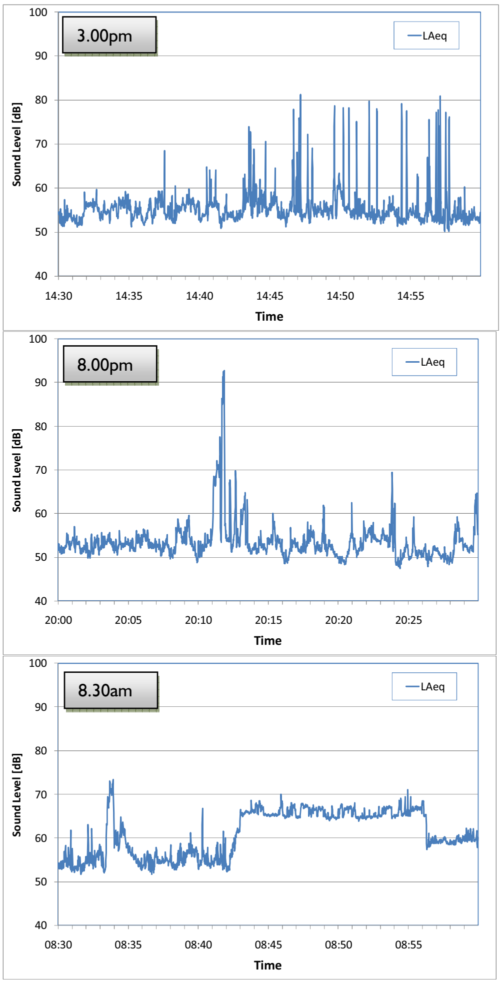


Figure 5: L_{Aeq} measurements at Location 1.

Figure 6 shows the values of L_{Aeq}, L_{AF10} and L_{AF90} recorded at Location 2. The measured values are very similar to those at Location 1 and it was not considered necessary to perform a full 24-hour measurement at Location 2.

ACOUSTIC REPORT

J1023
11/2/08

SKELLY&COUCH

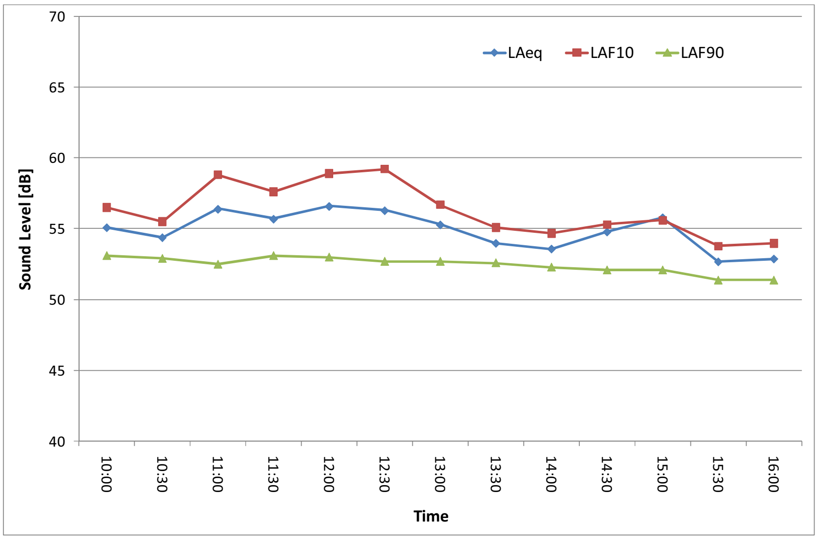


Figure 6: Noise levels measured at Location 2 between 10am and 4pm on 8th Feb

A full set of noise survey data (at 1 second intervals) can be supplied on request to include both A-weighted and frequency 1/3-octave bands.

Analysis of Results

Noise Break-in to Houses

When creating a new-dwelling near an existing source of noise (as in this case), Planning Policy Guidance Document 24 (1994) is normally used in the assessment of the proposal. PPG24 uses the concept of Noise Exposure Categories (NECs) which are defined in Figure 7.

NOISE LEVELS[4] CORRESPONDING TO THE NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS $L_{Aeq,T}$ dB				
	NOISE EXPOSURE CATEGORY			
NOISE SOURCE	A	B	C	D
road traffic				
07.00 - 23.00	<55	55 - 63	63 - 72	>72
23.00 - 07.00[1]	<45	45 - 57	57 - 66	>66
rail traffic				
07.00 - 23.00	<55	55 - 66	66 - 74	>74
23.00 - 07.00[1]	<45	45 - 59	59 - 66	>66
air traffic[2]				
07.00 - 23.00	<57	57 - 66	66 - 72	>72
23.00 - 07.00[1]	<48	48 - 57	57 - 66	>66
mixed sources[3]				
07.00 - 23.00	<55	55 - 63	63 - 72	>72
23.00 - 07.00[1]	<45	45 - 57	57 - 66	>66

NEC	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Figure 7: Noise Exposure Categories. Tables taken from PPG24.

ACOUSTIC REPORT

Taking account the 3dB reduction from the effect of the façade reflection, the measured results at Location 1 correspond to:

- $L_{Aeq,16hour(07:00-23:00)}$=55.1dB
- $L_{Aeq,8hour(23:00-07:00)}$=47.0dB

These values correspond to NEC-B. However, they are only 2dB above NEC-A and it is expected that there will be no issues with planning permission in regard of noise break-in to the new houses.

The L_{Amax} values for individual night-time events are also well below the PPG24 levels required for NEC-B.

Limiting values for Plant-noise Break-out
BS 4142 (1997) suggests that the likelihood of complaint due to a new noise source can be assessed by comparing the noise level from the new source with the existing background noise level.

The lowest measured background noise level is L_{AF90}=44dB at around 3.30am.

It is suggested that the noise level, resulting from any plant associated with the development, at the position of the nearest residential window is $L_{Aeq,T}$=40dB or less. A 4dB tolerance is allowed to account for the face that the equipment may have a distinct tonal or impulsive noise characteristic.

Figure 8 shows what is likely to be the closest residential window (depending on the exact plant location).

Figure 8: The nearest residential window.

The site is in the London Borough of Camden. Camden Council Environmental Health department have been contacted regarding any specific local guidelines on noise pollution but none were established. Further consultation is advised.

ACOUSTIC REPORT

J1023
11/2/08

SKELLY&COUCH

Acoustic Terminology

FREQUENCY, f (Herz, Hz)
The rate of vibration of the air molecules which transmit the sound measured in cycles per second or Hertz. The human ear is sensitive to sound in the range 20Hz – 20kHz.

FREQUENCY - OCTAVE BANDS
For an octave band the upper limiting frequency of each band is twice the lower limiting frequency. Octave bands are described by their centre frequency values. The typically used bands are from 63Hz to 4kHz.

SOUND PRESSURE LEVEL, SPL or L_P(decibels, dB)
A measure of the instantaneous sound pressure at a point in space. The threshold of hearing occurs at approximately L_P=0 dB (which corresponds to a reference sound pressure of 20μPa).

$L_P(dB)=20.\log_{10}(\text{Sound Pressure (Pa)}/20\mu Pa)$

Sound pressure is generally measured using a time-weighting. The time weighting is effectively an exponentially weighted root-mean-square average over a short time period. The commonly used time weightings are Fast (F), Slow (S) and Impulse (I).

A-WEIGHTED SOUND PRESSURE LEVEL, L_A (dBA)
A-weighted sound pressure level values are frequency-weighted in a way that approximates the frequency response of the human ear and allows sound levels to be expressed as a single figure value. Alternative frequency-weightings are C-weighting and Z-weighting.

EQUIVALENT CONTINUOUS A-WEIGHTED SPL, $L_{Aeq,T}$ (dBA)
Energy average of the A-weighted sound pressure level over a time period, T. The level of a notional continuous sound that would deliver the same A-weighted sound energy as the actual fluctuating sound over the course of the defined time period, T.

N% EXCEEDENCE SOUND PRESSURE LEVEL, $L_{AFN,T}$
This is the A-weighted sound pressure level which is exceeded for N% of the time during a measurement period T. The subscript F denotes the time-weighting.

34 - 35 FITZROY SQUARE

STRUCTURAL ENGINEER'S REPORT

This report (60042715 ESAF) was prepared by Engineering Design & Analysis in February 2008 for the Planning Application and Listed Building Consent Application for the restoration and refurbishment of two Georgian townhouses by Robert Adam, Nos. 34 and 35 Fitzroy Square.

STRUCTURAL ENGINEER'S REPORT

The Structure

1.0 Introduction

We have been asked by Garbe Real Estate Ltd to carry out an inspection of the above properties to assess their current structural condition and comment on proposals to restore and convert the buildings. Details of the proposals to restore the buildings to two separate dwellings, on which this report has been based, have been prepared by emoli petroschka architects.

Our inspection of the buildings took place on the 10th January 2008, when a limited amount of the floor structures was exposed by lifting finishes.

It is understood that no structural drawings or other relevant documentary information on the alterations that have been carried out, exist for the buildings.

We have little documentary information on ground conditions in the immediate area, although the ground in this part of London is known to comprise sands and gravels at relatively shallow depths over clay, and in the absence of any signs that the buildings have suffered foundation movement, and in view of the fact that the proposals for restoration do not include the addition of any load on the foundations, we have not carried out any special searches for geotechnical information.

2.0 The Structure

The terrace buildings at 34-35 Fitzroy Square are approximately 200 years old and are conventionally constructed with load-bearing masonry walls, timber floors and pitched timber roofs. The building has brick jack arch vaults extending under the pavements on the front elevation.

The buildings foundations are not known, but the absence of indicators (by way of serious cracking) of differential or overall settlements suggests that they are performing satisfactorily. The buildings are likely to have simple spread foundations with brick offsets on a thin weak concrete blinding. As a result of the basements (that effectively force the foundations through fill and into better, well protected ground), the foundations should be reliable in the ground in this area of London, which at basement level should comprise either London Clay or gravels, both of which can give good support to a building of this type.

The original floors of the buildings were likely to have had a relatively low superimposed loading capacity before they were upgraded for office use. This is because the original use of the buildings was for residential purposes. Most old buildings of this type were constructed with timber of reasonable quality, but in rather shallow sections, so that modern requirements for serviceability (deflection) might not be met if the floors were subjected to detailed structural analysis to current codes of practice. Deflections in old timber floors have usually been made worse over the years as a result of notching of joists for services. Evidence of radical strengthening or a detailed analysis of the floors would be required to confirm their capacity for office loading – the most recent use of the buildings. The current statutory requirement for offices is a superimposed loading capacity of 3.5kN/m2 (approximately 70lb/sq.ft), including an allowance of 1.0kN/m2 for lightweight demountable partitions.

An inspection of holes that had been cut for new services in the floors showed that they are partially filled with builder's rubble; a form of "pugging". This mixture of masonry rubble and plaster set on a timber tray on battens fixed to the sides of the floor joists was often used to add mass to the floor and improve sound attenuation. It was reasonably effective for this purpose, but adds considerably to the dead weight of the whole floor, and there are much more structurally efficient means to reduce sound transmission available these days.

We are aware that many of the former reception rooms have been used for meetings during their most recent occupation, and under the loading imposed from this form of use, the floors are likely to have been very close to, or to have even marginally exceeded, current serviceability limits, although plaster ceilings that could have suffered under excessive deflection, appear to be in reasonable condition.

There are few structurally significant cracks in the walls. The mortar in the brickwork (except where it has been re-pointed) will be lime based and possibly without any cementitious component. This type of weak mortar has little if any tensile capacity, and brittle cracking in London Stock brickwork in lime mortar is not common. The forces that give rise to cracking in modern brickwork are often effectively dissipated in the soft, lime based mortar so that thermal movement alone rarely results in visible cracking.

STRUCTURAL ENGINEER'S REPORT

The stairs in both buildings appear to be in reasonable condition. The stairs are likely to been formed originally with the treads acting as propped cantilevers, built into the stair well walls with each tread deriving its support from the wall and from the tread below it. This gives an elegant structure, with the stair having no any obvious waist. This type of stair is successful where there is no movement, and visually, the stairs appear to be reasonably straight overall, and the walls around the stair well appear to be reasonably plumb.

The roofs are quite conventional, and their geometry appears to have been retained reasonably well.

In view of the age of the buildings, and because there has been very little modern intervention structurally (except at the rear extension which is not considered here), there is little likelihood that materials that are currently regarded as "deleterious" to the integrity or stability of the structure, are present in the building. We cannot confirm that that this is the case behind all finishes, and beam casings, but it is most unlikely that deleterious materials exist in any meaningful quantity in this building.

The proposals to restore the buildings are mostly in connection with the fabric, and little work is intended to be carried out to the building structures.
So far as the proposed removal of walls at basement and ground floor levels is concerned, an assessment of the layout of the existing structure indicates that these walls are non load-bearing and make no contribution to the stability of the buildings. Nevertheless their removal should be carried out with care, and their connection to the existing frame should be exposed and examined to confirm their non-structural status and ensure that no temporary propping or other support is required during their removal. The present intention is to re-locate the walls on what are believed to be the original lines of the vertical structural support for these spine walls, and as such, no additional support is believed to be necessary. The structural condition at these positions will be confirmed prior to their re-location.

3.0 Progressive Collapse

At the time of their construction, there was no requirement for these buildings to be provided with special levels of tieing (connections between floors and walls other than that arising from normal bearings) to provide what would be regarded today as reasonable levels of integrity, and obviously there was no requirement for them to resist progressive collapse. Since the mid 1970's, the Building Regulations have required buildings of five (and more recently four) storeys or more including basements to resist the possibility of progressive collapse in the structure when a "key" element (such as a column or beam), is removed under the action of an external force. Floors in modern buildings are expected to hang in catenary when such a key element is removed, or they are otherwise designed to resist the nominal explosive force in the first place.

By their nature, load-bearing masonry buildings with loose beams have a fairly low degree of continuity and therefore tensile capacity in them. It is not intended to intervene in these structures to improve the level of tieing and continuity, except where their conditions specifically require it. The buildings are not being extended or altered in any sense that would require them to be re-assessed in terms of their resistance to progressive collapse. Another characteristic of construction that leads to a poor level of integrity in buildings of this age, was the tendency for the walls to be brought up at different times, so that the cross walls are often not bonded to the front or side walls.

4.0 Summary

We gained the impression that the buildings are stable, and that foundation movement (without additional load) is unlikely. The earlier alterations to the building, involving the removal of some of the cross walls may mean that any further alterations involving additional load or the removal of further structural walls are not likely to be acceptable, without radical strengthening. However, the proposals here should result in a net overall reduction in superimposed loading from the potential for loading as offices to the much more modest requirement for residential space. A nominal reduction of loading of at least 1kN/m2 overall on the floors is anticipated.

There is a slight concern regarding the serviceability of some of the floors and their loading capacity, where dead weight (rubble fill) and the notching of joists for services could have caused a measurable reduction in serviceabily, and any further notching will be carried out with controls over its extent to prevent any further measurable reduction in the strengths of floor joists.

34 - 35 FITZROY SQUARE

FIRE SAFETY STRATEGY

This report was prepared by Faber Maunsell Fire & Risk Engineering in February 2008 for the Planning Application and Listed Building Consent Application for the restoration and refurbishment of two Georgian townhouses by Robert Adam, Nos. 34 and 35 Fitzroy Square.

FIRE SAFETY STRATEGY

INTRODUCTION

1.1 Scope
This preliminary note outlines the general proposals and highlights the critical issues for the approvers. Subject to acceptance by the Design Team, the proposals will be discussed with the approving authority and their comments considered for subsequent inclusion.

It is noted that the buildings were originally houses, and in that sense the proposals are not a change of use. However, the most recent use is non-residential, and the conversion back to residential justifies a fresh assessment of the fire precautions.

1.2 Standards adopted
The base document is Approved Document B, fire safety, Volume 1 – Dwellinghouses.

1.3 Brief building description
The proposal is for two separate dwellings each using a basement, ground and 1st – 3rd floors. Both are served by a single stair. The two highest levels at 12.2m and 9m above the ground level are above 7.5m from the ground floor.

Architects drawings indicate the current options.

1.3 Purpose group –
Appendix D in the AD indicates Residential (Dwellings) (1b).

1.4 Fire scenarios –
The initial analysis suggests the following scenarios should be considered:

[1] fire in any room off the escape stair – addressed by stair enclosure, using detector-operated door hold-open devices where required.

[2] night-time fire - addressed by stair enclosure, using detector-operated door hold-open devices where required.

[3] ground floor kitchen fire - addressed by stair enclosure, using detector-operated door hold-open devices where required, but also raising the issue of the dining rooms being an ‘inner room condition’, and for which a conventional window exit as an alternative escape is not possible due to the lightwell beneath.

1.5 Matters of particular interest at this stage
The following matters are of particular interest at this stage in the design:

1.the highest floors are over 7.5m from access level, and the AD B recommends either an alternative escape provision from the highest floors, or inclusion of a sprinkler system – or ‘water suppression’.

2.by including water suppression, a ½-hour standard of fire resistance to structure should be acceptable.

All other maters of interest have been suitably addressed in discussion with the architects.

B1 – MEANS OF WARNING AND ESCAPE

2.1 Evacuation regime
Dwelling house are normally expected to evacuate single-stage upon being alerted by an alarm system.

2.2 Detection / alarm
Paras 1.11 – 1.18 in the AD describe the details of the recommended detection / alarm system. In a tall building, at least one detector is recommended per level. They should be main-powered, and linked such that an alarm raised by one, is sounded throughout. The detailed design is outlined in the ADB, and BS5839: Pt 6 to which it refers. In support of the proposed layout benefits, more detection points are likely to be required than the minimum one per floor.

2.3 Number and location of stairs
The single stair is acceptable, even though there is more than one level above 7.5m. This condition is acceptable subject to the inclusion of a sprinkler system to BS 9351: 2005 – see the AD, diagram 1d. In build-ings less than 20m high, some concessions can be anticipated in terms of water storage and supply. Water suppression might be provided by a non-standard regime, and the approving authorities will need to be convinced of its efficacy.

2.4 Stair enclosure
As a single stair condition in a building with top floor over 4.5m from the ground, the stair should be enclosed to at least a ½ -hour standard. Self-closing doors are recommended, with any conflicts with general circulation accommodated by using detector-operated door hold-open devices.

FIRE SAFETY STRATEGY

Normally, though not highlighted in the AD, a stair that serves upper levels and a basement has to be separated at the ground floor; this strategy recommends that the inclusion of sprinklers is sufficient compensation to omit such separation. But the proposal assumes provision of FD30S doors to all rooms opening into the stair. In view of the building height, a fire door is included at the top of the basement stair.

On the lower ground floor, separation of the gym by an FD30S door is included, particularly in the single stair condition for upper levels. The rear escape stair in No 34 does not help in that it returns persons into the building.

On the first floor, the 'lobby' forms part of the stair enclosure; this attractive space may result in fire load within it. A fire door is therefore required to enclose the stair using detector-operated door hold-open devices.

2.5 Inner rooms
[AD, para 2.9] All rooms having direct access to others, also have doors into the stair, and are therefore not 'inner rooms'.

2.6 Managing the disabled
The AD gives no definitive advice or guidance on accommodating disabled persons [residents or visitors] for fire and the Design Team should look to AD M for guidance on access and inclusive design. The combination of the two ADs will cater for the disabled.

B2 – INTERNAL FIRE SPREAD, LININGS

In Table 1 of the AD B, a Class 1 system is acceptable in circulation spaces and rooms generally. A Class 3 system is acceptable in small rooms.

B3 – INTERNAL FIRE SPREAD, STRUCTURE

4.1 Fire resistance
All new structure should provide a 1-hour performance, and the base-ment floor should provide the same standard in supporting upper levels.

Whilst the AD recommends installation of a sprinkler system, and some form of water suppression will be included, no concessions on fire resistance are identified. However, this strategy recommends that the combination of water suppression and at least a ½-hour standard, should be acceptable.

The standard of water suppression, if not a conventional sprinkler system as recommended in the AD B, will require special attention. Both high and low pressure water mist systems are being installed within the London area, and the approving authorities can be convince-ed of the benefit and suitability for this project.

4.2 Compartmentation –
The only compartmentation that is required is between dwellings, to a 1-hour standard. The substantial construction should achieve that standard, but the existing connections between No 34, and 35 will need to be infilled to the 1-hour standard.

4.3 Higher fire risks
In that the kitchens open directly into the single stair condition, the kitchen doors should be fire-rated to FD30S standard. Self-closing requirement can be over-ridden by detector-operated closing.

B4 – EXTERNAL FIRE SPREAD

There should be no matters arising with respect to control of fire spread from these dwellings to adjacent buildings.

B5 – ACCESS AND ASSISTANCE TO THE FIRE BRIGADE

6.1 First aid firefighting
It would be prudent to encourage occupiers to provide appropriate first aid firefighting facilities.

6.2 First brigade access –
The fire brigade will park outside the main entrance doors. They can reach all floor areas within a 45m laid-out hose and the proposals are acceptable.