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BUILDINGS AND BUILT ENVIRONMENT

Beckenham Public Hall Refurbishment

M&E FEASIBILITY INPUT

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Notice

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1. INTRODUCTION

1.1 Bisset Adams Architecture & Design have been invited by the London Borough of Bromley to undertake a feasibility study to refurbish the Beckenham Public Hall building and have subsequently engaged BWB Consulting to assist with this feasibility study. This section of the feasibility study addresses the mechanical and electrical building engineering systems and installations.

Photo 1: Main Street Approach

Photo 2: Side Elevation

1.2 The building is currently operated as two separate demises, the public hall and the club, with the existing mechanical and electrical building engineering systems split to suit these separate uses. The mechanical and electrical installations throughout the building are looking tired and arguably suitable for modernisation which will need to be managed within budget cost expectations and to align with the anticipated level of refurbishment in each area.

1.3 A building condition survey and output report has been produced separately to the feasibility study and provided by the client for reference. This condition survey raises a number of M&E related issues such as replacement of the main gas fired boiler plant as back-log maintenance issues which are addressed within the cost plan for this feasibility study. The recommendations of the building condition survey have been taken as an accurate and full definition of back-log maintenance actions which would be required to enable operation of the building prior to inclusion of any refurbishment works.

1.4 The feasibility study includes the potential for conversion of the building to include a public library to varying extents within a number of configuration options, these options requiring different extent of upgrade to the engineering systems.

1.5 This feasibility study aims to explore the most suitable engineering systems installations and modifications to suit the refurbishment and change of use to a public library whilst providing sufficient guidance for preparation of a cost plan. Further design development would be required to explore options and solutions in more detail including production of information suitable for procurement of installation contractors.

1.6 The Public Hall is understood to have listed buildings status with some internal fixtures and finishes included in the listing. A definitive schedule of affected building elements is

not available at the time of preparing this feasibility report therefore the proposals made are subject to change when the scope of the listed building report is ascertained.

2. OVERVIEW OF EXISITNG M&E PROVISION

2.1 The building appears to be well served with incoming gas, electricity, mains water, gravity foul drainage and telecommunications infrastructure to suit its current use and there has been no indication of any operational issues with incoming utility supplies.

2.2 The building should have a display energy certificate (DEC) mounted in a prominent area which shows the latest assessment of the buildings energy performance. A DEC was not located during the initial visit to the building and given the low level of control provided to the heating systems distribution and internal lighting it is believed a DEC would show a low level of energy performance.

2.3 There are no renewable energy technologies installed to serve the building.

2.4 An existing gas fired boiler plant serves the Public Hall part of the building, the plant is at the end of its useful service life and requires replacement. Heating systems distribution in this part of the building is via a conventional pumped two pipe circuit which serves a combination of radiators and fan convector heaters all mounted at low level. The current community space on the first floor is heated by direct gas fired fan assisted convector heaters with the gas distribution pipework exposed at low level, this arrangement is less than ideal in a publicly accessed space and has presumably been added due to insufficient boiler plant capacity. A separate domestic scale gas fired boiler and wall mounted radiator system serves The Club part of the building and is also approaching the end of its useful service life.

Photo 3: Boiler fed fan convector + pipework

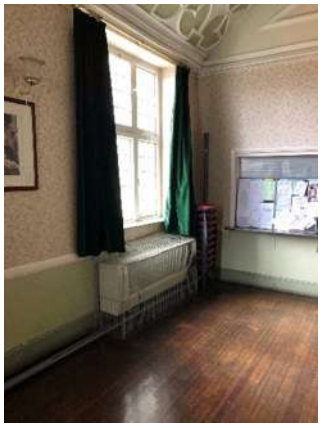

Photo 4: Convector + exposed gas pipework

2.5 The age of the building suggests that thermal insulation to the external elevations including ground floor to the unheated basement and the roof is either non-existent or minimal and not very effective. In addition the single glazed windows are original to the building and are likely to impose a significant heat loss both through uncontrolled ingress of external air and conduction through single glazed units. This will result in low internal air temperature levels within the building during the peak heating season and excess energy consumption. The large unprotected window areas are also likely to result in some overheating in the summer months which can currently be overcome by opening the windows providing the external noise environment doesn't impact excessively on use of the spaces.

2.6 Ventilation to the majority of spaces in both the Public Hall and The Club is provided by manually opening windows enabling a natural ventilation approach. There is no indication from the buildings users that this approach isn't suitable in the buildings current use and any external noise and air quality pollution effects on the interior of the building through the openable window ventilation strategy haven't been raised as being significant. Local mechanical ventilation is provided to the kitchens within The Club and the community space on the first floor of the Public Hall together with the bar area in The Club and local wall mounted extract fans within toilets throughout the building. These mechanical ventilation systems appear to be in good working condition but are installed to suit the specific accommodation and equipment currently installed and therefore are unlikely to be useable following any reconfiguration of the accommodation.

Photo 5: Club kitchen vent

Photo 6: Club bar vent

2.7 The building appears to be fed directly off of the mains water supply, water storage tanks and distribution equipment were not located on the initial site visit. Serving the building directly off of the mains water supply removes any risk associated with maintaining water storage tanks but does remove the ability for the building to function in the event of an interruption in the mains water supply. Domestic hot water is generated by a mix of gas fired and electrically heated point of use water heaters.

Photo 7: Community hall kitchen gas fired water heater

2.8 The mechanical building engineering services installations are provided with simplistic localised controls which do not promote energy efficiency or provide the ability for remote monitoring or set point adjustment.

2.9 The main electrical switchgear is thought to be housed within an enclosure located in the main entrance to the Public Hall which is obtrusive and not in an ideal location to permit maintenance operations in compliance with IEE regulations whilst the building is in use. The quality of the switchgear has not been assessed but is likely to warrant replacement to ensure the building remains maintainable and compliant with regulations.

Photo 8: Main Electrical Switchgear

Photo 9: Electrical Distribution Equipment

2.10 Electrical distribution throughout the building including submain cabling, protective devices and distribution boards are in various state of repair and present a range of remaining useful service life expectancy. The existing distribution boards are arranged to suit the current zones of use in the building and are unlikely to be suited to significant refurbishment and change of use of the building. Where the existing distribution is modified it will be required to meet current IEEE wiring regulations which the existing equipment will not comply with.

2.11 Lighting throughout the building is functional and aesthetically enhanced by the use of chandelier fittings with historic importance in some of the main areas. Control of the lighting fittings is by simple manual local switching and there is no evidence of daylight linking or absence detection for energy saving purposes.

Photo 10: Lighting to The Club

Photo 11: Club snooker room lighting

Photo 12: Chandeliers to Main Hall

Photo 13: Central stairway lighting

2.12 Small power distribution is provided to suit the current use of the space using outdated distribution circuitry in the Public Hall, the Club is understood to have a maintained 5 year testing and replacement regime so is likely to be more regulatory compliant. Power usage by the building users in the new library and community use areas is likely to be wider spread than in the current building therefore the existing distribution systems are likely to be of insufficient capacity to be re-usable within the refurbished building.

2.13 Miscellaneous electrical systems such as fire detection and alarm, electronic security and intruder detection and alarm are all provided on a decentralised basis and cover distinct areas of the building. These systems are unlikely to suit the remodelled building or accommodate significant upgrade and are therefore likely to become redundant and require replacement.

2.14 Vertical transportation between the ground and first floor of the Public Hall is provided by a single lift accessed off of the main entrance lobby. The lift has a change in access

door location between the two floors served to suit the accommodation on each floor and the lift car is arguably undersized for wheelchair use.

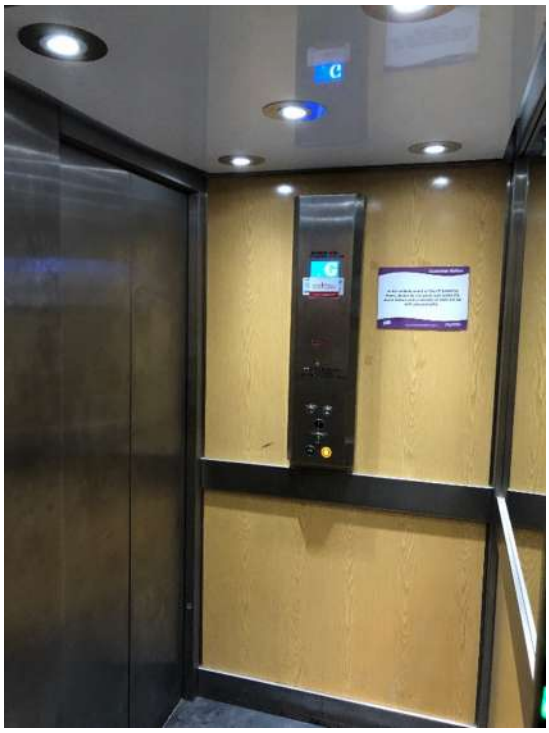

Photo 14: Lift Car

Photo 15: Lift control panel

3. PROPOSED REMODELLING OF M&E INSTALLATIONS & INTERNAL ENVIRONMENT IMPROVEMENT

VENTILATION

3.1 The building is currently predominantly ventilated using a manually openable window natural ventilation approach which from the perspective of external noise ingress from the neighbouring is suitable for the current accommodation. Conversion of parts of the building for use as a public library will prevent the openable window ventilation approach due to excessive noise ingress. Consequently mechanical ventilation systems will need to be incorporated in order to maintain the air quality and temperature of the internal environment within suitable parameters.

3.2 The only location available for the mechanical ventilation air handling plant necessary to provide the required ventilation regime is in the basement, the affected areas of the basement will need improvement in order to house ventilation plant. It is proposed that a low level displacement ventilation approach is adopted to ensure optimum air quality within the treated spaces. Additional mechanical ventilation will be provided to kitchens, toilets etc either through refurbishment of existing installations, replacement or addition of new systems. Where spaces which are currently naturally ventilated can continue to be treated in this manner such as areas of the club mechanical ventilation will not be added.

Photos 16 & 17: Basement areas needing improvement to house ventilation plant

3.3 The sketch below indicates the areas of the basement where mechanical ventilation plant is proposed to be placed together with the routing of supply and extract ductwork required to serve the ground and first floors. The arrangement of bringing fresh air into the air handling plant from outside of the building and discharging vitiated air out of the building requires further development.

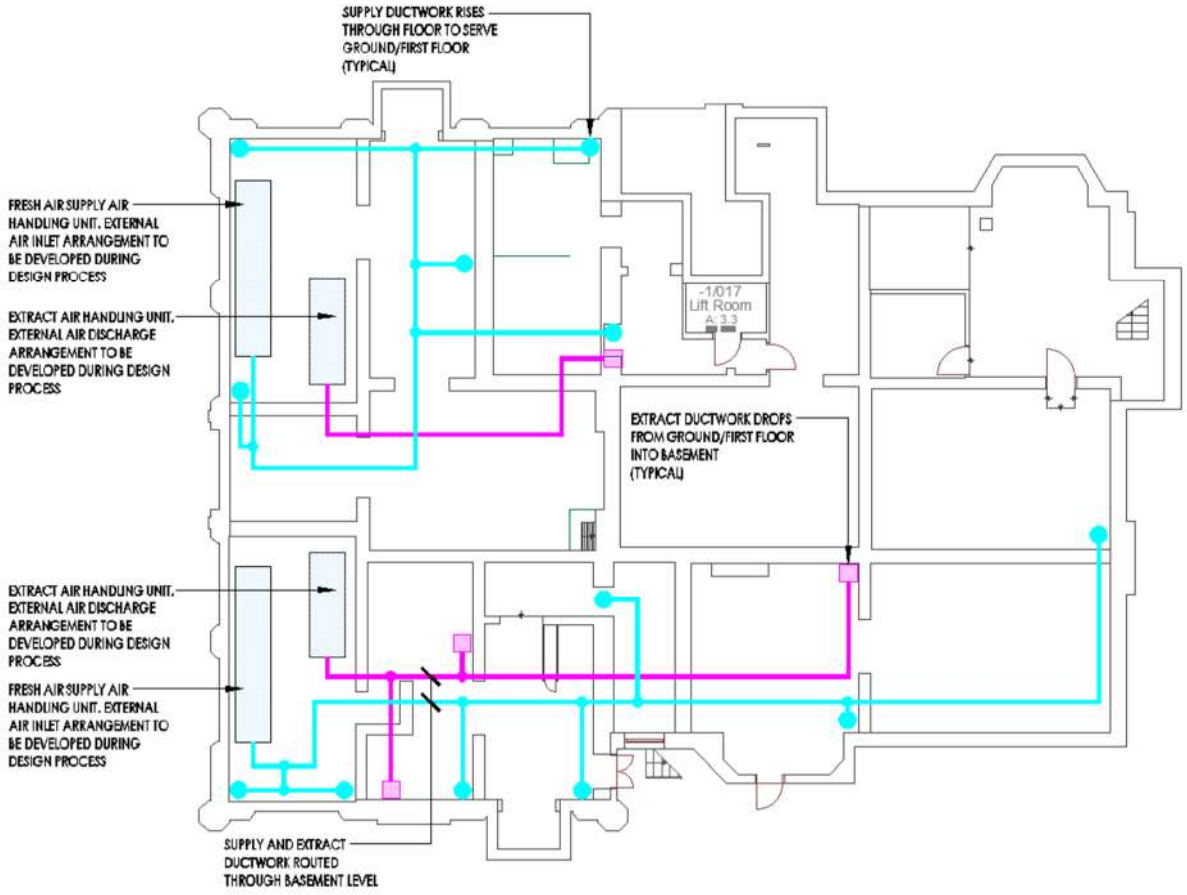

Figure 1: Basement ventilation plant and ductwork routing proposal

3.4 Introduction of fresh air into the mechanically ventilated spaces is proposed to be through low level displacement ventilation terminals with bottom entry ductwork connections. For the ground floor the terminals would be connected through the floor to ductwork routed in the basement. For the first floor the ductwork would need to rise from the basement up through the ground floor, therefore the first floor terminals have been positioned above corners on the ground floor where possible assuming that a boxing out through the ground floor to house rising ductwork could be provided.

3.5 Displacement ventilation terminals are available in a range of shapes, sizes and finishes so there is scope within the design progression stage to select the most suitable arrangement for the spaces served. The images below show the range of terminals available together with an indication of presentation where free standing terminal outlets are appropriate. For the library areas the most suitable arrangement is likely to be to build the displacement ventilation terminal outlets into the low level book shelving systems with a typical face are for the terminal outlets of circa 1m wide by 0.8m high.

Figure 2: Range of displacement vent terminals **Figure 3: Typical freestanding vent terminal**

3.6 The sketches below propose locations for the low level displacement ventilation terminals using Option 4 of the architectural layouts, terminal locations are marked using a red star. The displacement ventilation strategy is particularly suited to the type of library accommodation planned for the Public Hall building as it delivers fresh air directly to the occupants producing an improved internal air quality, does not rely on routing ductwork at high level in the main spaces which would have a visual effect and supports low internal noise levels. Vitiated air would be removed from the spaces at high level using vertically mounted grilles preferably built into furniture or positioned within walls with ductwork connections back to the basement air handling plant. The majority of the space heating requirements would be delivered by the displacement ventilation system except for peak heating periods when the ventilation plant would be assisted by suspended radiant panel heaters fed from the boiler plant. Energy efficiency would be incorporated within the mechanical ventilation systems by the use of heat recovery devices and by varying the volume of air delivered to each space to suit internal air quality and temperature.

3.7 All mechanical ventilation systems serving the building will be provided with automated controls which provide time scheduling together with setpoint adjustment and alarm handling all of which will be remotely accessible.

Figure 4: Ground Floor Option 4 Layout – Proposed Displacement Ventilation Outlet Locations

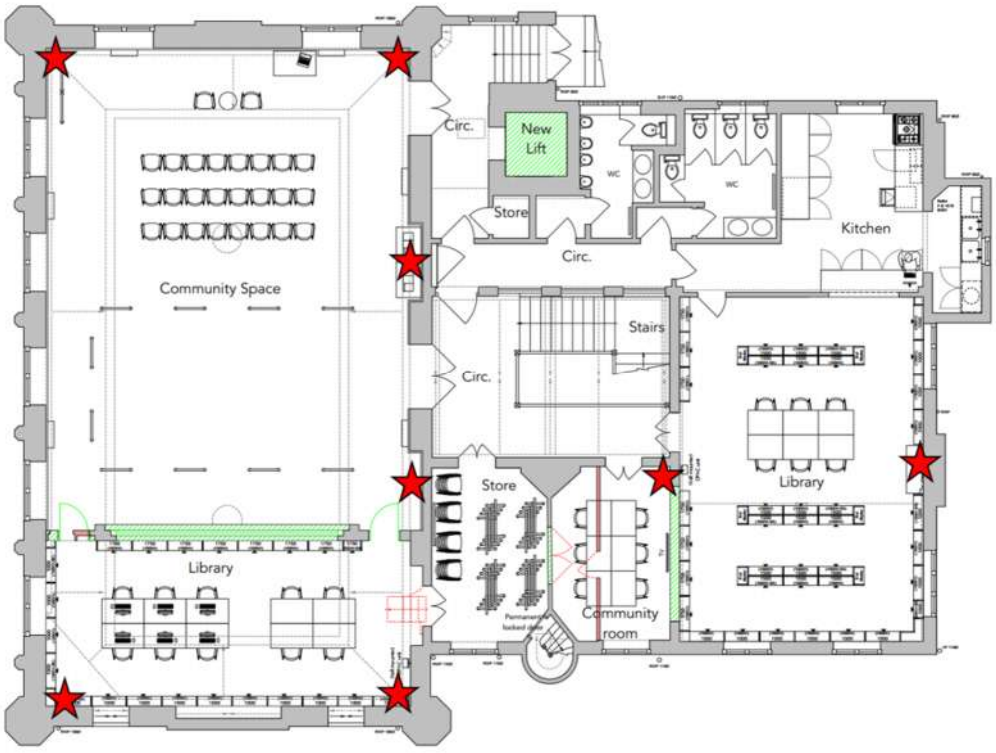

Figure 5: First Floor Option 4 Layout – Proposed Displacement Ventilation Outlet Locations

HEATING

3.8 The existing gas fired boiler plant serves the public hall part of the building, the plant is at the end of its useful service life and requires replacement. A condition survey provided by the client advises that the distribution pumps and ancillary equipment within the heating system are operational.

3.9 The addition of mechanical ventilation to the public library areas increases the heating load to the building which combined with the need to replace the current boiler plant imposes the need to relocate the boiler plant to a larger plantroom which is proposed to be located in the basement. The new and enlarged heating plant is likely to require a replacement to the gas supply to the building and provision of combustion air together with a route for boiler flues preferably to roof level require further investigation within the design development stage.

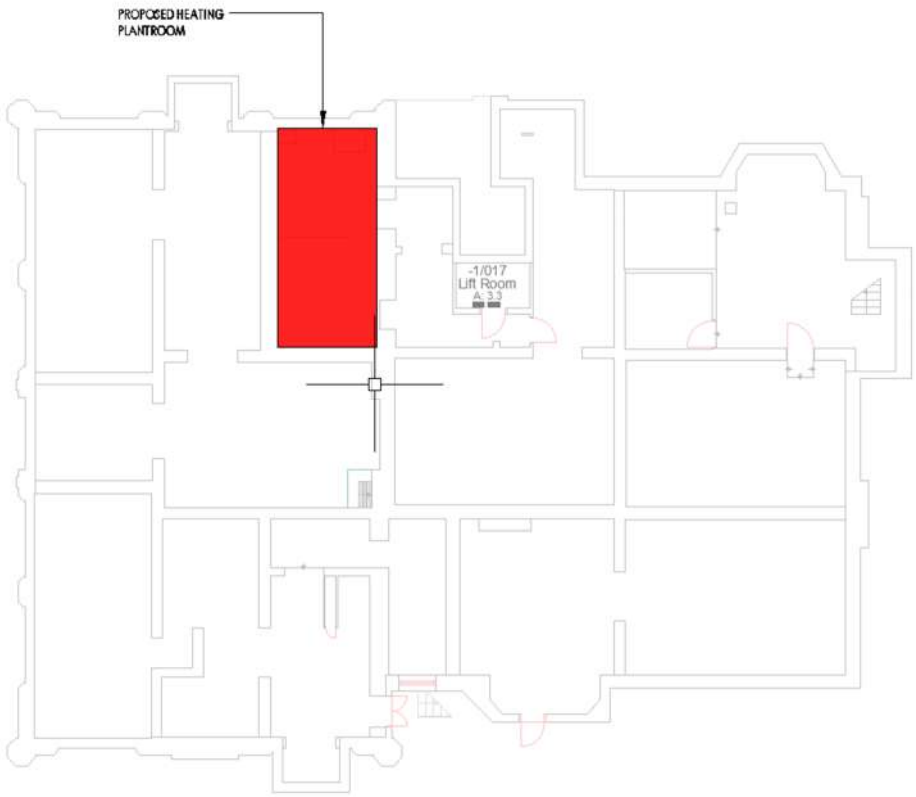

Figure 6: Proposed basement heating plantroom relocation

3.10 Heating distribution to the building is currently provided by perimeter fan convector heaters which are not suitable for a library environment due to noise pollution and the units are approaching the end of their useful life expectancy. Consequently the existing heating system shall be replaced throughout with a combination of heating provided through the mechanical ventilation system, wall mounted radiators and suspended radiant panels which could be integrated with new lighting installations. The existing exposed low level pipework distribution detracts from the aesthetic appearance of the accommodation, restricts flexibility in use of spaces and presents a risk for building users. The proposed replacement heating system will improve on the existing exposed

pipework distribution by removing the extent of room mounted heat emitters by heating through the mechanical ventilation systems and placing heat emitters at high level.

3.11 Additional control will be introduced to ensure the heating plant operates efficiently, allows for automated setting back during periods of low use and is provided with local room control to ensure that energy consumption is minimised. This control facility will also enable remote time scheduling, alarm handling and set point adjustment.

DOMESTIC WATER SERVICES

3.12 The domestic water demand within the refurbished building will not vary significantly from the existing demand and consequently there appears to be no requirement to change the direct mains fed cold water distribution to the building. This approach however does not address the risk of interruption to the mains water supply to the building which would take toilet and kitchen facilities out of use. Removing this operational risk would require the introduction of cold water storage tanks which imposes significant additional maintenance activity to ensure new health and safety risk is not introduced. The feasibility study does not allow for he introduction of cold water storage tanks or consequently the removal of the operational availability risk on the building.

3.13 The strategy within the existing building of using point of use water heaters, either gas fired or electrically heated, for the provision of domestic hot water is appropriate to the remodelled accommodation. Consequently electric in-line point of use water heaters will be provided to wash hand facilities within toilets and gas fired water heaters provided within the main kitchen facility as the current provision.

ELECTRICAL PRIMARY INFRASTRUCTURE

3.14 The main electrical switchgear being located within the entrance lobby of the Public Hall is not ideal but currently operational and cost prohibitive to relocate. Consequently the main electrical switchgear will be retained in its current position and overhauled where necessary to bring it in line with current wiring regulations with metering incorporated where beneficial.

3.15 The proposed remodelling of the building warrants replacement of the submains distribution together with provision of new distribution boards and outgoing ways to small power and lighting circuits. The new distribution boards will be zoned to suit the use of the building and provided in suitable secure and internal locations, the quantity of distribution boards together with demarcation of zones served will be determined in the design development stage.

SMALL POWER DISTRIBUTION

3.16 The use of computer and electronic equipment within public library and community use accommodation has escalated over recent years and it is important to provide sufficient appropriately located small power outlets which can cope with flexible use of the accommodation. Provision of small power outlets will need to be arranged to co-ordinate with furniture located remote from the perimeter of rooms which will be a challenge in the main hall areas especially where retaining existing floor finishes is

important. The preference in this situation would be to serve floor recessed power outlets from below. Where desks requiring power outlets can be located around the perimeter of rooms this will simplify power delivery by the use of wall or dado track mounted outlets.

3.17 Any specialist IT or audio visual equipment proposed for use in the remodelled building will be reviewed and provided with the appropriate type and rating of small power supplies. This will include any specialist book management equipment.

LIGHTING

3.18 The existing general lighting systems installed throughout the building are outdated, poorly controlled and not energy efficient. Consequently the refurbishment works will be based on providing new lighting installations which shall include daylight linking enabling automatic dimming of luminaires when there is sufficient daylight distribution and the use of LED low energy fittings where possible. Where appropriate absence detection will be incorporated which shall automatically dim or turn off lighting to spaces which have not been used for a predetermined period which shall further reduce energy consumption.

3.19 A number of chandeliers are provided to key spaces within the building which are to be retained and refurbished, where possible to incorporate the use of low energy lamps. The chandeliers will be integrated into the general lighting scheme.

3.20 A number of areas are required to have enhanced lighting provision to aid the aesthetic effect, these are shown on lighting look and feel plans produced by Bisset Adams.

3.21 A co-ordinated approach for delivery of general lighting, heating system radiant panels and acoustic absorption panels is required within the main hall areas. A multi-service raft approach, a typical example of which is shown in the image below, is proposed which co-ordinates all of these elements together into a single unit which can be suspended below the existing ceilings in order to reduce visual impact. This regularised approach to provision of light fittings enables suitable distribution of light through a combination of downward and upward directional lamps providing suitable lighting levels and uniformity whilst enabling daylight linking especially for fittings located near to window walls.

F **Figure 7: Multi-service suspended raft in use**

Figure 8: Typical multi-service raft

3.22 Provision of energy efficient light fittings together with addition of automated dimming and timed or absence control will provide a significant reduction in energy consumption compared to the current building.

MISCELLANEOUS ELECTRICAL SYSTEMS

3.23 A new access control and intruder detection system will be provided to the complete building as part of the refurbishment works.

3.24 The existing fire detection and alarm system is not suitable for the change of use of the building and will therefore be replaced throughout.

3.25 Telecommunications and data installations will be provided as part of the refurbishment works to deliver a specific client brief which shall be established through consultation in the design development stage.

PASSENGER LIFT

3.26 A new passenger lift will be provided as a direct replacement of the existing lift. The new lift will provide a larger car which is suitable for both wheelchair access and other community access requirements. The lift shaft will require enlargement to accommodate the larger lift and the new lift shall be provided as a motor-room less arrangement with the lifting gear located in the shaft and control panel provided on the first floor adjacent to the lift.

3.27 The specification of the size and finishes to the lift car will be determined in the design development stage.

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