POST OCCUPANCY REVIEW REPORT

CENTRE FOR BIOMOLECULAR SCIENCES

MAY 2009

Post Occupancy Evaluation of the Centre for Biomolecular Sciences
For the University of Nottingham

1. Introduction

QTC Projects were appointed to carry out the Post Occupancy Evaluation following the submission of a proposal letter dated 18 October 2008 to the University of Nottingham, Estate Office Development Director.

2. Scope of the Review

Evaluation Technique

The evaluation was conducted at strategic review stage for Phase 1 (2 – 4 years after handover) and at project review stage for Phase 2 (12 – 18 months after handover). The evaluation was structured so that the same evaluation technique could be used for both phases.

Analysis

Analysis consisted of reviewing all written information received concerning the building together with information collated from the questionnaires and workshop. Particular areas reviewed were:

Purpose and scope of project
Some aspects of the building procurement process
Building user feedback
Stakeholder participation
Project management

Questionnaires

Questionnaires were developed to obtain information feedback from five specific groups:

a) Client
   - Director of CBS
   - CBS Building Manager

b) User
   - a representative sample of 25 users of the building

c) Estate Office Staff
   - Development Director
   - Capital Projects Officer
   - Operations & Facilities Director
   - Senior Building Surveyor
   - Chief Security Officer
   - Senior Engineer
   - Energy Manager
   - BMS Engineer
   - Maintenance General Manager
   - Administration & Business Systems Manager
   - Cleaning Services Manager
   - Communications Engineer
   - Mechanical Design Engineer

d) Consultant Design Team
   - Architect
   - QS/Project Manager
   - Services Consultant
   - Structural Engineer

e) Building Contractor

Samples of the Questionnaires are shown in Appendix 1

Interviews

Interviews were held with the following:

Tim Brooksbank	Development Director
Richard Wigginton	Capital Projects Officer
Barry Chadwick	Director of Operations & Facilities
Owen Roberts	CBS Building Manager

A meeting also took place with representatives from the Operations and Facilities Team.

Workshop

A half day workshop was held on 10 February 2009 (a list of attendees is shown in Appendix 2).

The format for the workshop was a brief presentation by QTC Projects acting as facilitator which included feedback from the user satisfaction questionnaires. The workshop helped to highlight the key issues that had been raised in the questionnaires and interviews which were then discussed and debated.

The information from the workshop provided important comment which has been incorporated into this report.

3. **Building Data**

Name	Centre for Biomolecular Sciences	
Size	Phase 1	3500m²
	Phase 2	5250m²
No of Storeys	3 storeys plus Plant Room	
Occupants	CBS School of Chemistry School of Electrical Engineering School of Humanities School of Mathematics School of Medical & Surgical Sciences School of Molecular Medical Sciences School of Pharmacy	
Types of space	Research Laboratories (including Category III) Offices CT Rooms Staff space Café area Reception 550 seat lecture theatre & foyer	
Start on site	Phase 1	2nd quarter 2002 (14 month contract)
	Phase 2	3rd quarter 2005 (17 month contract)
Date completed	Phase 1	3rd quarter 2003
	Phase 2	1st quarter 2007
Cost		
Construction	Phase 1	£5.79m (build)
	Phase 2	£10.3m (build)
Total	Phase 1	£7.44m
	Phase 2	£12.2m
Funding	University, HEFCE	

<u>Design Team</u>

Architects	Benoy, Newark
QS/Project Manager	Gleeds, Nottingham
Services Engineer	Max Fordham, Cambridge
Structural Engineer	Ward Cole, Nottingham
Contractor	Thomas Fish
Building Contract	JCT 1998 with contractors design portion

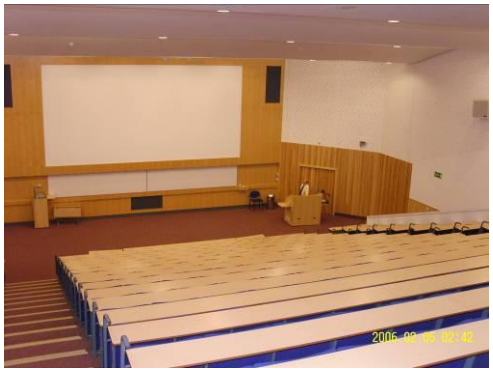
4 Project Background and Description

The aim of the project was to create state of the art laboratory facilities for collaborative and integrated research in a number of fields. It brings together a diverse range of researchers who, traditionally, would not have worked so physically close together resulting in significant operating efficiency, cost and research benefits for the University.

Phase 1 of the project was built on the site of the former Cancer Research Laboratories and part of Clifton 1 building adjacent to the A52 Clifton Boulevard with a bridge link across to the QMC. The footprint of the building is rectangular and provides a much improved frontage to the A52 ring road. Laboratories and associated spaces are located on the north side of the building facing the A52 with sealed and mechanically controlled environments. The south side of the Phase 1 building overlooks a courtyard created by the close proximity of Phase 2. The offices are naturally ventilated.

Phase 2 was developed on a vacant site adjacent to Phase 1 having been cleared of redundant research buildings in 2003. It has no external outlook from the campus and is enclosed on all sides by existing university buildings, namely Coates Building, CBS Phase 1, Manufacturing Engineering and L2 Laboratory.

It was intended that the Phase 2 building would provide flexible laboratory space with associated offices. The building is linked to Phase 1 on all three floors and provides a range of common facilities including meeting rooms and café.



A fully accessible 550 tiered seat lecture theatre and foyer has been provided as a two storey element at the north west corner of the Phase 2 building. It has its own dedicated external entrance and does not share any facilities with the main laboratory. (There is no access from the lecture theatre to the main Phase 2 block.)

Externally, opportunities have been taken to introduce areas of soft landscaping and create a courtyard suitable as outdoor social space in the warmer weather. A water feature has been incorporated into the Phase 1 development and a small number of car parking spaces has been provided.

The project followed the University's capital project procedures with the establishment of a Project Management Group which met at appropriate times to receive progress reports and give approvals for the key stages. The Group was chaired by the Pro Vice Chancellor for Infrastructure and Development and members included:

Director of Estates
Finance representative
Principal client
plus others as and when required

The Capital Projects Officer reported to the Group, supported by the external Project Manager and Cost Consultant.

The Building Project Management Group reported to the University's Finance Committee.

During the course of the projects' development the CBS Building Manager acted as the main point of contact with the client group.

5 User Satisfaction

Building user satisfaction has been gauged from the responses to the questionnaires received and discussions with the CBS Building Manager. Appendix 3 shows a range of bar charts covering the following areas

- Satisfaction with specific room types, ie laboratory, office, lecture room, administrative area, social space and overall impact of the building.
- Security
- Accessibility
- Cleanliness
- Air quality
- Internal room temperature
- Distraction from noise
- Lighting conditions, natural and artificial
- Data connectivity at the workspace
- AV equipment in teaching/lecture rooms

The responses from the limited number of staff and students that returned the questionnaires show a good level of satisfaction, with a range of 83% - 95% satisfaction with the room types. The exception to this was the provision of social space which dropped to 76%.

There is general satisfaction with security and access. The responses to cleanliness vary across the three groups with students being most satisfied. Comments from users on cleanliness were:

Cleaning edge of glass and ledges in atrium could be improved

Toilets get basic cleaning but no one ever cleans door handles, walls, back of toilet and frequently bowl left unclean. Consequently they are fairly horrible places, especially by the end of the day

Floors well cleaned in corridors but lab floors get very dirty

Often hand towels and soap run out in the labs and are not replaced by the cleaners.

I also think the sanitary bins in the ladies toilets need changing more often – sometimes they overflow

The areas where the greatest level of dissatisfaction has been recorded relates to air quality and temperature and this is supported by the level of comments received from users on these issues.

Generally lighting conditions are considered satisfactory but distraction from noise is a problem for 36% of the respondents.

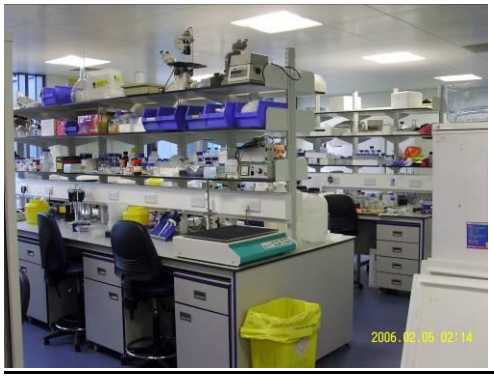
87% of users consider the AV equipment works well and 76% consider data connectivity to be adequate to well provided.

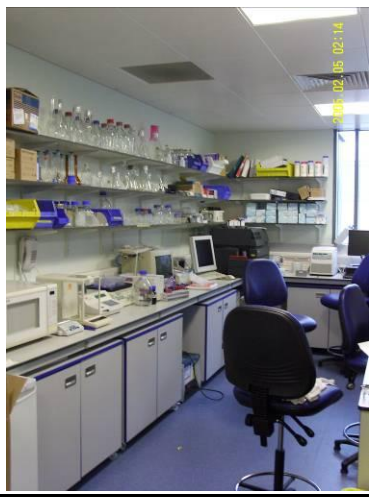
Resulting from the questionnaire responses, interviews and various discussions, a number of issues have been highlighted and were presented at the POE workshop for further discussion/debate. The issues have been grouped under the following headings and considered in more detail in this report.

- Design Issues
- Budget and Cost Management
- Building Performance
- Construction Issues
- Operations and Facilities Issues
- Project Management Role

6 Design Issues

Design of Laboratory Spaces





Comments from the user client have shown that they would have liked a more imaginative and innovative approach to the design of the laboratory spaces and that the architectural team might have benefitted by using a specialist laboratory designer.

It is not clear on what was specified in the original design brief but as the user groups were not known in the very early stages it may have been difficult to identify specific user requirements. A more modular approach to the laboratory design and construction might

have been achieved if more discipline had been imposed on the planning of the spaces with a definitive user brief provided from the start.

Also some laboratory elements were fitted into office designated areas which will have limited flexibility and innovation in design and layout. However, it is accepted that Phase 1 (C floor) was more generic and hence more flexible in use.

Recommendations

Identify where possible, clear user groups for future multi disciplinary buildings at the earliest stage with a clearly defined user brief.

Consider modular design of future laboratory spaces.

Assessment of Occupancy of the Building

It is important that the user brief accurately defines the users and estimate of occupancy together with any reasonable future expansion.

When the current Director of CBS took up his post the initial occupancy of the building had been provisionally agreed.

The University has a clear policy on planning for future growth and includes space requirements in its capital projects to allow expansion over a five year timescale. Any national growth beyond this is not considered cost effective in capital budget terms.

The Director therefore worked with the Estate Office to provide a workable solution which was subsequently approved by the Project Management Group.

Recommendation

Responsibility for determining initial occupancy should be taken on board very early in the project development, particularly for a multi-school building. The Project Management Group should where possible, agree occupancy prior to the final design.

Balancing Architectural Design with Preferred Products/Specification

The architectural brief required a building to be designed of the highest quality and this has been achieved to great effect taking into account the budgetary constraints.

Architects and Design Engineers look to balance innovation and design flair with fitness for purpose when selecting building components. Following design, construction and initial occupation, the building thereafter requires regular and effective maintenance to ensure its longevity. A conflict often arises between development and operations where the latter prefer tried and tested products carefully selected and located to minimise maintenance with the former sometimes preferring design flair and/or products selected to keep within financial budgets.

In discussion with the University's Operations and Facilities Team there were examples

cited of products selected which, if the Team had been consulted, could have advised on their application and suggested more appropriate alternatives (choice of flooring and rooftop materials have been mentioned). One member of the consultant design team shares this view and states that "some earlier communication with the Operations and Facilities Team might have improved the reception of the finished product."

Recommendation

Early involvement of the Operations and Facilities Team is essential and regular dialogue with the Design Team should be established on future projects with a forum for discussion at key stages.

The design team should be made aware at an early stage of any standard specifications and preferred products/components/systems (by use of the Estate Office 'Standard Design & Elemental Requirements' document).

Early involvement of the in house engineers would be advantageous in helping them have a better understanding of the systems and allow a relationship to be established with the Design Team to allay any concerns.

Sustainability and Energy Saving Measures

It was noted that no formal BREEAM assessment was carried out during the design process although the intention was to design to a "very good" BREEAM rating.

There were a number of comments from the user/client relating to the lack of energy saving measures and the missed opportunity of producing a flagship building recognised for its 'green' credentials. However, it should be remembered that technology has advanced since these buildings were designed and certainly the Hefce position on sustainability and building carbon footprint has changed and will impose new sustainable standards for future capital buildings.

The buildings are not without energy saving measures which, according to the Consultant Services Engineer, are generally hidden as part of the building's plant and equipment. Also the value engineering exercise that had to be undertaken at tender stage may have impacted on the extent of energy saving measures that were affordable.

One initiative that has taken place since the completion of the CBS Building is that the University has now established an Environment Committee to promote sustainability and will be vetting future capital building project designs as they come on stream.

Recommendation

In line with Hefce's strategy for reducing the HE Sector's carbon footprint work to achieve a BREEAM rating 'very good' as a minimum standard and consider whether a more formal assessment should be applied.

Ensure that future budgets for capital buildings take into account reasonable whole life costs where possible.

Ensure the University's Environment Committee continues to play a role in the vetting of future capital projects.

Endeavour to ensure cost effective energy saving measures are not 'value engineered' out.

In promoting energy efficiency in the design of new buildings consider the introduction of a design compliance checklist.

Face Blockwork

There were issues with the external face blockwork to the building. At the early design stage the Architect provided visual images of a Forticrete block for use as external stone facing. The actual product that was eventually delivered to site did not accord with the previous images. The stonework product had to be subsequently changed resulting in an increase in cost and a small delay at the start. However the quality of the final product selected is very good with excellent workmanship demonstrated in laying the blocks.

Recommendation

Principal material samples should be sourced and agreed at a very early stage in the project.

The Architect should ensure that visual images portrayed in design presentations are a true reflection of current manufactured products.

Water Feature

The north side of the Phase 1 building incorporates a water feature fronting onto the A52 and runs the full length of the building. Generally the water feature has not performed as intended due to a number of problems associated with its operation.

The level of water in relation to the window sills is far too close and there has been a number of reported water leaks into the building. Modifications have now been made but there is little confidence from Estates and building users in its long term operation.

Recommendation

Similar design water features on future buildings should be carefully considered and poor detailing avoided.

7. Budget and Cost Management

Cost plans were generally higher than the available construction budget (circa 5 – 10%). Tender documents were issued to contractors with a pre tender estimate 5% over budget. This was agreed on the basis that Quantity Surveyors can only accurately estimate costs within a 5% margin and anything within these parameters is acceptable to proceed in order to test the market. Time would have also been wasted and inflation potentially added by delaying the tender issue to work on reducing costs to come within budget.

When tenders were received they were also higher than the pre tender estimate resulting in a value engineering exercise having to be undertaken to bring costs down.

Although this was achieved there had to be a number of compromises in design and equipment at tender stage which the Architect and users would have preferred not to have made. It also resulted in abortive/duplicate work for the Architect.

However the overall approach has provided a very cost effective building which is

believed generally to meet user and University requirements.
Recommendation

Pre tender estimates should be kept within 5% of the construction budget but this policy should be regularly reviewed in relation to the economic climate and inflation current at the time.

Architects and other design team members should allow for an element of duplicate/abortive work. It is part of the design process and unless there are significant design changes, it should be allowed for within their original fee.

Where value engineering has to be applied to a project due to the tendered costs exceeding the approved budget, then careful consideration needs to be given to where cost savings can be made. It is understood that cost savings are prioritised and graded to ensure design compromises are kept to a minimum. This policy should continue. Value Engineering should be applied in any case to ensure best value is obtained.

Life Cycle Costs

Some work was done on life cycle costing in reviewing the longevity of building materials / components and the cost of their future maintenance. Balancing maintenance liability against aesthetics where this is appropriate was also carried out.

Recommendation

Life Cycle costs should continue to be an important part of the whole life costs of a new building.

8. Heating and Cooling of the Building

Heating and cooling for both phases is provided by means of mechanical heating and cooling via air handling plant to the laboratory spaces which have non opening windows.

The offices and common areas are heated from LPHW radiators with ventilation provided from opening windows.

It is university policy not to provide air conditioning to offices.

Probably the greatest number of comments/criticisms of the building relate to temperature control in offices and the level of breakdowns of heating and cooling plant. This comment from a building user is typical:

"*There is a problem with temperature control in offices, especially in summer and this can be extreme on hot, sunny days. South facing offices are worst affected. There is also a problem with excessive direct natural light in these offices. This means that blinds need to be drawn most days, summer and winter and even this does very little to reduce temperature in summer."*

The brise soleil on Phase 2 were omitted as part of the value engineering exercise. Solar blinds have been fitted to offices but these are not considered entirely satisfactory by users.

There were a number of faults identified during handover and early occupation of the building. These related to low flow rates, problems with the chiller units and the need for some separate cooling to be installed.

In Phase 1 there were problems with smells being distributed through certain areas of the building via air intakes. The problem was due to extract air from a Preparation Room being sucked into an air intake which was adjacent to the extract on the roof. This was accepted as a design fault after detailed investigating and testing and as a result the extract/intake problem took a long time to resolve (18 months).

The maintenance call outs have been analysed for 2007 and 2008 and they indicate a high level of breakdown/attendance to mechanical services (Appendix 4).

In 2007 there were 104 faults reported, 66% of which were emergency or urgent (code 1 or 2). In 2008 there were 108 faults reported, 52% of which were emergency or urgent. Overall this equates to an average of 2 call outs for this type of fault per week which for a fairly new building is excessive.

There have been comments that the temperature in the Atrium is below satisfactory comfort levels. Modifications had to be made to the reception counter shortly after handover as no screen had been provided and the receptionist had complained of being too cold due to draughts from the entrance doors.

There is no mechanical means of providing warm air to this large atrium space, the only means of heat being provided by small radiators. Using the space for ad hoc meetings may have been an afterthought but clearly the space has only been designed for background heating.

Recommendations

Consultants appointed on future projects should have robust quality control and design monitoring procedures in place to help prevent post completion modifications having to be made.

The level of faults reported on the Mechanical Services is excessive and this should be further investigated. If this level of call out continues then it is suggested that a commissioning engineer be appointed to carry out a review of the systems installed.

Orientation and location of internal spaces should be carefully assessed in relation to solar gain on future building projects.
Consider providing larger LPHW radiators in the atrium area.

9. Construction Issues

The early involvement of the contractor and positive relationship with the client and consultants has ultimately led to a successful project. However some problems were experienced during construction that need to be highlighted. On Phase 1 the secondary steelwork to the steel framed lift shaft had been missed off the structural drawings in error. (Lift manufacturer not appointed at the time.) This resulted in some delay and extra cost.

This potential problem was overcome on Phase 2 by reverting to a lift shaft of block construction.

A major flood occurred on Phase 1 close to handover. This was due to a burst water pipe that had been tested but subsequently failed at one of the crimped joints. This inevitably caused delay to occupation.

On Phase 2 quality control was improved by marking each crimped joint once it had been checked and tested.

The University has a policy of not appointing Clerks of Works to monitor and check the quality of workmanship on site. The workshop discussion concluded that the contractor's quality assurance procedures negated the need for Clerks of Works. The right contractor's team needs to be appointed to ensure effective working relationships are developed. It worked well on this project, although comments have been made regarding the commissioning stage.

Recommendations

The procedures for appointing contractors appear to work well and should continue, ensuring good working relationships with the contractor are developed along with checking of contractors' QA procedures at tender pre qualification stage.

Closer liaison is needed between structural design consultants and specialist manufacturers with early selection of manufacturers where necessary.

10. Operations and Facilities Issues

There were a number of Operations and Facilities issues raised at the group discussions meeting and at the workshop. The need for early involvement of the Operations and Facilities Team was a key theme running through these discussions which was reinforced in the feedback from the questionnaires received from the Estate Office.

In following capital project procedures the Operations and Facilities Team were keen to stress the need to adhere to established processes and protocols. It was noted that the Project Communication Framework (Appendix 5) has subsequently been created and should be followed on future projects.

The commissioning process did not run smoothly on Phase 1 but was considerably improved on Phase 2. Earlier receipt of maintenance manuals and the ability to record maintenance assets and planned maintenance processes before the occupants moved in would have given a smoother handover.

There has been a lack of clarity of responsibility for building items/equipment and plant still in warranty. The inability to get a speedy response to faults following handover resulted in urgent issues being dealt with by Operations and Facilities.

There were examples of contracts for maintenance being established with different manufacturers following installation of similar specialist systems in Phase 1 and Phase 2. For example the RO Water System in Phase 1 has a different maintenance contractor to Phase 2. Although the Building Manager now has two separate maintenance contracts to deal with, there are valid reasons for this situation.

In this particular case the maintenance contractor on Phase 1 did not perform well and consequently was not appointed for Phase 2.

Helpdesk staff were not shown round when the building was completed resulting in lack of familiarisation/understanding when dealing with calls reporting faults.

There were a number of security issues raised relating to keys and schedules. There appears to have been a lack of consultation regarding the supplier of keys and information on obtaining locks, blanks etc. Key schedules have been difficult to obtain and Security had little control of the issue of keys at handover.

Full room data sheets were developed during the detailed design stage which included room elevations. Gleeds as the Project Manager produced a comprehensive guidance manual for the user client on how to complete the Room Data Sheets.

Recommendations

Re launch the Project Communication Framework and ensure it is followed on future building projects.

The 'Standard Design and Elemental Requirements' document (last updated February 2009) should continue to be followed and is incorporated into Consultants' Schedule of Services.

Commissioning procedures should be reviewed including further development of the Familiarisation and Handover Sheet already introduced. This should include a familiarisation walk round by maintenance helpdesk staff.

Responsibilities during the defects liability period should be clarified between the contractor/subcontractors responsible for responding to faults/defects and the Operations and Facilities Team.

Ensure Operation and Maintenance manuals are provided to the Operations and Facilities Team promptly to ensure maintenance contracts are established at an early stage.

The Design Team should early on in the design process liaise with Security staff to ensure an adequate level of consultation and input is achieved. Procedures should be reviewed for appropriate handover of keys.

11. Project Management Role

Management of a building project with highly complex and sophisticated services, laboratories and multi user clients demands a high level of expertise and leadership from the in house Project Manager.

Evidence from the client feedback questionnaires records a high level of satisfaction of the service provided by the Estate Office with good communication with the user clients demonstrated during the project.

The internal Project Manager's role is a complex one with a key area consisting of communicating/reporting internally and creating the interface between the user client and the consultant design team. The internal Project Manager will also step in to assist in decision making and conflict resolution when necessary.

The University also appoints a Consultant Project Manager on its capital building projects with responsibility for management of the project in liaison with the design team, internal project manager and contractor.

The Estate Office is seen as an educated client with a large amount of embedded knowledge and understanding of what is needed to complete a project at many levels of operation. Evidence from interviews would suggest that there is a lack of clarity of roles of the internal and external project managers, with the internal project manager taking on a more 'hands on' role and the external Project Manager stepping back or vice versa.

Throughout the project there was a good relationship with the CBS Building Manager who provided a effective communication link between user client and the internal Project Manager and the Design Team. Having this single point of contact has been a contributing factor to the success of both Phase 1 and Phase 2 projects.

Recommendations

The roles of the external Project Manager and internal Project Manager should be reviewed and clarified and the Schedule of Consultant PM Services revised, the aim being to ensure tasks are not missed or duplicated and more of the internal Project Manager's time is released to concentrate on other capital projects.

Continue the policy of appointing a client point of contact on future capital projects to aid communication between user client and the Project Manager/Design Team.

12. Summary of Recommendations

Identify where possible, clear user groups for future multi disciplinary buildings at the earliest stage with a clearly defined user brief.

Consider modular design of future laboratory spaces.

Responsibility for determining initial occupancy should be taken on board very early in the project's development, particularly for a multi-school building. The Project Management Group should where possible, agree occupancy prior to final design.

Early involvement of the Operations and Facilities Team is essential and regular dialogue with the Design Team should be established on future projects with a forum for discussion at key stages.

The Design Team should be made aware at an early stage of any standard specifications and preferred products/components/systems (by use of the Estate Office 'Standard Design and Elemental Requirements' document).

Early involvement of the in-house Engineers would be advantageous in helping them have a better understanding of the building systems and allow a relationship to be established with the Design Team to allay any concerns.
In line with Hefce's strategy for reducing the HE Sector's carbon footprint, work to

achieve a BREEAM ‘very good’ rating as a minimum and consider whether a more formal assessment should be applied.

Ensure future budgets for capital buildings take into account reasonable whole life costs where possible.

Ensure the University’s Environment Committee continues to play a role in the vetting of future capital projects.

Endeavor to ensure cost effective energy saving measures are not value engineered out.

In promoting energy efficiency in the design of new buildings consider the introduction of a Design Compliance checklist.

Principal material samples should be sourced and agreed at a very early stage in the project.

The Architect should ensure that visual images portrayed in design presentations are a true reflection of current manufactured products.

Similar design water features on future buildings should be carefully considered and poor detailing avoided.

Pre tender estimates should be kept within 5% of the construction budget but this policy should be regularly reviewed in relation to economic climate and inflation current at the time.

Architects and other design team members should allow for an element of duplicate/abortive work. It is part of the design process and unless there are significant design changes, it should be allowed for within their original fee.

Value Engineering should be applied in any case to ensure best value is obtained.

Where value engineering has to be applied to a project due to the tendered costs exceeding the approved budget, then careful consideration needs to be given to where cost saving can be made. It is understood that cost savings are prioritised and graded to ensure design compromises are kept to a minimum. This policy should continue.

Life cycle costs should continue to be an important part of the whole life costs of a new building.

Consultants appointed on future projects should have robust quality control and design monitoring procedures in place to help prevent post completion modifications having to be made.

The level of faults reported on the mechanical services is excessive and should be further investigated. If this level of call out continues then it is suggested that a commissioning engineer be appointed to carry out a review of the systems installed.

Orientation and location of internal spaces should be carefully assessed in relation to solar gain on future building projects.

Consider providing larger LPHW radiators in the atrium area.

The procedures for appointing contractors appear to work well and should continue,

ensuring good working relationships with the contractor are developed along with checking of contractors' QA procedures at tender pre qualification stage.

Close liaison is needed between structural design consultants and specialist manufacturers with early selection of manufacturers where necessary.

Relaunch the Project Communication Framework and ensure it is followed on future building projects.

The 'Standard Design and Elemental Requirements' document (last updated February 2009) should continue to be followed and is incorporated into Consultants' Schedule of Services.

Commissioning procedures should be reviewed including further development of the Familiarisation and Handover Sheet already introduced. This should include a familiarisation 'walk round' of the building by Maintenance and Helpdesk staff.

Responsibilities during the Defects Liability Period should be clarified between the contractor/subcontractors responsible for responding to faults/defects and the Operations and Facilities Team.

Ensure Operations and Maintenance manuals are provided to the Operations and Facilities Team promptly to ensure maintenance contracts are established at an early stage.

The Design Team should, early on in the design process, liaise with Security staff to ensure an adequate level of consultation and input is achieved. Procedures should be reviewed for appropriate handover of keys.

The roles of the external Project Manager and internal Project Manager should be reviewed and clarified and the Schedule of Consultant PM Services revised, the aim being to ensure tasks are not missed or duplicated and more of the internal Project Manager's time is released to concentrate on other capital projects.

Continue the policy of appointing a client point of contact on future capital projects to aid communication between user client and the Project Manager/Design Team.