

3.0 ENGINEERING PRACTISE REPORT

This section has been divided into two distinct elements. In the first part I have responded directly to the competence criteria detailed in sheet F21. In the second part, I have selected a number of projects that I was responsible for that demonstrate how these competencies were implemented.

A – USE A COMBINATION OF GENERAL & SPECIALIST ENGINEERING KNOWLEDGE AND UNDERSTANDING TO OPTIMIZE THE APPLICATION OF EXISTING AND EMERGING TECHNOLOGY.

Criteria Met

Over the last five years I have developed a particular interest in the application and integration of sustainable solutions, both in terms of the opportunities and constraints of the renewable technologies as defined by the London Plan, but also building integrated design to reduce energy/carbon use in buildings.

A1, A2

Particularly in the current market, viability and "return on investment" are key issues when considering new developments or refurbishments. Similarly the availability of energy, and electrical power, in the City Of London in particular, are also significant areas of concern, both for Developers and the market as a whole.

A1

At my current firm I am part of a small research committee looking at opportunities in regard to Sustainable Infrastructure. The requirements of the GLA for planning are now pushing new schemes of any significant scale down the route of Energy Centre's in one form or another, so I am investigating options for on site power generation, ESCO's, MUSCO's, district schemes etc and the various benefits to Developers etc in respect of :-

A1, A2

- Obtaining Planning
- Capital Expenditure
- Operational Expenditure
- Plant Area Take
- Energy Efficiencies
- Resilience
- Capacity

The Future Sale Of All Or Part Of The Development.

For one major Developer I investigated the possibility to link a number of their proposed sites that were located quite close to each other. This was primarily at the request of the Planners.

A1, A2

However what the exercise indicated at the time was that because the sites in question were already quite large, and had a number of mixed uses, the benefits of energy profiling on each of the individual sites were almost as efficient as when all of the sites were considered together.

A1, A2

Distribution losses, the costs of the installing distribution systems between the sites in London meant that it was not viable at that time. There were also significant problems with obtaining consents for the installation of the district pipe work, and physical constraints of crossing major roads etc.

A2

Another challenge was the question of which of the sites would house the Energy Centre, because it would affect the Net / Gross efficiencies of whichever site it was installed on, would dictate the construction sequence, and would impose a disproportionate cost against the first phases of the Development.

A2

Despite all of these issues, I believe that Energy Centre's, ESCO's etc should provide a major contribution to Energy / Carbon reduction in the future. Energy profiling and sharing reduces energy use, reduces the gross plant required to serve a number of sites, is more resilient, releases capacity and is more adaptable for plugging in future low energy and renewable technologies as they evolve and prove themselves to be viable.

A2

It is likely that a mixture of Private & Public funding will be required to give this type of solution the inertia it needs to develop.

I also have a great interest in the use of software modelling tools to optimize building design, and actively support these techniques for projects that I am involved with. At my current firm I have responsibility of the Energy & Sustainability team as well as an Engineering team, and I work closely with the various teams to ensure that we have the tools to be able to respond to the requirements of emerging legislation.

A1, A2

B - APPLY APPROPRIATE THEORETICAL AND PRACTICAL METHODS TO THE ANALYSIS AND SOLUTION OF ENGINEERING PROBLEMS.

Criteria Met

Because of my practical background I have always sought to propose solutions that are effective and appropriate for the situations they are applied to, and for the people who will use and operate them.

B2

In one of the Career Episodes below I detail a situation where I was the lead engineer on the refurbishment of a shopping centre that removed all of the Cooling and Ventilation plant and replaced them with a naturally ventilated solution.

B2

This required me to measure the current environmental conditions, and to make an estimation of the beneficial heating and cooling from the retail stores that I could reasonably allow in the calculations. This was then fed into the computer modelling of the space to predict the expected temperatures.

B3

At the time computer modelling was fairly new as a design tool, therefore it was necessary to carefully consider and question the inputs throughout the process. When the project was complete and operational, I went back to the site to obtain measurements on a "Design Day" to compare with the original design parameters.

B2

Particularly when developing designs for innovative solutions I believe that it is important to take advice from those who can provide technical input. This may be from specialist suppliers whose equipment is being used in the system, or from contractors etc to ensure that the system is practical, and can be installed in a safe and economic manner.

B1, B2, B3

I value collaboration and feedback throughout the design process, both to ensure that we reach the correct solution through a combination of experience, expertise, innovation, and by challenging the norm. This method also encourages the transfer of knowledge across groups, and the feedback from the operational building to feed into future designs.

B2, B3

I also ensure that on all of my projects that audits are undertaken at all of the key milestones to ensure that they are technically correct, but also to ensure that we have the correct philosophy in respect of the assumptions we have made to develop the brief.

B3

My role as a director also requires that I get feedback from the client and to disseminate this information through the company.

B1, B3

More recently I have been investigating opportunities for post occupancy reviews, and in some way to link our fee to the actual performance of our design

B3

C - PROVIDE TECHNICAL AND COMMERCIAL LEADERSHIP

Criteria Met

As Director of the West End office, I have responsibility for all of the technical and commercial aspects of the projects that are undertaken within the office, and the overall commercial profitability of the office.

C1, C2, C3

Quality is maintained through training, staff development, recruitment, communication and auditing. My role is to ensure that everyone is aware of their position in the team and their specific responsibilities, and to ensure that they are clear that quality in both the design and the delivery of the project is an imperative.

C1, C2, C4

Building a team is about blend as much as skills therefore I always look at people's technical ability, AND how they will fit into the team. Energy, commitment and ownership are also essential qualities.

C2, C3

I am responsible for Business Development for the office, both maintaining existing clients, and the development of new clients, and for recognising and developing new opportunities, fee proposal, interviews and appointments.

C1, C3

In the current market, getting fee proposals right is very important. This means not just the financial value, but also the make up, and the supporting information such as the team, the approach, and the value we can bring to a project over and above our competitors.

C1, C4

At the last practise I was with I helped develop a new Fee Proposal document that addressed all of these issues and gave the framework for the author to add value to each proposal that responded specifically to the project.

C1, C2, C4

I also ran a series of seminars / workshops, based on material that I developed that set the company's expectations for the ways staff could enhance the company's reputation and the quality of both the delivery of the product and the service.

C3, C4

For example, the workshop focussed on Client meetings, and required the attendees to ensure that they were prepared for the meeting, had satisfactorily dealt with all of their action points from the last meeting, and that everyone was aware and satisfied with the results.

C1, C3

I also suggested that they need to consider the quality of the information that they provided, were aware of the issues relevant to the project, ensured that they had items which they need to get from the meeting and did so, that they arrive a little early and not rush off to quickly at the end, and to take the opportunity to engage clients and fellow professionals.

C1, C3

This was only a small part of the workshop which I delivered in details to over 60 of the company's most senior staff, and in a summarised version at the Staff Conference.

At my current Practise I manage projects through a series of meetings, and project milestone. At the regular Monday morning meetings I review with the senior staff and "Key Account Holders" the status of all of the projects and the resources required in the forthcoming weeks / months. We discuss project issues and key deliverables.

C3, C4

For new projects I require, and often Chair a "Project Launch Meeting" at which all of the staff involved in the project meet to discuss the scope and timing of the deliverables, review to ensure we have the correct level of expertise and skills available, and that the project is planned from start to completion.

C2, C3

Commercial matters are also dealt with at this meeting so that everyone is fully aware of the level of input required and to manage profitability.

C2, C3

On a monthly basis I Chair Practise Meetings which everyone in the office attends and we update them on financial, resource and technical issues, and Board Meetings in which we review corporate issues relating to finance, training, appraisals etc.

C2, C3,
C4

D - DEMONSTRATE EFFECTIVE INTERPERSONEL SKILLS

Criteria Met

I believe that effective communication is one of the key skills for success. My style of management is regular honest and open communication to ensure that everyone knows what they are doing and what is expected from them, but still leaving room for growth and autonomy.

D1, D3

I have always enjoyed the role as mentor, and assisting with staff development. This requires time to regularly meet with the people, to give direction, guidance and feedback.

D1, D3

In my experience, particularly with the various appraisal systems that I have been involved with, many people seem unwilling to give any feedback that is not positive, perhaps because they are concerned that it will be taken as criticism.

D1, D3

This is often not the case, and can be more damaging than beneficial. People need honest feedback on what they are good at, but also area's in which they can improve their performance, and I believe therefore that appraisals need balance in this respect.

D1, D3

At my last company I held monthly meetings for all of the "Specialist Groups" (Architectural Lighting, Acoustics, Fire Engineering, FM etc) to help them help themselves with raising the awareness of their specialism, both internally and externally so that they could raise the profile of the service and increase sales.

D1, D2, D3

I held monthly workshops which they all attended, and then individual sessions. During the group sessions I asked them to look at their strengths and weaknesses, both in terms of their ability to effectively communicate their product and be able to sell it, and also the collateral, such as presentation material, Intellectual Property etc.

D1, D2, D3

Because the various members were at different stages in their development the individual meetings were to assist those who needed more guidance and coaching.

I then arranged, through the business, opportunities for them to meet with fellow professionals and clients, at Business to Business Meetings or presentations, so that they could develop their style in a supported environment.

D1, D2, D3

I undertook a similar exercise with my fellow Directors when I introduced a "Sector Champion" campaign within the practise, with each of the Directors being given a sector to champion. Again some took to this better than others, and needed guiding and coaching.

D1, D2, D3

Communication, at all levels is, I believe one of my key skills. Client Relationship Management is a role that I have worked in for the last six years, maintaining existing client relationships, as well as developing new ones.

D1, D3

Whilst the processes and approach I use is often similar, the client bodies I deal with all require bespoke attention. My approach is to initially research as much as I can about the company and the individuals to establish their main objectives as a business, but also as individuals.

D1, D2,
D3

Then to meet with the clients to try and agree methods in ways that we can implement the strategy in a mutually beneficial way.

D1, D2,
D3

I am also currently involved with the Better Buildings Partnership on their Sustainability and Owner Occupier committees, and on the British Council of Offices Sustainability Committee.

D1

E – DEMONSTRATE A PERSONEL COMMITMENT TO PROFESSIONAL STANDARDS, RECOGNISING ONE'S OBLIGATIONS TO SOCIETY, THE PROFESSION AND THE ENVIRONMENT

Criteria Met

Career development is critical to the success of a company or Business unit. I believe that one of my most important duties as a Director is the development of my staff. I achieve this through both formal and informal training and mentoring.

E3, E4

Formal training is essential to ensure that the staffs specific career development requirements and the skills needed to achieve the companies overall objectives are aligned. I review these at Monthly Board Meetings for my office.

E1

The proliferation of emerging legislation requires a significant amount of training, much of which, such as the registration of engineers to undertake EPC assessments, BREEAM Assessments, etc require staff to demonstrate a level of competence prior to being awarded certification that allows them to offer the service.

E1, E3

I have therefore developed a skills matrix that records and monitors these requirements so that we are able to respond appropriately. The matrix also looks at individual's specific expertise. This is often either sector based, or perhaps some particular area of expertise they have gained through project experience such as a CHP project.

E4

Safety is another important element of what we do, particularly for staff that visit building sites, or plant rooms etc.

E2

As far as possible I will always seek to design out dangers, or hazards, however this is not always achievable, so I encourage staff to look for ways that mitigate any potential hazards, and ensure that they are well documented and managed.

E2

I ensure that all staff attend the appropriate courses and inductions before going onto a site, and ensure that they are fully aware of any dangers. Younger staff are required to be accompanied until such time as they are experienced and more aware of hazards.

E2

In my introduction I refer to the emerging role of the Building Services Engineer due primarily to issues surrounding climate change. I regularly share my view with other engineers, and particularly the graduates in the office.

E3, E4

I have been fortunate to work on some great projects, with some of the biggest Developers, and famous Architects, which I believe, has not only helped me develop technical skills and my career, but has also contributed to my personal growth and development.

E1, E3

CAREER EPISODES

In this section I have focussed on three projects on which I had a high level of responsibility, and highlighted some of the competencies "in action "

THE REFURBISHMENT OF [REDACTED]

Criteria Met

The client was a leading London based Property Developer. They had recently purchased the [REDACTED] which dated back to the 1960's and was typical of its time in that it comprised of long covered Malls, with a large central atria, and small feeder malls providing access to the main shopping areas, and was in need of extensive updating and remodelling.

My role for this project was as Associate and Project Co-ordinator. This required me to have full technical and financial responsibility. I was also responsible for ensuring that the project was adequately resourced and managing the quality and client relationship management.

C1, C2

Therefore in conjunction with one of the Partners I prepared a fee proposal against a specific set of Employers Requirements, and then prepared and presented a Power Point presentation to the Client at the interview.

B2, C1, C2

I then produced a resource schedule for the project, based on the construction programme, and I then monitored the planned resource and associated expenditure against the actual.

C3

The clients objectives were to refurbish and modernize the Landlords area's of the centre, and to create additional retail space, either by creating new space or by remodelling some of the existing area's. In doing these we also had to reduce the energy used in maintaining environmental conditions and thereby reducing service charges.

B2

The key objective was to more closely align the internal conditions with the external conditions, whilst maintaining an acceptable environmental for visitors.

A1

The existing centre utilised a central MTHW district heating system situated adjacent to the entrance of the site, and 9no Plant rooms which were at service deck level above the mall roofs.

Each plant area consisted of an air cooled chiller, an air handling unit, and an REC sub station. The scale and location of these plant areas restricted the amount of natural day lighting that entered the malls.

Part of the Refurbishment works necessitated the existing glass roofs being replaced. We saw this as an opportunity to redesign the environmental control systems to create an environment that was naturally ventilated, and therefore I initiated a series of calculations that demonstrated how increasing the height of the new roof would increase the stack effect and produce more effective air circulation through the malls.

B2, B3

We identified at the outset that the only way we could be sure of accurately predicting the likely internal comfort conditions within the Landlords areas was to utilise Computational Fluid Dynamic computer modelling to predict both the environmental and day lighting conditions for the proposed design, and Dynamic Thermal Modelling to predict performance across a year.

B2, B3

In the first instance detailed calculations were carried out to determine if natural ventilation was a realistic option.

A2

These indicated that, given the correct conditions, natural ventilation could achieve adequate conditions within the malls.

A2

It was firstly necessary to agree with the client acceptable design parameters for the design. The client acknowledged that visitors to the centre would be prepared to accept conditions that tracked the external weather conditions, provided that the internal comfort conditions were acceptable.

Therefore, I, in conjunction with the Architect, developed questionnaires for customers and retailers to test this hypothesis, and the feedback was that customers would accept variable conditions on the basis that they did not expect to remove, or add clothing when they entered the centre because the internal and external conditions and temperature were very different.

A2, B2,
C1

Having determined the new height for the roof mall, which was optimised to induce "stack effects" within the malls, we determined that the following would also be required to create the correct environment:-

- The entrance doors to the malls would need to be automatically controlled to allow air movement when external conditions were adequate.
- Openings were required along the length of the malls and in the central atria to induce air movement taking advantage of the stack effect. These would also double for smoke clearance.
- Beneficial heating and cooling into the malls from the adjacent shop entrances could be included within the simulations. (At the time we allowed for the benefit from 50% of the shops which had entrances that opened directly onto the main malls.).
- The new roof would be glazed to maximize daylight penetration, but would be a high performance product to combat solar gain.
- Five of the nine plant rooms would be completely removed, and the other four reduced in size to increase the glazed roof area.

Computational simulations were then run using the following operational hierarchy:-

A2

1. When external temperatures are low, all of the entrance doors and roof openings are closed.
2. As the external temperatures rise, the doors open as do the roof openings.
3. As temperatures further rise the roof mounted fans begin to operate to induce further air movement.
4. As external temperatures approach design doors and roof openings close and the fans shut down.

The predicated environmental conditions were then determined and presented to the client for approval, which was achieved.

D1, D2

These works were then designed and detailed for the tender process, and the Main Contractor was ultimately selected on a Guarantee's Maximum Price contract.

The construction process involved two phases, and all of the works, including the utilities were undertaken whilst full trading continued.

12 months following practical completion, we attended site on a summer design day to measure temperatures within the mall and found them to be within 1 deg C of the design.

B3

LONDON

**Criteria
Met**

The client was a leading London Developer. The site is on the borders of the City of London and Hackney with open cut railway lines in the South West corner.

A2, C1

The proposed development comprises the following elements:-

- A 40 storey commercial office tower of circa 650,000ft²
- A 12 Storey commercial office building of circa 150,000ft²
- A 50 storey tower consisting of mainly private residential, with some serviced apartments and a four star hotel at the base.
- Two affordable accommodation blocks, one 12 stories and the other nine stories.

These were all constructed over a single, common basement.

My involvement in this project was as the Director with overall responsibility to the client for their projects. Therefore I submitted and agreed the fee proposal and stage payments, negotiated the scope and content of the appointment documents, managed the resources for the project, both in terms of quantity and skills requirements.

**A2, B1,
B2, C1,
C2**

The scope set by the client required a highly innovative response to the challenges, particularly in terms of the approach to Energy and Sustainability, therefore my team comprised engineers with a significant input from the Energy and Sustainability and computer modelling teams, all which I managed and co-ordinated throughout the Concept phase of the design.

A2

The client's aspirations/targets were:-

- To meet or exceed the requirements of the London Plan (20% Renewables)
- To exceed the requirements of Part L by 50%
- To achieve BREEAM Excellent and target Outstanding
- To achieve CFSH Level 4

A2

However, they were keen to achieve these targets using methods that actually reduced energy / carbon uses, as opposed to simply achieving planning targets. It was necessary therefore to provide solutions that responded to this brief.

The first challenge was to persuade the client to accept the principal of an on site "energy centre", that took advantage of the differing energy profiles of the building uses to reduce the overall peak and to share waste energy.

B2, C1

The challenge was not that the client did not recognise the benefit, but had reservations concerning their ability in the future to sell on the individual elements. They also had concerns that this solution would front end load the capital cost of the first building to be constructed. By demonstrating that the energy centre would be located in a common area, that the services could be arranged so that each building would be stand alone from the ground floor slab, and that the components could be added as the development progressed allayed these concerns.

B2

By also highlighting the benefits in energy saving, reduced capital and running costs, reduced overall plant areas, higher levels of resilience etc, the client ultimately was so convinced that we undertook a further study to assess the viability of connecting to other sites that the client owned in the immediate vicinity.

B2, C1

To achieve the client's aspirations it was necessary for us to utilise the latest leading edge software to assess the impact of the shape and orientation of the massing design against the prevailing microclimate, and in terms of the solar path of the sun around the development.

B2

This allowed us to suggest ways in which the building could be altered to improve its overall environmental performance.

These simulations also provided us with information that assisted with the design of the façade, the clear glazing to solid ratios which were assessed elevation by elevation, where it may be suitable to introduce openings into the façade to facilitate some level of mixed mode ventilation, daylight penetration, shading from adjacent buildings etc.

B2

The results of these findings were refined and then combined with the outputs from the BREEAM / CFSH predictions and the Part L analysis results to contribute to the overall Energy Strategy for the development that was included as a key element of the Planning Submission.

B2

STRATFORD

**Criteria
Met**

Our Client for this project was Lend lease, and we were appointed as the designers on three of the 12 storey Mansion Blocks. The original appointment was to design for the "Legacy" phase, IE for commercial private and affordable apartments for sale or rent, but we were later to have our appointment extended to incorporate the "Olympic Overlay" for the layout that was to be used for the Athletes Accommodation during the Olympic Games.

My role was Director with overall responsibility to the Client for the delivery of the Building services design, and included all commercial aspects such as submitting the fee proposal, attending interviews, agreeing the payment schedule, the appointment documents etc. Due to the number of stakeholders involved in the project the appointment document and associated scope of services was extremely complicated to resolve.

**C1, C2,
C3**

I also attended Client Liaison Meetings and Principals meetings throughout our involvement with the project.

C3

In all there were 17 Mansion Blocks to be constructed, and therefore there were a number of consultants appointed. We, along with one other were the first Building Services Consultants to be engaged on the project to commence the design of one Mansion Block.

The Client was keen to ensure that the brief we had received was properly interrogated and reviewed, both for technical correctness and to ensure compliance with their contractual obligations.

We agreed that this would be best achieved by close collaboration with the other consultants to ensure we achieved the most effective outcome. In practise this was executed by each consultant over viewing a particular, but separate element of the brief. We then met to review each others findings, and to agree a common approach.

B1, B3

Whilst this worked very well, each plot had its own Design Team and its own Client / Contractor team, therefore each plot tended to have minor variations on the design approach.

The original intent was that our client would effectively be the developer for the plots, however, due to the financial climate, this proved not to be the case, and the role of client ultimately fell to the ODA, with our immediate Client becoming, in effect, the Development Manager.

The changing financial climate also instigated wide spread changes and "Value Engineering" exercises across the various plots.

C3

To manage these, I, along with my Project Associate spent a large amount of our time looking at the effects of these changes, both on the design and programme, but also our associated fees.

C3

Because the Client had no change control process in place, we developed a system that captured all changes to highlight the effect on the:-

- Design
- Build ability
- Programme
- Lead in periods
- Our Fee's

And this was used at regular meetings to assess the impact of the changes.