

SCSI Professional Guidance

Design and Specification

Guidance note

1st edition



RICS®

Design and Specification

Guidance note

1st Edition

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Contents

	Page
Acknowledgments	5
SCSI/RICS guidance notes	6
1 Introduction	8
1.1 The appointment	8
1.2 Cost management	9
2 Design and the lead consultant	10
2.1 Design philosophy and responsibilities	10
2.2 The common threads: Compliance, sustainability and safety	11
3 Principles behind the role	13
3.1 Strategy and project definition	13
3.1.1 Resourcing and risk	15
3.1.2 Designer engagement	15
3.1.3 Risk management	16
3.2 Monitoring, measurement, analysis and review	17
3.3 The cost manager	18
4 Design process management	19
4.1 Documentation: giving definition and meaning	19
4.2 Standardisation and project integration	21
4.3 Building Information Modelling (BIM)	21
5 Establishing the project	24
5.1 Project briefing in practice	24
5.2 Feasibility	25
5.2.1 Project options	26
5.2.2 The scope of investigations	26
5.2.3 Data validation	27
5.2.4 Change control	27

		Page
6	Outline design and specification	29
6.1	Risk and uncertainty in practice	29
6.2	Contingency management	30
6.3	Implementing change control	30
6.4	Legislative compliance	31
6.4.1	Planning and Development Acts	31
6.4.2	Public health (Building Regulations)	32
6.4.3	Safety Health and Welfare at Work (Construction) Regulations	32
6.4.4	Control of Asbestos Regulations	33
6.4.5	General legislation	33
6.5	Design presentation and ownership	33
6.5.1	Design presentation	33
6.5.2	Design ownership	34
6.6	Review and the design report	35
7	Preparing for detailed design	36
7.1	Prescription or performance	36
7.2	Expressing quality; verifying design	37
7.2.1	Nominated material and product quality	38
7.2.2	Third party testing and certification	39
7.2.3	Supplier warranties and guarantees	39
7.3	Design method review	41
8	Design production	42
8.1	Scheduling of works	43
8.1.1	Scheduling forms	44
8.1.2	Bill of Quantities (BOQ) and measurement standards	44
8.2	Working (or production) drawings	45
8.3	Reviews and audits	46
9	Towards building occupation	47
9.1	Construction and commissioning	47
9.2	Facility management	48
9.3	Life cycles and performance feedback	49
Bibliography		49
Appendices		51
Appendix 1 : Lead consultant services		51
Appendix 2 : Briefing agenda		55
Appendix 3 : Initial design review		56
Appendix 4: Design change request		60

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SCSI/RICS Guidance Note

This is a guidance note. Where recommendations are made for specific professional tasks, these are intended to represent 'best practice', i.e. recommendations which in the opinion of approving professional bodies meet a high standard of professional competence.

Although members are not required to follow the recommendations contained in the note, they should take into account the following points.

When an allegation of professional negligence is made against a chartered surveyor, a court or tribunal may take account of the contents of any relevant guidance notes in deciding whether or not the member had acted with reasonable competence.

A member conforming to the practices recommended in this note should have at least a partial defence to an allegation of negligence if they have followed those practices. However, members have the responsibility of deciding when it is inappropriate to follow the guidance.

It is for each member to decide on the appropriate procedure to follow in any professional task. However, where members do not comply with the practice recommended in this note, they should do so only for a good reason. In the event of a legal dispute, a court or tribunal may require them to explain why they decided not to adopt the recommended practice. Also, if members have not followed this guidance, and their actions are questioned in an SCSI/RICS disciplinary case, they will be asked to explain the actions they did take and this may be taken into account by the Panel.

In addition, guidance notes are relevant to professional competence in that each member should be up to date and should have knowledge of guidance notes within a reasonable time of their coming into effect. This guidance note is believed to reflect case law and legislation applicable at its date of publication. It is the member's responsibility to establish if any changes in case law or legislation after the publication date have an impact on the guidance or information in this document.

It is the member's responsibility to be aware of changes in case law and legislation since the date of publication.

Document status defined

SCSI and RICS produces a range of standards products. These have been defined in the table below. This document is a guidance note.

Document status defined		
Type of document	Definition	Status
SCSI practice statement	Document that provides members with mandatory requirements.	Mandatory
SCSI code of practice	Standard approved by SCSI, and endorsed by another professional body that provides users with recommendations for accepted good practice as followed by conscientious practitioners	Mandatory or recommended good practice (will be confirmed in the document itself)
SCSI guidance note	Document that provides users with recommendations for accepted good practice as followed by competent and conscientious practitioners	Recommended good practice
SCSI information paper	Practice based information that provides users with the latest information and/or research	Information and/or explanatory commentary

1. Introduction

This guidance note sets out to provide surveyors and other professional practitioners with a source of information and best practice guidance relevant to the tasks and processes of design and specification for construction projects.

Best practice is considered from project inception to the end of a detailed project design stage, with frequent reference to how practice during these early stages will impact on later project activity and the performance of the built asset at occupation and throughout its life cycle.

This publication is intended for sole practitioners, as well as members of a larger professional project team. It describes how the diversity of modern design and specification practice has led the need for a lead consultant role in small rural or domestic project environments. A lead consultant is defined for this publication as a project manager, building surveyor managing a multi-disciplinary team.

It is not intended to cover those projects with the following:

- complex design or high value specialist services
- significant contractor led design
- management style packaged or project management led contracts

1.1 The appointment

The guidance assumes that the lead consultant appointment is secured from the project inception. One very practical challenge facing many practitioners in today's professional market place comes from the client who seeks to instruct only after having first instructed others in the design and specification process.

Surveyors wishing to act as the lead consultant should thoroughly review the information on which the appointment might subsequently depend. Issues relating to design ownership, established briefing content and other committed undertakings, should be considered.

The lead consultant role may involve one or more of the following key characteristics:

- the client's main point of contact
- participation throughout the project life cycle
- a designer; or
- a design manager who procures the bulk of the project design through sub-consultant design services.

The broad range of professional service undertaken by a lead consultant is a reflection of the diverse nature and scale of Ireland's construction projects under their commission. This is illustrated by the specific tasks highlighted in Appendix 1. Some of the tasks listed have been extracted from 'A Clear Guide to Chartered Building Surveyors'. This consumer guide is available for free downloading on www.scsi.ie.

1.2 Cost management

Cost estimates, budgets and financial control underpin much of the strategic and tactical decision making in design and specification practice. Detailed cost management guidance is not however, covered here.

While acknowledging financial advice provided by the lead consultant is implicit in best practice, this guidance focuses on substantive technical design and specification processes. The reader is encouraged to assimilate the guidance given here with reference to other specific cost management practice guides available from the SCSi website.

Further reading is highlighted in the bibliography.

2. Design and the lead consultant

The task of designing and the process of design in the modern era of construction is an increasingly complex activity performed by a growing team of project and non-project based professionals. The process comes about as a result of consultation with an array of external third party organisations and is subject to a huge volume of guidance and mandatory requirements.

The move away from professional exclusivity practiced by the surveyor is a cultural shift in modern society whereby overriding individual authority is replaced by the use of organisational roles like design manager, co-ordinator and lead consultant. It should be noted however that under the Building Control (Amendment) Regulations 2014 (BCAR), a design certifier is required to sign the Certificate of Compliance (Design). At the time of this publication, member guidance on BCAR is being prepared by SCSI. This will be available to members at www.scsi.ie when published.

These roles will be familiar to readers who have been involved in larger commercial schemes.

However, this guidance note sets out to relate best practice to the increasing trend for the democratisation of design in a range of projects. No longer is there absolute definition in project design responsibility, even for the simplest of repair and maintenance projects.

It is important to appreciate how practice has changed in the organisation and execution of projects over the last 20 years, for the following practical reasons:

- to anticipate/integrate the approach and opinions of senior fellow practitioners
- to adapt established but relevant skill resources and methods of working, both within the surveyor's office and across the project environment
- to account for suppliers and supply chains that exercise residual past practice
- to explain the context of relevant guidance drafted during this period; and
- to appreciate trends in current practice for future working projects.

2.1 Design philosophy and responsibilities

The surveyor is advised to acknowledge and to manage varying and sometimes conflicting approaches to design practiced by the project team and of those parties surrounding but not directly appointed.

The lead consultant may need to reflect on the client's own attitude towards the design and overall goals of the project. Their approach may involve one or more of the following:

- Occupational design: this approach will focus on the requirements of a specific building end user.
- Use centred design: emphasis is given to the general facility to be offered and how this might appeal to a broader range of building users. This would fall within well defined use classes and in speculative commercial development, the approach looks to the requirements of the market place.
- Pragmatic design: a more creative approach that acknowledges existence of more than one design solution.

- Critical design: this approach introduces a fundamental driver to the design often linked to a culture setting identified by the client, e.g. open plan office accommodation that reflects a business management approach or the use of sustainable materials reflecting a company policy or image.

An individual's approach to the design process will be influenced by a sense of their responsibility and that of others around them. A detailed understanding of design liability falls outside the scope of this publication and the surveyor acting as a lead consultant should review their own knowledge and experience in dealing with liability issues.

The following are examples of design attitudes sometimes held by project participants.

- The client who might believe everything flows from design as a spontaneous activity, that the design role is definitive and absolute, and the responsibility for design lies with those under the client's control and direct appointment.
- The project designer who accepts that total project design is an exceptional event and inevitably, their contribution is but one of many design islands.
- The designer of supplied goods and components whose task has been to define their product using non-project specific performance criteria and where product classification revolves around the lowest common denominator of 'fit for purpose'.
- The facilities manager who sees the design role as a matter of definitive learning, rarely acknowledging that design might be a unique collective result of project specific criteria. For the facilities manager, good design may be less intuitive and more an accumulation of experience.
- The litigation solicitor who presents design as certain and irrevocable and that every project event can be traced back to an individual design responsibility.
- The end user who rarely acknowledges design beyond an expression of aesthetic pleasure (or disdain) and prefers to judge the project on practical outcomes and performance. When these fail to impress, poor design is blamed.

These sometimes conflicting attitudes and perceptions can lead to friction within a project environment. The ability to determine, unify and manage these interactions is fundamental to the role of the lead consultant. In building heritage and conservation works, the lead consultant may find that a dominant design philosophy comes not from the client or the responsibilities of the individual design team members but by reference to the locality and the influence of planning guidance through the requirements of specific legislative controls. At the time of this publication, the SCSi is developing a guidance note called *Historic Building Conservation* and will provide a useful understanding of the way these controls can be manifest in a project design philosophy and how the design process is influenced from inception to the management of maintenance.

2.2 The common threads: compliance, sustainability and safety

The lead consultant will need to understand and to some degree, foresee how these three leading factors impact on the project from inception through to detailed design. The universal application of compliance, sustainability and safety considerations is implicit to all projects regardless of size and complexity.

The influence of specific statutory requirements and other compliance issues will be project specific and it will be the lead consultant who addresses the provisions or otherwise interrogates the design team to ensure such requirements are drawn closely into the project and the design.

Sustainability has a compliance component which will need to be considered in project specific terms. The lead consultant should be aware however that sustainability covers a near philosophical approach towards project outcomes and the requirements for the design. This can be driven by the attitude of the client towards the general policy of sustainability or by a very specific objective, whereby environmental performance becomes key to successful project completion.

Sustainability issues are covered by RICS guidance and the diverse range of subjects includes the following:

- climate change, pollution control, biodiversity, energy and waste management
- social inclusion and accessibility
- crime and security; and
- heritage and land use.

The lead consultant will need to assess their own understanding of these subjects and the likely demands made by the client and the project on a sustainable design. Additional design resources should be considered at the very start of the project through the possible appointment of specialist consultants. In the absence of such consultant support, the lead consultant should review their advice to the client at regular intervals as the design develops towards procurement and construction.

The consideration of safety pervades the whole design process and while it might be rare to engage a health and safety specialist, Statutory regulations require that building owners / designers and building contractors register with the Health and Safety Authority (HSA) before certain construction works take place. The HSA has developed guidance for homeowners/designers and contractors and this can be viewed on their website www.hsa.ie or by contacting the HSA at 1890 289 389.

3. Principles behind the role

The identification and establishment of a construction project involves the creation of a temporary organisational entity from which the lead consultant is given a key management role and to which it is possible to apply the principles of broader management processes.

In this environment, the lead consultant should look to promote the following management outcomes:

- the efficient use of design resources
- structured decision making based on factual evidence; and
- focus on need and the management of expectations.

The guidance described here is taken from the principles set out by the ISO standard for Managing the sustained success of an organisation ISO 9004:2009. The key activities in achieving these outcomes for the lead consultant are:

- retain a long-term planning perspective through clear and quantifiable performance indicators that include post completion factors
- identification of all relevant parties, assessing their impact on the project organisation. Regular monitoring and analysis of the interacting environments. Engage with others and keep them informed of the project status. Determine their approach towards any competing or conflicting expectations
- identify risk areas, the nature of that risk and have a strategy for mitigation
- identify future resource profiles; peaks in demand, and specialist services
- establish the design and specification processes that are required for the project outcomes
- build into these processes the ability to deal with change ('change control'); and
- regularly monitor compliance and take corrective/preventative action.

One of the earliest activities for the effective lead consultant is the identification of stakeholders (or 'interested' parties) and the matching of that individual or body against need and expectation. An interested party would be one who adds value to the project or is affected in material terms by the activities and outcomes of the project.

The client is an obvious interested party but lead consultants should also consider the client's customers (e.g. the tenants to your landlord client), owners or shareholders, people within the client's business, suppliers and partners (including advisers) and society. The needs and expectations of society can mean environmental protection, ethical behaviour and compliance with statutory and regulatory requirements.

3.1 Strategy and project definition

Normally, it is the individual client or a committee that pre-determines an initial set of project objectives. This direction can extend to a detailed method of procuring the idea and a clear vision of project completion and closure.

A clear sense of outcome is more often than not a positive force in defining the project at an early stage. A client who relies too heavily on their consultant for the project objectives or a client without sound development experience, who dictates method and application, is rarely a positive force in the determining strategy or project definition.

It is the lead consultant's role to guide the inexperienced client through the briefing process.

There are three distinct component parts to project definition – vision, objective and outcome.

The lead consultant should be fully involved in defining the client's vision. The lead consultant role is to engage with others within the client organisation; those who have helped to formulate the vision. Advice may have already been sought from solicitors, accountants and other external client advisers. With client permission, it is better to seek a direct validation of this advice with the third parties than to rely on second hand communication and the client's interpretations of that advice.

Many clients will have established plans and policies that can supplement the project objectives. These relevant sources of background information can be reviewed by the lead consultant:

- business forecasts and project related budgets
- health and safety policy – general and project specific; and
- environmental policy and corporate aims.

The strength and clarity of the project vision provided by the inexperienced client can be enhanced by the lead consultant's efforts to understand the business and established practice within the client organisation, and to interpret and draw out the key requirements that can make up a vision for the project.

An important part of the lead consultant's role at the briefing stage is therefore to engage with and impact on the substance, communication and presentation of the project vision. Handled well, this should create a key defining project document and will set the management tone for the subsequent processes. An inexperienced property client may resist an influential involvement by the lead consultant at such an early stage and the role boundaries for the consultant should be agreed. If considered too limiting, a decision over whether or not to proceed should be made.

An effective project vision should result in distinct objectives capable of clear understanding by third parties not yet involved in the project. Agreement between the lead consultant and client as joint authors should prove invaluable in communicating and maintaining a consistent vision during the project.

Project objectives can be established at an early stage by very specific external criteria. The surveyor is advised to identify these external determinants and to apply a project specific knowledge to their requirements:

- Specific grants and other funding conditions.
- Overriding public legislative requirements; national standards or planning issues.
- Rights and obligations that are attached to the property or the development; specific planning conditions, easements and adjoining third party rights.
- Legacy issues arising from previous working; warranties or other unexpired undertakings.

The lead consultant may identify a gap in their knowledge or experience arising from such external determinants and the surveyor needs to consider working with a specialist consultant in order to maximise the project's potential and to achieve effective objectives and outcomes.

A project brief will not be complete without the definition of outcome. This is the translation of project aims and objectives into physical means, often capable of measurement and always available for review.

Key performance indicators (KPIs) are an example of a project outcome and aside from the most experienced of clients, the role of lead consultant is to identify these against the project vision and to have each KPI drafted in technical terms so that the professional construction team are able to compare against their own project input.

KPIs are an essential management tool not only in evaluating each project stage, but also in providing a measure of performance throughout the life cycle of the works including occupation, future adaptation and renewal.

BS EN 9004 states that the identification of a KPI should allow for the following:

- needs and expectations of the client and interested parties (stakeholders)
- importance of individual products to the client organisation – present and future
- effectiveness/efficiency of processes and resources
- profit and financial performance; and
- statutory and regulatory requirements (where applicable).

With project definition comes the opportunity to determine the resources applicable and the extent of the lead consultant role in generating the design and specification for the construction work. The lead consultant should identify the key design roles.

3.1.1 Resourcing and risk

A lead consultant role can offer near exclusivity in the design function notwithstanding peripheral inputs from suppliers, manufacturers and other third party non-project specific designers. However, a more frequent scenario for the consultant is one of lead designer, with a co-ordination role for building service, structure and other specialist designers who may be drawn from sub-consultants, suppliers or nominated sub-contractors.

On larger projects (or where complex work activities are required), the lead consultant can have no design responsibility. The management of such projects falls outside of the guidance offered here.

To a large extent the design activity determines the timing and content of the remaining project stages: feasibility, concept and detailed work. The project brief should establish who carries out the design and to what stage and when. If these details are lacking in the client's instructions, it is the role of the lead consultant to advise and make recommendations in good time.

3.1.2 Designer engagement

The anticipation and subsequent timing of an appointment will be critical to the performance of the larger project. The lead consultant should not rely on a text book identification of when or how to appoint, but rather each potential appointment decision should be reviewed against project risk and uncertainty.

The experienced lead consultant should be able to offer client specific advice over design engagement once the briefing stage has been concluded. Further clarity will be achieved during the feasibility stage, having possibly made an initial appointment to manage a specific design-led issue on an early site investigation requirement. The main practice of direct or sub-consultant design management for the lead consultant will, however, start during the concept stage, with a peak in commitment at detailed design.

Potential sources of design resource can be summarised as follows:

- the lead consultant or a design division of their organisation (if multi-disciplinary)
- the client organisation
- residual design (e.g. the modification of a previous project)

- general construction consultants; architects, engineers, surveyors, etc.
- compliance-led standard detailing, e.g. robust details
- specialist construction consultants – building systems, installations
- manufacturer and supplier-led; and
- specialist contractor or sub-contractor.

The adoption of effective information and communication technology (ICT) systems such as Building Information Management (BIM) can result in a peak in resource demand at the briefing stage. The lead consultant should have already made their recommendations for the early appointment of the designer or design team.

The range of appointment forms, terms and conditions is significant and the client will need to be advised well in advance of any planned commitment date.

A short fall in design resource can lead to problems throughout the project unless the lead consultant is able to identify and address the issue at an early stage. The consequences can lead to the following:

- disproportionate design liability
- increased design gaps – post tender risk and uncertainty
- abortive information production; and
- a volatile construction contract – post tender risk and uncertainty.

A lead consultant should be aware of their own limitations in preparing a design and technical specification and the extent to which they may rely on others within their organisation for the practical preparation process. They would do well to anticipate some form of skill shortfall by way of contingency management, and a design review process is discussed later.

3.1.3 Risk management

Effective risk management cannot be achieved by one individual in a team but in the absence of a project risk manager, the lead consultant can be seen as the one who identifies; analyses and responds, especially during the early stages of the design process.

A fully detailed design and specification with measured drawings can give a high degree of project certainty and result in reliable tendering for competitive construction prices. Like all advice worth having, the client will face a higher level of consultant cost as a result. The client can be exposed to abortive fees under these circumstances depending on the likelihood of vision change, of variations in required project outcomes or any change in committed project funding.

At the extreme high cost end of the relationship, areas of uncertainty are shrunk to insignificant levels but only after incurring disproportionate cost.

There is a role for the lead consultant to discuss with the client how best to balance cost and design uncertainty. All areas of significant uncertainty should be subject to an assessment of risk and contingency planning should be identified in conjunction with appropriate forms of change control management.

The lower end of the cost and uncertainty curve draws out a less conclusive and much broader matter: who is best positioned to manage the risk; the client (through agents) or the contractor. In theory, this decision should be based on who holds the greater knowledge and relevant experience (or skills) to

address the specific uncertainty and who can therefore most efficiently manage the risk at a lower level of total cost i.e. investigations, fees, time and final construction costs.

A design risk register can be used by the lead consultant to assist in the early identification, assessment and accurate communication to all within the project.

3.2 Monitoring, measurement, analysis and review

The lead consultant may need to influence the design production process undertaken by others in the project team in order to achieve consistency and ultimately, to obtain a unified presentation of the concept design for the client's approval.

The lead consultant has a value management co-ordination role. In practice, this usually brings value engineering activities to the project that aim to preserve function but at a lower cost.

On larger or more complex commissions, the lead consultant should consider the use of a design programme to highlight the key design players, agreed target production dates and the critical design related events. It may be harder for the lead consultant to justify such formality in the simpler design project. Nevertheless, there should be some acknowledgement of these disciplines in the written exchange between the lead consultant and the designer source.

A responsibility to review design by the lead consultant stems from four project characteristics:

- 1 poor definition or other inadequacy in the project brief
- 2 changes in project requirements, e.g. briefing criteria, cost constraints
- 3 clarification over earlier design assumptions; and
- 4 execution of parallel design activity and resulting design co-ordination issues.

Compounded errors arising from a poor brief can be avoided by regular project testing and analysis. It is a vital role for the lead consultant to sign off the project brief and in practice, this can be challenging for the inexperienced surveyor. Such a failure to guide the client through the briefing process can only be identified promptly if the lead consultant holds timely reviews (Appendix 3 provides one example of a design review form).

The lead consultant should ensure that critical activities are not closed off from further review when moving between the stages of a linear project model. The lead consultant should systematically review all previous key activities at the end of each stage.

A range of information based protocols for the project are available to the lead consultant.

These can relate to the presentation of design, the method and timing of issue and the process of review, revision and feedback.

The advances of ICT has challenged the skill set of the professional consultant, while the co-ordination and review role of lead consultant has placed a growing demand on the individual (and their organisation) to keep pace with developments.

The exposure of the construction process to new information systems and database resources is characteristically uneven and the appointment of the design team should fully explore their individual capabilities, limitations and the relevance of their ICT experience and practice to the project in hand. The lead consultant might consider the following fields of ICT data handling:

- the co-ordination of drawn information and the use of compatible software
- project protocols for the distribution and circulation of emails and other forms of data exchange
- the use of universal software media; and
- application of cloud computing and web- based information portals.

The role of the lead consultant is to promote consistency in the use of widely available and well understood ICT tools. The imposition of complex systems that can create communication barriers within the project team are not envisaged by this guidance note.

Self-assessment is an important tool for the surveyor in a lead consultant role. The identification of strengths and weakness in areas of leadership, strategy, management systems, resources and processes should be encouraged, along with opportunities for improvement and innovation. In the context of an organisation, this can also mean review and feedback by others within the lead consultant's business.

3.3 The cost manager

On a larger project, the lead consultant may only have a co-ordination role towards good cost management provided by the project quantity surveyor. Most clients will nevertheless expect front line knowledge of the project costs from their lead consultant and in the case of a smaller project or one that involves repetitive works by a few trades, the lead consultant can be required to generate and sustain accurate and reliable budgets up to the procurement stage.

The lead consultant should have a thorough understanding of the principles behind the preparation of pre-tender budgets whether acting as the cost manager or providing a co-ordination and reporting role.

Checklist – Principles behind the role:

- Determine the project organisation
- Understand and express the project vision
- Determine objectives and define project outcomes
- Identify areas of uncertainty
- Identify project resources and determine commitment over time
- Identify methods of change control
- Develop a project model and review.

4. Design process management

A key aspect of the role of the lead consultant is the establishment of a project based information management system that can support the design process. The surveyor should be able to rely on a collective knowledge base drawn from their own experience, and that of their professional office, through the adaptation of an office standard system.

It is rare in a modern practice environment to encounter a professional office without some form of well-established and structured filing system which is capable of keeping records generated by the types of projects considered in this guidance. A degree of adaptation to suit the work, the client or to satisfy an individual's preference can be expected.

An important duty of the lead consultant is to ensure the maintenance of an effective record keeping system. The system must facilitate the timely recovery of data for the purposes of everyday activities which will include design and design co-ordination. Reviews, audits and post completion interrogation of the design work will rely heavily on the thorough and diligent use of the filing system.

Good information management will help to keep clear design objectives and to identify change during the design and specification process. A consistent and widely adopted system is critical to change control and acceptance of a final design solution.

4.1 Documentation: giving definition and meaning

Effective project communication should include consistent and well defined documentation based on the following characteristics:

- purpose; the intended use by other
- status; the level of detail and stage of development; and
- content; the use of standardised information and the definition of terms

The lead consultant can use the information characteristics to develop the project protocols.

These are a function of the lead consultant's co-ordination role and the protocols serve the practice aims of achieving consistency in presentation and interpretation.

The lead consultant is recommended to adopt this approach as a matter of good practice even if the number of designers in the project team is limited.

On small projects, or where timescales are short, the lead consultant may have little opportunity to establish project specific protocols and can often expect to rely on standard practice and the experience of the project team to accept and deploy a consistent level of protocol behaviour. A consistent approach can be reinforced by good communications and questioning but the lead consultant will need to identify areas in the design and specification that may be mis- interpreted by the project team and the immediate stakeholders.

Good document definition can avoid misunderstanding and will assist in communicating the scope and nature of the works to a contractor or supplier, both at tender stage and during the construction period. It will also assist with co-ordination, communication and the sharing of data resources within an ICT environment such as BIM.

Textual documentation involves the preparation of written specifications in the form of preliminaries, materials and workmanship clauses, and a works schedule including general work item descriptions, assembly, components and finishing schedules.

As author or co-ordinator, the lead consultant should ensure that the purpose of any issued document is clear in the context of the whole project and not just that chosen as relevant by the originating designer; typically for discussion, approval, ordering and for construction.

The status of textual documents refers to the readiness of the design and the likelihood of further change. It should include a reference to previously issued documents by tracking and describing the revision history. Familiar status labels can be used for prompt recognition: preliminary, working and detailed.

The lead consultant can apply purpose and status characteristics to define drawings and other graphic based documentation in equal terms and where in practice, such definitions are well established in comparison with a written specification.

Content definition for both specifications and drawings refers to the exploitation of standard terms and presentational forms.

The level of effective control exercised by the lead consultant over third party design definitions will be a product of the surveyor's own individual experience and the specialist nature of the work. Most lead consultants will find it practical only to reinforce the principles rather than regulate content definition in detail. Typical areas of content definition are highlighted as follows:

- drawing scale conventions and the implications for detail and accuracy
- title references; general arrangement, sketch, component, assembly, schematic
- building grid and service/structural zoning
- external references and the use of ARM 4 (Agreed Rules of Measurement) on national standard building elements trade order, Ci/SfB tags, etc.
- commercial standard forms found in use across the industry, e.g. NBS; and
- The use of standard terms and phraseology in project documentation can give clear, well understood and relevant definition. Such terms are part of a common technical language approach, the principle of which underpins much of ICT systems and that has a deserved general appeal to all those participating in design and construction specification work.

Over diligent dedication to the consistent use of such language conventions may impede the effective preparation of documents for the smaller project types and the lead consultant should be aware of this risk and take positive steps to identify and effectively communicate a balanced approach to the required protocols.

Much of the more familiar terminology used in practice does not attempt to express an overtly quantitative attribute to work. In the past, this had limited the usefulness of such terms in the application of ICT inter-relational database software.

The linking capability of today's systems and the predicted advances in interrogation of textual data for the near future means that even such everyday descriptions attached to phrases like 'make good to match existing' can be identified and valued as a useful attribute that will persist beyond the life of the project.

4.2 Standardisation and project integration

Surveyors who practiced during the 1990s will be aware of the rise in standard forms and the development of commercial ICT database systems such as the National Building Specification (NBS). Today, these forms offer an opportunity for the quick production of comprehensive and consistent documentation and with careful application the lead consultant can have a high degree of confidence in the content of the documentation issued.

The design function is supported by routinely updated database systems whether generated as a commercial product like NBS or through the investment in internal office data models. The lead consultant should be aware of the following practical limitations:

- the indiscriminate use of irrelevant clauses and whole specification sections
- the subtle revision of clause content, increasing the risk of reader oversight
- inconsistent application of standard terms in supporting documentation
- removal of detailed clauses and an over reliance on general provisions
- obsolete cross referencing where a document is subject to excessive revision; and
- misinterpretation of design principles behind the standard clause.

Standardisation of drawn information is linked to the growth in ICT based systems and the use of standard libraries of symbols, components and detailed assemblies is common practice. These design resources are available for commercial exploitation but the lead consultant should be aware of the pitfalls in over reliance on generic non-specific project detailing.

A practical note to consider here is that current ICT database systems are frequently operated under a periodic licence. The initial electronic output files (reports) stored in an office archive system may require the maintenance of the licence to recover data at some later date.

It is normally possible to have the files converted to a universal format (PDF or similar) either directly by a software interface or by a print and scan method.

4.3 Building Information Modelling (BIM)

A single integrated information system can be used in the design, construction and subsequent management of the property asset generated by capital projects. The dominant characteristics of such a system are the principles of effective collaboration amongst the project team and the application of whole life cycle management with the aim of reducing cost and waste on the project.

Ireland's *Construction Strategy 2020* sets out Governments ambition to adopt BIM for all public sector tendering. The growing capabilities of ICT resources in construction and property practice and in particular, the more frequent use of standalone (packaged) data based systems have fuelled this ambition.

In practice, BIM is currently a high-end ICT based system for representing the whole life cycle of a building related facility. It is an electronic model using physical and functional characteristics defined (as attributes) in terms of spatial reference and by construction as assemblies/components/products and materials which form entities.

Entities properly defined in a BIM model become 'parametric' when they are associated with attributes such as intrinsic geometrics (length, width, depth etc.), position and orientation, geometric tolerances, material properties, and references to other features such as life cycle, maintenance requirements, cleaning or any matters salient to its creation and use in the built environment. Thus, parametric entities in a BIM model have a semantically higher level of usefulness to their life cycle for all parties involved in the design creation, occupation, management and disposal of a project. Features in a BIM model are generally expected to form a basis for linking with downstream functions and also for organising databases for data reuse throughout a building's life.

Parametric entities should be interactive and able to report their status when interrogated or relocated in an intelligent building.

The pace of change in the construction industry continues to accelerate and the lead consultant should review the principles behind BIM and in particular recent developments in the use of open source (or 'global platform') BIM software, which can promote the following:

- low cost record keeping by reliable and accessible electronic means.
- availability and effective communication of data
- use of standardised detailing in component and assembly design
- ability to revise and update; and
- flexible data for evaluation of future change.

The rate of growth in professional practice may depend on the principles of open source applications being maintained so that the input of data involves the application of established, routine and compatible ICT software and the generation of flexible reporting (outputs), critically without the need for specialist operation or training.

There are a number of industry initiatives promoting the use of BIM, including an Enterprise Ireland BIM Implementation Forum and Construction I.T Alliance, which aims to promote awareness of BIM for construction professionals. The lead consultant is likely to encounter an established information system rather than working from first principles and such a system may not exhibit the 'open (global) source' aspirations put forward by the latest industry initiatives.

The early challenge will be to understand and to interact with a potentially unfamiliar data environment and the lead consultant role could include the following:

- determine the realistic objectives for the system against the specific project criteria
- identify and agree outcomes with the client and the facilities manager (or system adviser)
- assess the system limitations and its effect on common/familiar practice, i.e. the early commitment to design
- agree additional resources (if necessary) for the project team, i.e. software licences, training, etc.
- communicate the system objectives, the aims and the management procedures to the project team; and
- review system performance and project interaction.

Developments in integrated information systems are subject to exponential change and full consideration of the systems available and how they can be managed within a project environment is not covered by this guidance note.

The surveyor in a lead consultant role can be expected to demonstrate an understanding of BIM and an appreciation of the benefits and current pitfalls in its application as a matter of good practice. The practical use of BIM in the smaller project environment may remain a matter of aspiration rather than necessity for the near future.

Checklist – Design process management:

- | | |
|--------------------------|--|
| <input type="checkbox"/> | Assess options available for a project based integrated information system |
| <input type="checkbox"/> | Determine the project protocols and promote a unified standard process between designers |
| <input type="checkbox"/> | Reinforce aspects of design definition and change control |
| <input type="checkbox"/> | Identify system call on project resources. |

5. Establishing the brief

The remaining sections of this guidance provide a structured plan to the common processes experienced by the practitioner. The process model described is a linear sequence of events, adopted for guidance purposes by many of the professional institutions. The SCSi has developed a template *Project Execution Plan* which is available at www.scsi.ie. The lead consultant should be familiar with this latest plan.

The sequential nature of the plan should be very familiar to the experienced surveyor and is sufficiently generic to be valid for the range of projects covered by this guidance.

The lack of interaction and interconnectivity described by the process model is inherent to its linear presentation. The model persists because general clarity and a good sense of clear orientation in time is readily gained from a sequential description of the design and specification process. The inexperienced surveyor engaged in design and specification is recommended to use the model in more detail to map their role, making reference to all activities contained in the Job Book publication.

5.1 Project briefing in practice

The lead consultant should be fully involved in defining the brief. It should not be underestimated how the effectiveness of this stage of the project so often determines the successful delivery of the whole. A poorly drafted brief should be identified by the consultant not the client and in this regard, the lead consultant should take the lead in securing a good understanding of the project's objectives and outcomes, and the resources to be employed.

This is achieved through well prepared examination of the initial project parameters and open exchanges during an early structured meeting with the client. Be prepared, with an established agenda that gives the client the opportunity to reflect on the process to date and to identify their own internal resources and experience. One example of suitable briefing agenda is given in Appendix 2.

Briefing service may extend to a formal business presentation and early advice over the principles of procurement and the client's contractual relationships with the project consultants and the principal contractor. The basic format for the initial briefing session with the client can be adapted from BS 7000-4.

The lead consultant should identify areas of the brief that may be subject to confidentiality issues and the manner of disclosure should be discussed with the client. The following are frequently encountered:

- financial limits and in particular, project budgets
- ongoing legal transaction agreements; and
- near future company restructuring.

Project outcomes need to be matched against realistic costs and key contingencies should be set aside for addressing unforeseen or alternative project criteria. The sensitivity of the client's financial commitment to the project should be assessed as part of a change strategy. External environmental issues, such as trading market conditions cannot be controlled, yet an appreciation of these factors will assist the lead consultant in managing the design process.

Whenever practical, the lead consultant should seek a reality check of their own interpretation of the client's vision by drawing on a colleague's understanding. This may necessitate a joint attendance during early briefing meetings with the client. The colleague need not be destined for detailed involvement with

the project nor need they be introduced as such. However, factual minutes recording the meeting would benefit from a collective drafting in order to give an accurate technical definition to the project vision and to minimise the risk of an early 'expectation gap' in the client's understanding of the project outcomes.

The timing of design appointments is critical to the briefing process. The client should be made aware of the relationship between design and project risk and the distinction between consultant (agent) and contractor (supplier) led activities.

There can be no sense of absolute conclusion to the briefing process and it is advisable that the lead consultant acknowledges the evolving nature of the brief. However, the lead consultant may wish to reinforce the advice that change can involve risk and a recorded conclusion to the stage can help.

The brief should form a single document drafted by the lead consultant and endorsed by the client. The report should be concise and made available to a wider audience within the project team and the client organisation.

Circulation of the report will need to be discussed and the lead consultant should be prepared to advise on the advantages and drawbacks of any wider circulation issue.

Reference may be made to other sources of information in order to keep the document project specific and to promote involvement by others without disclosing client sensitive data.

The briefing report can also provide an effective means to communicate the following important factors that can have a significant influence on the client's expectations and that might not otherwise have been collectively confirmed or updated at the end of the briefing stage:

- opinion forming third party documents
- design assumptions
- areas of project uncertainty
- strategies for change control; and
- budgets and fiscal constraints.

5.2 Feasibility

By this stage in a linear interpretation of the project model, the lead consultant is assumed to have drawn out and concluded on the brief, with the technical outcomes for the project identified and agreed. This assists with clarifying the early process but in practice, feasibility work can be used to further develop briefing criteria and to offer options and alternatives. An important consequence of this acceptance of the evolving brief is the lead consultant's need to establish and to put in practice a system of change control.

The feasibility stage is in essence a structured gathering of information based on known project criteria (or the 'brief'), determined in a manner to highlight uncertainty and to manage risk. The lead consultant can test basic design assumptions against the gathered data. This stage can require the appointment of specialist surveying and engineering companies and can demand some preliminary advice from the key project designers on the scope of the investigations required and their interpretation of the findings.

The lead consultant should acknowledge some degree of re-drafting of project outcomes arising from the findings of the feasibility. The lead consultant should advise the client at the earliest opportunity if the project vision is altered and in extreme cases, a decision to recommence the project with a fresh brief should be evaluated against the uncertainty of proceeding with the original scheme. A recommendation

to set aside commitments already made so far and to deny established client expectations cannot be taken lightly.

However, a duty to give strong advice that leads to a better project outcome falls squarely within the role of the lead consultant.

This stage may also not appear relevant or clearly distinctive to the lead consultant in many smaller projects. However, in practice some form of data gathering stage as distinct from the briefing process is always present and the highlighted principles and practice can be relevant.

The formal development of the project design at a feasibility stage is often limited and a tactical role for the designer in the gathering of supporting data is anticipated, rather than a full design service.

However, during the feasibility stage, the strategic (or outline) project budgets are likely to require review as a result of the following factors of change, which individually may require some enhanced level of early design review:

- design assumptions at the briefing stage are challenged by the results of the site investigations
- the client's objectives are changed by volatile external factors, e.g. available project finance, a new leasing agreement with an incoming tenant, market conditions, etc.; and
- project outcomes are tested against the findings of further desktop analysis and variations to the project brief are made either to satisfy specific performance based criteria or to provide new KPIs.

The risk of budget adjustment should be highlighted by the lead consultant and when significant, the client should be advised over the need for a design appointment and to engage with a cost consultant if not already part of the lead consultant role.

5.2.1 Project options

It is a common requirement from the inexperienced client that the feasibility stage includes for radical change in the project brief based on a series of cumulative options or 'what if' arguments that come with substantive alternative criteria. These will have a fundamental impact on the further design and specification of the project. In the first instance, the lead consultant should seek to remove as much of this client led uncertainty at the briefing stage.

Persisting with broad options and alternatives should be accompanied by a suitable warning that in essence, project costs and programme are left on hold pending delivery of the feasibility and that abortive resourcing is likely to arise. It is not unknown for the experienced lead consultant to give in to such client expectations and this should be resisted unless the uncertainty is at least matched by the client's leaning towards flexible project outcomes. As mentioned before, if the options have the potential to change the project vision, abortive design is inevitable.

5.2.2 The scope of investigations

The level and detail of data required for direct design services undertaken by the lead consultant should be well understood by an experienced surveyor and with appropriate project planning, the less experienced surveyor should be capable of anticipating what needs confirming at feasibility stage to ensure a reasonable degree of design certainty at a later date.

Problems can arise where the lead consultant adopts a design co-ordination role and the appointment of the designer(s) does not match with the timing of the design duties. At feasibility stage, these duties can extend to formulating, participating in, and the interpretation of the investigations.

The lead consultant as co-ordinator should be careful not to prejudice the gathering of appropriate data through a lack in understanding of the uncertainty associated with any one area of design. More importantly, the surveyor should not be tempted to make critical design decisions in the absence of an appointed engineer or other designer.

5.2.3 Data validation

The increasing availability of property data offers the opportunity for desktop review rather than site based measurement, testing and further investigation. The client may treat such information as accurate, comprehensive and relevant. The lead consultant should not accept the data without some basis of validation.

Issues of liability and copyright should be addressed. At such an early design stage, assumptions drawn from inaccurate data provided by a third party company that has ceased trading or worse still, that continues to trade in uncertain times with no effective appointment, can have the potential for significant project risk. The lead consultant should advise the client accordingly and as a minimum, should provide an alternative method of validation, either through sampling of the data or by means of collateral agreements.

An important source of data at feasibility stage comes from studying local authority records, public archives and other published information relating to the site, the project and the local environment. The suitability and degree of enquiry and the interpretation of the findings should be undertaken by the designer who subsequently relies on the data for their design. Where this is not possible, the lead consultant should qualify the results of their own enquiries and should plan for a review as soon as the designer is appointed.

5.2.4 Change control

The experienced lead consultant will be aware that the feasibility stage can be characterised as the period most likely to experience significant levels of change to an already established project brief. During the early stages of a project, the reason for change is more often the result of factors outside the control of the professional project team rather than factors within their immediate influence. Nevertheless, the lead consultant should take steps to plan for foreseeable events associated with a specific feasibility scheme, and an experienced surveyor is likely to have a degree of foresight that can also address key external factors as well. The early regulation and management of change control is an important task for the lead consultant.

The lead consultant should consider the following activities as part of a change control strategy during and at the end of the feasibility stage:

- integrate the potential for change into your information systems
- identify change against the brief
- disseminate new data and co-ordinate with project team
- review design resources, identify residual risks and a design close out programme; and
- effective and timely client reporting.

A model form of the control process is illustrated in Appendix 4.

Checklist – Establishing the project:	
<input type="checkbox"/>	Guide the client through the briefing process
<input type="checkbox"/>	Capture the brief and record the interactions during its preparation
<input type="checkbox"/>	Manage expectations, identify uncertainty
<input type="checkbox"/>	Prepare and issue an approved briefing report
<input type="checkbox"/>	Exercise and review the change control system
<input type="checkbox"/>	Highlight outstanding project options and establish closure programme
<input type="checkbox"/>	Populate the project information system with validated data
<input type="checkbox"/>	Manage and/or co-ordinate information gathering and site investigations
<input type="checkbox"/>	Summarise findings against the brief and report

6. Outline design and specification

The main reason for the separation of concept and detailed design can often be obscured by the ebb and flow of the project, the reactive nature of the feasibility stage and the seemingly inevitable comings and goings of client instructions. For such practical reasons, it is worth highlighting the difference.

The RIBA Outline Plan of Work 2013 describes the concept stage as one that prepares a technical design sufficient to co-ordinate components and elements of the project and to satisfy the information requirements for statutory standards and construction safety.

A conceptual design represents an appropriate blend of lower project uncertainty against cost of design fees. Whether undertaken directly or as part of a co-ordinating role, the lead consultant role is to pitch the level and scope of design so that the client is not exposed to significant abortive costs.

A design at this stage will assist in the identification of construction budgets based on site specific criteria as well as the established brief. The cost consultant (or on smaller projects, the lead consultant) should be able to refine anticipated expenditures to a new order of estimation, backed up by a commitment to delivery made from the designers in response to the brief and the findings of the feasibility.

The lead consultant should be prepared to report in formal terms to the client on the outline design and how it answers the brief, with updated costings and a project programme. This stage also offers the benefit of review and reflection against the brief and the defined project outcomes. The lead consultant should arrange for a review meeting with the client following the issue of the report.

This stage may also not appear relevant or clearly distinctive to the lead consultant engaged on smaller projects. However in practice, some form of preamble design is always present and the principles and practice described here can be relevant.

6.1 Risk and uncertainty in practice

The lead consultant can exercise risk management at any time during the project. Risk is routinely encountered by the project team in their everyday decisions and on many occasions, the encounter is managed without a conscious reference to the office handbook and professional manual or by dialogue with a risk manager. In the process of design and specification, however, there are important issues to address that can have a significant impact on the project, its outcomes and the very long term performance of the construction asset.

Whether designing or co-ordinating, the lead consultant role requires the surveyor to procure a scheme that best fits the project, the programme and the level of collected and verified data at that time. This stage is often the point at which the client and their consultants are able to address some of the likely gaps in design and agree a method of management with the lead consultant. Design gaps are persistent uncertainties that can arise for the following reasons:

- concealed or unknown site or building condition – physical access restrictions
- incomplete site survey – legal title and third party occupation restrictions
- incomplete briefing – characteristic of poor project vision/absent project outcomes
- poorly investigated tenant's assumptions incorporated into landlord's enabling works
- incomplete and poorly documented landlord's enabling works
- interpretive compliance against statutory requirements; and
- the availability of critical systems and materials.

Design gaps are no different in one important aspect from other project uncertainties in that resolution and clarity can be improved at a cost, often a combination of financial expense through fees and investigation, and potential programme delay.

The lead consultant should acknowledge that completion of the concept design can be the stage at which a less than committed client under advice (or not) may wish to review how the work is procured. Faced by such an enquiring client and the prospect of losing a lead design role, the surveyor should discuss the levels of commitment achieved to date and review what work can be adapted to suit such a radical strategic change in direction.

6.2 Contingency management

The lead consultant should now consider how to deal, in practical terms, with those potential design gaps that might be best left unaddressed but highlighted at this scheme stage.

It is worth repeating that to some degree, all matters might be considered provisional pending a full design. However, the lead consultant design role here is to take the opportunity of forecasting those gaps that can persist beyond a full design stage, and to allocate or seek an allocation of cost that reflects the nature of the uncertainty.

Some confusion may arise in the client's mind between the different allowances, therefore the lead consultant is recommended to offer a definition specific to the project in hand. In principle, it is worth noting the following.

Provisional items expressed at concept design can be lump sum allowances or costed rates applied to provisional quantities. The important criteria for a well drafted provisional allowance is that the sum relates closely to a narrow well defined element of work and can be easily distinguished from other designed parts of the scheme. A poorly defined provisional sum can be misinterpreted and the lead consultant runs the risk that the allowance is latterly used by more than one designer, leading to conflict and an under-estimation of the works cost.

A widely drafted sum or general contingency does have a place but it requires stricter control by the lead consultant. The contingency allowance must always show the level of overall project risk and at a scheme stage, the allowance may be split between construction costs and project fees.

Prime cost ('PC') allowances can be used to reflect a level of anticipated specification or quality in design without committing to a specific fitting, component or finished element manufacturer. The stated lump sum cost or rate highlights an allowance for the supply of the subject item but leaves the budget to include separately for the fixing, waste, associated builder's work and other related costs.

6.3 Implementing change control

The team co-ordination role exercised by the lead consultant is more important as the pace of design increases and the project calls on a growing range of design resource. During this project stage, the lead consultant can establish control measures that promote effective communication, change management and design integration. The following provides some of the more frequent systems and techniques applicable to project work:

- adopt the principles of a change management plan
- consider the use of a change request form and include it in the change management log
- regulated and monitored access to common database systems
- accurate data circulation, i.e. drawing and other key document registers
- reference to milestones, sign offs and 'design freeze' events; and
- establish consistent forums for feedback.

The change management process establishes an effective procedure for tracking the submission, coordination, review, evaluation, categorisation, and approval for release of all changes to the project.

Common in many larger schemes in the last ten years has been the application of web- based project portals often sponsored by the main contractor as part of their sub-contract management. These systems have the ability to encompass all of the above measures under a single virtual environmental.

The development of Cloud services (remote server storage) and a move towards global or open source software systems suggests that the surveyor will encounter the internet project portal for small schemes and critically, their application at an earlier project stage. The management of an internet data portal may become a key role for the lead consultant.

6.4 Legislative compliance

Each area of design will involve a review of legislative compliance and an initial assessment of the relevant conditions and requirements.

Where this can be achieved through an appointed designer at this early stage, the surveyor acting as a lead consultant is advised to anticipate these reviews, and to study and summarise the findings with a client report that describes the gaps and assumptions.

Client advice on their statutory obligations from the lead consultant will need to be suitably qualified where specific designer appointments are pending, or the advice obtained from specialist design consultants is given in anticipation of further appointment.

Surveyors should be cautious when summarising their client's commitments against relevant property or construction related legislation without the submission of formal and detailed application, or confirmation of third party consultation in writing.

6.4.1 Planning and Development Act

The appointment of planning consultants is rarely seen in small to medium size construction projects unless the property had an unusual condition in a previous planning consent or the application attracts adverse reaction from the planning enforcement officer or the consultation partners.

The lead consultant is advised to make an assessment of the likely planning issues arising from the project and to evaluate what feedback can be obtained from the local planning authority using data from the site history and the record of development consent for similar working in the locality. This may be undertaken in conjunction with or in parallel to enquiries made by individual designers.

In preparing an early application, the project is more likely to be confronted by significant conditions attached to any consent, reflecting a lack of detail to the submission. The lead consultant should report on the uncertainty arising from a conditioned consent.

The lead consultant should be able to identify the relative risk to the project outcomes involved with each. The following provide broad categories expressed in management terms (lower risk categories are given first):

- standard prescriptive and 'for approval' type conditions
- site specific working method prohibition
- non-standard prescriptive or standard performance conditions
- performance conditions with reference to planning policy; and
- significant reserved matters.

The lead consultant will need to conclude on each condition and in consultation with the team designers, may need to recommend the client takes specialist advice from an external planning consultant. This advice might include options on a project strategy for handling the discharge of high risk conditions, appeal procedures or the merits behind a revised application.

In the absence of specific environmental requirements from the client, the planning process may be the first occasion during which environment and sustainability driven issues are identified for design consideration.

This may entail consideration of site characterisation issues for on-site wastewater treatment systems (e.g. septic tanks) and compliance with the EPA Codes of Practice in this area. Other factors such as ground contamination risks should also be taken in to account.

6.4.2 Public health (Building Regulations & Building Control Regulations)

The lead consultant should be confident of advising their client over the broad requirements for the project arising from the Building Regulations & Building Control regulations. Unlike planning advice, the lead consultant may be expected to offer very specific direction in this field and it is the exception rather than the rule when a matter of interpretation warrants specialist advice.

The lead consultant should exercise experienced judgment in the handling of consultations made by the local authority, including initial approaches to the Fire Brigade.

Compliance based sustainability issues will require consideration and the lead consultant can be expected to assess general as well as specific provisions as part of the concept design process.

6.4.3 Safety, Health and Welfare at Work (Construction) Regulations

The lead consultant is expected to know how the Safety, Health and Welfare at Work Act (the Act) and the Safety, Health and Welfare at Work (Construction) Regulations (the regulations) are applied to construction projects. Detailed guidance is freely available through central government web based information systems.

Upon appointment, assessment of the scope of the project and the implications under the regulations should be undertaken. In the event that a designer carrying out design work on a project is not aware of the appointment of the Project Supervisor Design Stage (PSDP), the designer is required to inform the Client of his or her duties in relation to the appointment of Project Supervisor Design Stage. This is a requirement of the regulations.

In the case of projects where the scale and simplicity fall outside the requirements for statutory notification to the Health and Safety Authority, there may still be a requirement for appointment of Project Supervisors. Even in the case of simple works not requiring appointment of Project Supervisors, as outlined in the regulations, appropriate regard to health and safety is required.

The duties of designers are set out in the Regulations and the Act and should include;

- Identify any hazards that your design may present during construction and subsequent maintenance
- Where possible, eliminate the hazards or reduce the risk e.g. can roof-mounted equipment be placed at ground level or can guard-rails be provided to protect workers from falling?
- Communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the Safety and Health Plan;
- Co-operate with other designers and the PSDP or Project Supervisor Construction Stage;
- Provide information
- Take account of any existing safety and health plan or safety file;
- Take account of the general principals of prevention

- Comply with directions issued by the PSDP or Project Supervisor Construction Stage (PSCS);
- Where no PSDP has been appointed, inform the client that a PSDP must be appointed;
- The Safety, Health and Welfare at Work Act 2005 requires designers to ensure that the project is capable of being constructed to be safe, can be maintained safely and complies with all relevant health and safety legislation.

Designers can be expected to have their own risk assessment methods to address duties under the Acts and Regulations. As part of a design team the lead consultant will need to satisfy the requirements in relation to their design. In the case where the surveyor's role falls short of design responsibility, it is important for the lead consultant to anticipate the need for design risk assessment and co-ordination and be aware of requirements under the Acts and Regulations.

Surveyors should advise their client in relation to the Health and Safety at Work 2013 legislation and their obligations to register the works. Further information can be sought from the Health and Safety Authority at www.hsa.ie

6.4.4 Control of Asbestos Regulations

The lead consultant should be familiar with the provisions of the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006. For projects working in or around existing buildings, the Regulations impose specific precautions in the identification and management of the risks associated with asbestos containing materials found in older building stock.

6.4.5 General legislation

Individual designers might be expected to review their early work against other project or site specific legislation. The surveyor acting as lead consultant is advised to promote this precautionary work and establish a reporting procedure to the client that is open and inclusive to all project participants.

6.5 Design presentation and ownership

Understanding how a designer intends to prepare their work will be important to the lead consultant and at concept stage, the guidance and direction gained from it will set the scene for the larger complex project. For the less resource intensive smaller projects, a good understanding of even a limited design commitment will assist in maintaining efficient team relationships by minimising the risk of abortive or corrective design.

6.5.1 Design presentation

The lead consultant should already have a good idea of how a conceptual design should be presented and it is more often the case that decisions over the form of presentation will influence the manner by which the detailed design is subsequently produced.

The four most familiar forms of design presentation at this stage are: a written outline specification (or textual statement); sketches/ drawings (2D and 3D graphics); physical modelling and mathematical calculation. A project may employ more than one form although calculations are rarely used at concept design stage other than for the presentation of cost.

In addition to general considerations of project scale, complexity and programme, the following factors can determine an appropriate choice of presentation:

- client preference or their key decision advisers, e.g. the use of BIM
- project team capabilities and practice
- standardisation in design; and
- external resourcing, i.e. manufacturer's design information.

For small scale simple projects, the presentation of a scheme design may be a simple matter of a few paragraphs in a written exchange between the lead consultant and their client. A description of the proposed work might be included in a larger report, the subject of which is related but forming only part of a distinctly separate preamble instruction. The terms, concept and scheme are rarely used.

The concept design stage is likely to be the first point at which the product of the ICT environment is clearly demonstrated in the issue of draft design presentations.

The development of PC based global software platforms, such as AutoCAD (computer aided design), can offer a high degree of co-ordination potential at concept stage. Those engaged in the simplest design activities should be expected to employ a CAD system and the lead consultant should confirm this on appointment.

Designers may still prefer to use hand drawn sketches. This method may suit the project, particularly at concept stage when the designer believes the principles of their work are better reflected through this medium rather than using a technician or CAD operator. The merits of this approach involve arguments beyond the scope of this guidance. However, it is worth highlighting that there is an increasing trend for designers to by-pass the operator in favour of direct use with the onset of powerful and more user friendly CAD system interfaces.

The lead consultant has an opportunity to agree the use of universal software media such as the portable download format (PDF) format.

6.5.2 Design ownership

The lead consultant is advised to review the emerging design and specification at this stage and to identify any residual design elements that may result from third party technical reports used as part of the project briefing and feasibility.

Documents that can contain an early level of implied design include the following areas of professional advice:

- legal interest transaction reports (purchaser and vendor surveys)
- heads of terms and agreements to lease (third party rights)
- property and construction condition and defect reports
- feasibility reporting on an unrelated project
- property compliance reporting; and
- schedules of dilapidations.

Under such circumstances, the formulation of a design is unlikely to involve a strong or project specific brief from the client and the author of the established report, schedule or agreement will have been required to make some important presumptions as to the client's future intentions. These documents are rarely prepared with a specific project brief in mind.

If the lead consultant has been instructed to continue, it is important to seek client endorsement of the assumptions made and a formal briefing review may be required even for the simplest of projects. The lead consultant may or may not be the author of the initial client advice and in some cases, the message conveyed to the client by a third party report can become unclear or diluted through unrecorded verbal exchanges between the client and the author. A project surveyor in the lead consultant role should be prepared to test the client's expectations against a reasonable interpretation of the document and where practical, to address any significant deviation with the author if their document is still part of the project design.

A lead consultant who inherits and adopts a third party report should exercise greater caution. The ambiguity in the definition of design can lead to issues of copyright and liability on all types of work. In practice, the risk of infringing rights or accepting third party liabilities is low for smaller project work but there remains the chance that a crucial yet invalid or inaccurate assumption may have been made by the original author. At best, this could lead to abortive detail design work without a thorough review of the initial advice.

For larger or more involved work, any design decisions drawn from an earlier advice document should be fully reviewed once the basis of the project brief has been established, whether or not the advice was authored by the lead consultant. This guidance has previously highlighted how consultation with the client's opinion formers at the briefing stage can assist in understanding and defining project vision.

Such property reports should be treated in a similar fashion and the lead consultant is advised to consult with the external party, or an internal colleague, in the case of a report previously prepared by the lead consultant's own multi-disciplinary practice.

Early advice provided by external professional consultants can be of sufficient authority and persistent influence over the project vision that the lead consultant might consider whether or not to engage the consultant as a project designer.

6.6 Review and the design report

During the concept stage, the lead consultant should promote and participate in a regular review of the evolving design. The experienced surveyor will be aware that this process requires finalisation and this is best achieved by the issue of a written design report and a final review meeting with the client.

The reporting exercise is a form of internal review undertaken by the author. The lead consultant on a larger project will co-ordinate the output of several authors of the design and their collective reporting should be integrated into one document with an overview by the lead consultant.

A smaller or less complex project may not require such a co-ordinating role and the lead consultant should take ownership of the document noting where the design task has been delegated and who has responsibility for the presentation.

Common to all reporting exercises during concept design is the objective of ensuring that the brief and particularly the client's vision and modified expectations, are fulfilled by the presentation. Elements of cost control, compliance and auditing techniques will form a part of the report although these considerations will become more important during the detailed design stage.

An example of a suitable design review form is included in Appendix 3.

The design report also provides the lead consultant with an opportunity to test any enduring project assumptions through an independent review of the document in draft form. This can be achieved under a robust quality assurance check using senior colleagues who may have only a peripheral knowledge of specific project but who can use their experience to comment with a fresh overview.

For the surveyor acting as lead consultant in a small practice, an independent review can be sought from another professional within the project team. The task of the reviewer should be clearly stated under these circumstances and any shortcomings in disclosure carefully managed. A trusted third party reviewer who is fully committed to the project and the aims of the client can assist in the drafting of an incisive and informative design report.

Checklist – Outline design and specification:

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Assess design against areas of uncertainty |
| <input type="checkbox"/> | Decide on methods of contingency planning |
| <input type="checkbox"/> | Review design progress through the change control systems |
| <input type="checkbox"/> | Identify relevant legislation and review compliance |
| <input type="checkbox"/> | Review against the project brief, identify change and performance |
| <input type="checkbox"/> | Provide a design report |
| <input type="checkbox"/> | Take the opportunity to obtain an independent review. |

7. Preparing for detailed design

This guidance describes the processes involved in a front loaded design approach, where contractor or other post tender design activities are contemplated in minor form only. A further important assumption made here is in the use of traditional single stage selective tendering, although the guidance will touch on other methods and how these can affect the detailed design documentation. A short but authoritative reference on the subject of tendering procedures is the NBS guide to tendering.

The process of detailed design and specification involves the anticipation of the contract form and the respective duties of the surveyor and consultant, post tender.

The lead consultant can now turn to the questions posed by the project outcomes with the intention of providing a detailed and finalising response. Of particular interest will be the way in which the design answers the specific performance criteria laid down by the KPIs and how the works are then defined for the purposes of efficient and effective construction.

The growing influence of the facilities consultant on the brief has been highlighted before and their perspective should be sought again by the lead consultant to acknowledge the likely importance of the longer term KPIs.

7.1 Prescription or performance

A completed design process requires the specification to develop from descriptions defining the required performance of work to one that determines what is needed to comply with statutory regulations and achieve the project requirement. The lead consultant might note that this familiar two stage process confirms that design occurs in both stages of the process.

A specification that identifies only the first part of the process will leave the contractor, manufacturer or supplier to determine the precise form and dimensions of the subject work. If this condition persists as an express obligation of the contractor beyond the tender stage, the specification creates contractor design.

The lead designer must take account of the requirements of the Planning regulations, Building regulations and in particular the Building Control (Amendment) regulations 2014 and ensure that this is clearly communicated to the relevant parties.

Incomplete design is not uncommon in detailed specification practice and the lead consultant should identify those items containing any significant level of performance specification so that the resulting project risk can be managed, either by:

- completing the design process at this stage; or
- identifying an agreed means to complete and by who.

Under SI 9 Building Control Amendment regulations (2014) ,general arrangement drawings are required as a minimum , for work coming under the scope of the regulations, (prior to commencement notice/lodgement stage) and this requires more than just outline drawings and specifications. More detailed drawings/specifications would be updated on the Building Control Management on line Local Authority system (where appropriate).

Deferred design undertaken by the lead consultant can be justifiable and by example, further reference is made to the factors previously mentioned under defined provisional and prime cost allowances. Typically, these can involve areas of work where the condition of the building is unknown and the cost of investigation and exposure is prohibitive against the envisaged scope of works.

Reference to further service testing in anticipation of identifying remedial works is another potential deferment.

Design by a specialist services or system contractor may also be deferred by intention, either because of time constraints or through an earlier project decision to pass the risk on to the contractor.

Issues can arise when projects are documented with substantial prescription but an area of performance specification is left that involves ill-defined builder's works or other such attendances.

The lead consultant may be familiar with those internal refurbishment projects that have expanded in scope, possibly due to the client's increasing confidence in their budgetary commitment. There will come a point when the lead consultant realises that the introduction of HVAC mechanical service work is sufficient to have warranted, in hindsight, an earlier appointment of an M & E consultant.

Setting aside the clarity of responsibility in this simple example, the lead consultant may be required to manage the design process through performance criteria and not by a critical halt in the detailed design process.

Management issues arising from the deferment of design beyond the tender stage of a project are not covered by this guidance note. The lead consultant is, however, advised to anticipate the following issues:

- co-ordination in anticipation of a particular design solution
- competence of the design resource; and
- contractual flexibility in identifying and recognition of future design liability.

Useful further reading on the performance specifications is available through the guidance published by CPIC.

7.2 Expressing quality; verifying design

The detailed design process should aim to provide a clear definition of quality in all aspects of the project, both physical provision (materials, products and systems) and in the manner of delivery (workmanship). Quality will form a strong initial determinant in the client's project vision and the lead consultant should understand how these factors can develop through the project. Quality can be measured by the extent to which needs are met, functions are facilitated and the outcomes are sustainable for the intended purpose.

The briefing stage should be used to provide as a minimum, a broad definition of quality in terms of the project outcomes. For an experienced client, the lead consultant can expect to review more specific definitions of quality in the form of a development performance specification or similar document refined by repeated past 'successful' projects. A less experienced client can tend to rely heavily on the lead consultant for technical quality assurance but may still maintain a more obscure image of the completed building or space. The surveyor acting as lead consultant should be prepared to guide the client through the briefing process and in the case of the experienced client, the lead consultant role may require examination of the performance of past projects used to model the established specification.

An effective concept design will offer the client a chance to visualise the scheme and to reflect on the construction cost associated with the project outcomes. General levels of project quality may be reviewed, but frequently this is still undertaken in broad terms with conclusions drawn over the direction of quality level rather than any significant expression of detail.

Detailed design is, therefore, the stage at which quality is fully expressed and in terms of materials and workmanship, possibly the first occasion when the lead consultant can include and review the manner by which individual trade based project delivery is prescribed. The complete range of design media (textual, graphic and physical modelling) will be used to demonstrate quality and the following distinct non-graphic internal and external project expressions are used:

Internal authority (self-contained references):

- prescriptive dialogue for distinct work items /areas authored by the individual designer
- specific item standard clauses selected as appropriate by the designer from a database
- general standard clauses under broad trade headings (selected as above); and
- previously completed work and/or samples.

External authority (related standards, codes and certification):

- relevant compliance standards, , e.g. Building Regulations(part D etc), EU Construction Products Regulations and related standards and Environmental Regulations; and (where applicable)
- trade/professional body guidance given express authority by the designer.
- Evidence of compliance with Building Regulations (part D etc), EU Construction Products Regulations and related standards and other relevant Environmental Regulations is required to ensure that the client or other stakeholders affected by the process are not compromised.

The use of the Technical Guidance documents to the Building Regulations provides “prima Facie” evidence for low rise non complex buildings coming within the scope of its application. The

The EU Construction Products Regulation (No. 305/2011 - CPR) lays down harmonised conditions for the marketing of construction products and is directly applicable in its entirety in Irish law. It is therefore essential that all parties to the construction product supply chain learn and understand its requirements.

This is aimed at:

- manufacturers,
- importers,
- distributors,
- builders, specifiers and designers and provides basic information on the CPR for each of these stakeholder groups.

Paragraph 0.3 of the 2013 Edition of Technical Guidance Document D, Materials and Workmanship, states “---, it should be noted that compliance with the CPR or CE marking by itself does not necessarily indicate that the material is suitable for use in the works. ---”.It is therefore important to stress that the CPR regulations , of itself, does not give and comfort or assurance of compliance with Building regulations and the onus is on the designer and others to satisfy themselves that it is fit for purpose.

The above expressions will populate the building specification and can be used as notation on the detailed design drawings, either through duplication or by suitable numeric cross referencing.

Whether fully annotated or otherwise, all drawn information provides an indication of project quality and the detailed design stage on larger projects will see the preparation of a range of working drawings and a significant development in the content of the general arrangement plans and elevations appropriate to the scale and nature of the work in hand.

The expression of quality at a detailed design stage should address how the subsequent verification of that design can be achieved during construction. The specification methodology adopted will depend on many project variables, not least those decisions made about the construction contract form. For the range of projects envisaged here, the lead consultant can anticipate the role of the contract administrator, and their powers to enforce the specification are discussed in the RICS guidance note *Contract Administration*.

7.2.1 Nominated material and product quality

A practical way of expressing quality may come from reference to a specific manufacturer or supplier but it must be clear that the products specified are fit for purpose for the specific situation. This allows the designer to exploit the infrastructure of quality management processes adopted by an established and reputable supplier. Frequently, this gives an opportunity to select from a manufacturer's range of materials or products that are expressly defined by their quality. In this way, the designer is showing a clear decision over project quality.

It is important to stress that materials and workmanship must comply with the requirements of the Building Regulations and other Environmental regulatory requirements. This puts the onus on the designer to ensure that the drawings, specifications and supporting documentation clearly state this and reliance on third parties should only be exercised with caution and due diligence.

Accuracy and appropriateness in nominated material and product specification is key to exploiting design clarity. The tendency for manufacturers and suppliers to change their ranges and modify their specifications should be anticipated by the lead consultant and the repeated use of office standard specifications can have proprietary references that are quickly out of date.

The potential clarity in terms of quality when deciding to nominate can come with implications on programme compliance and cost. Diligent enquiries by the lead consultant during the specification process will limit these effects but the passage of time between design and work commencement and the reluctance of suppliers to commit to stock levels can leave the best made efforts obsolete and worse, misleading.

This risk can be limited by the use of phrases such as 'or as similar/equivalent approved', with the support of suitably drafted provisions that explain to the contractor how alternatives can be agreed.

The lead consultant should acknowledge however, that this tactic is not without practical difficulty in that closely specified requirements in support of the nomination may limit the contractor's choice in practice.

7.2.2 Third party testing and certification

With the demise of the clerk of works and the move towards contract administration rather than supervision, the specification writer will need to give even greater emphasis on procedures and site practice that can show quality compliance, prior to, during and on completion of the works.

The recently enacted Building Control (Amendment) Regulations imposes a rigorous oversight requirement on projects that come within the scope of the regulations. As a minimum general arrangement drawings and specifications and a schedule of drawings are required prior to application for commencement. The requirement for coordination of prior and ongoing declarations and certification of compliance in accordance with the Building Regulations and supported by the inspection plan/inspection notification framework. This is the responsibility of the Assigned certifier (and Design certifier where appropriate) and should be supported by a range of Ancillary certificates agreed by the Assigned Certifier in conjunction with the appropriate construction professionals. These ancillary certificates were developed as industry standards by SCSi in conjunction with Association of Consulting Engineers, royal Institute of Architects of Ireland, and Engineers Ireland and similar ACEI, RIAI and EI and similar Ancillary certs for Contractors, Specialist Contractors and Sub contractors were also developed by the Construction Industry Ireland. Other relevant statutory and industry specialist certificates will also be required, as before, to verify compliance. The Preliminary Inspection Plan should set out a clear schedule of inspection and testing methodologies and requirements and identify who will carry out such inspections, when this is undertaken and certified to the satisfaction of the assigned certifier/design certifier. Similarly the contractor should comply fully and specifically regarding similar ancillary

certificates and industry certificates and coordination and testing of certification within his/her area of operation and control. Testing and certification may be required for further evidence to be verified off site at a manufacturers/specialists premises/location.

Verification can be expressed by compliance with statutory regulations and this may be enhanced by reference to the scrutiny of delivery notes, packaging and manufacturer's batching data. Areas of work can be identified for specific attention with the use of phrases like 'subject to joint inspection' by the relevant specialists or 'retain access for CA inspection'. The specification can include reference to appropriate proprietary schemes which use marks, bar codes and other types of designations, discreetly visible on installed products and materials provided they are fit for purpose.

There has been a growing trend towards the use of testing houses and other third party verification services. The Accredited Industry.

Quality Scheme was established during the 1990s and the lead consultant can use the membership list to identify a suitable testing company. The decision to use third party accreditation will involve the following considerations:

- Approved and accredited agencies/ Laboratories
- experience and skills within the project team and their scope of appointments
- professional indemnity, works insurance and contractual link with the client
- extent of the designed work
- the measure of proposed work against the scale and complexity of the existing component, element or system
- contractors' experience and skill sets; and
- linkage to warranties and guarantees.

7.2.3 Supplier warranties and guarantees

The surveyor acting as a lead consultant is advised to assess what is expected from the potential protection afforded to the project from the many forms of warranty and guarantee made available by material, component and system suppliers.

This subject area is involved and detailed guidance on legal and insurance related factors falls outside of this guidance. The RICS guidance note *Construction insurance* (2009) provides a useful overview on latent defect insurance and collateral warranties. The lead consultant can provide broad advice to the client, but even the most experienced surveyor should exercise caution and avoid stepping into the field of legal consultation and brokerage.

In practice, there is often a gap between client expectation and the assurances offered by the supplier's standard agreement. The lead consultant should identify key warranties and urge their client to seek appropriate specialist advice. Early consideration should be given to the following important factors:

- identifying the beneficiary, the ultimate policy provider and any assignment issues
- the work covered (i.e. material, the product and/or the installation) and what is not covered
- protection periods, financial limitations and any insurance backed protection; and
- express or implied conditions over future maintenance obligations.

The lead consultant can also provide advice to the client that supplements feedback from the insurers with the following considerations:

- drawbacks of nomination of a supplier/ contractor at such an early project stage
- identifying the party who is authorised to sign off the completed works; and
- criteria for managing a dispute during and after completion of the works.

A poorly drafted warranty or one that relies heavily on implied terms will provide little certainty as to the quality and performance of the design and specification. Nevertheless, the lead consultant is advised to measure their pessimism against the effect of the agreement in practice.

A trade-based warranty can be offered by a manufacturer through a list of approved installers. The express policy provider may be with the sub-contractor and the link to the larger corporate manufacturer is not established by the wording of the warranty agreement. This is common industry practice for some roofing systems, for example.

However, the relative value of the proposed contract between contractor and the client can be low in comparison with the turnover of work between the contractor and their client's manufacturer. Under these circumstances, the warranty may have the effect of driving up quality.

Having sought appropriate specialist advice, the client may still be inclined to accept a poorly drafted standard warranty instead of redrafting delays and inflated premiums. An experienced lead consultant can offer pragmatic advice in this respect.

7.3 Design method review

The review process is a constant task undertaken by the designer and by the lead consultant through their co-ordination and client reporting role. The process of design will affect how a design is presented as an answer to the brief. In preparing for detailed final design, the experienced lead consultant will also have an understanding of how prescriptive or performance based design, and the use of nomination and third party certification, can have wider project consequences over the method of works procurement and the options available for asset management and building maintenance.

On smaller project work, a review of design method may be made as part of the concept stage or as a concluding report during the initial feasibility work.

The adaptation of performance based design methods can have a profound impact on the choice of the building contract used to execute the works. A detailed understanding of how this occurs falls outside of the guidance.

Nevertheless, the lead consultant is expected to report on such matters at an early stage and reference should be made to the latest SCSi / RICS guidance notes for their review.

A design review at this stage should be less about persisting assumptions in design and more a technical appraisal of solutions chosen by the designer(s). Again, reference to a suitably experienced independent reviewer can help to validate the methodology of the detailed design against the project brief. The lead consultant should promote a 'sense check' against the detailed proposals and on smaller projects this may prove to be one process of review rather than a two stage outline and detailed appraisal.

Checklist – Preparing for detailed design:

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Identify areas of prescription and performance |
| <input type="checkbox"/> | Identify methods of expressing quality and its verification |
| <input type="checkbox"/> | Assess the requirement for warranties and other design undertakings |
| <input type="checkbox"/> | Review design method and report. |

8. Design Production

Under traditional project design, the specification moves from a performance related document (with functional or spatial sub- division headings that respond to the briefing outcomes) to a fully prescriptive text (in theory) at the detailed design stage.

The lead consultant should identify residual areas of functional performance as part of a review procedure and determine how this work will be presented in the subsequent tendering stage in terms of provisional allowances or through contractual obligation, i.e. contractor design.

The definition of a production specification is given by CPIC as:

'Written information prepared by the design team for use by the construction team, the main purpose of which is to define the products to be used, the quality of work, any performance requirements and the conditions under which the work is to be executed.'

The lead consultant should expect the specification to communicate the following:

- work that is specific to the project
- descriptions and clause forms that promote pricing certainty and accuracy; and
- the ability (or state otherwise) to order products and materials.

Some of the pitfalls in drafting a specification based on an editable standard form are highlighted previously. A concise draft offers associated guidance:

- avoid repetition
- use generic descriptions in place of numerous examples; and
- give justification for design only where this assists understanding.

Past problems in identifying an appropriate level of workmanship detail have largely been superseded by the advent of the standard building specification and the application of ICT data based systems, such as the NBS. However, there remains a relatively limited degree of standard clause selection and the lead consultant may wish to include very project specific requirements that might be derived from the nature of the work, or a particular need in the brief.

Workmanship can also form part of a manufacturer's recommendations and may be linked into the conditions of a warranty or guarantee. The lead consultant should be aware that a balance needs to be struck between close control of the works and unnecessary provisions that lead to exclusion of otherwise competent sub-contractors.

The workmanship clause should first and foremost define the characteristics of the finished work. A description of how to achieve the work risks straying into the unnecessary prescription of the contractor's own responsibilities, their chosen methods and liabilities for safe workings.

The lead consultant can choose to identify areas of workmanship that are subject to pre- start sample and mock-up tasks by the contractor. Such provision is a good method of addressing the more ambiguous qualities of appearance (colour, texture, grain, consistency) that can otherwise require extensive detailed descriptions. In addition to the potential for consensus of interpretation between the specifier and the contractor, the sample panel can act as a measurable reference point used subsequently by the trade operatives.

The specification should cover, in sufficient detail, those obligations envisaged by the building contract. The lead consultant can anticipate the form of contract at a detailed design stage. However, there will be a need to review these assumptions and update the production specification before it is issued as a tender document.

The lead consultant should also be aware that production specifications are not a recommended medium for exploring outstanding work options, the 'what if?' provisional clause or the excessive use of extra over provisions. When required, and used in conjunction with a standard form of specification, a significant mix and match ('shopping list') approach will inevitably increase the risk of the pitfalls highlighted above.

8.1 Scheduling of works

For the smaller project scheme, a schedule of works can be the 'front line' section of a building specification document, used by the contractor for the submission of costs and rates.

In practice, some lead consultant's may discover that it is the only section of the specification read in advance by the tendering contractor. The lead consultant should take care to ensure technical clarity by the full use of the conventions, language sets and standard referencing discussed earlier.

The schedule of work should often fulfil the following purposes in addition to the pricing role:

- product and material purchasing
- for construction; and
- quality control.

Such good practice does not mean however, that the document is presented in strict trade order using New Rules of Measurement without regard for the scale, or sequencing of work. The lead consultant may be aware that an inexperienced client will struggle to understand a fiercely structured work schedule in trade order and in the absence of drawings, the Part 3 schedule may be the only realistic reference point for the client to make their own review of the final design.

The skills of the lead consultant will be fully exploited in the choice of format and the drafting of the schedule or, if taking on a review role of a co-designer's document, in the constructive criticism over their equivalent decisions.

The preparation of a schedule of works for smaller projects where drawings are limited should give emphasis to the following factors:

- location reference by sub-heading and through item description
- consistent trade order sequencing within location headings
- clause drafting demonstrating location, purpose and technical description.

The structure of the schedule can reflect the general class of the project works. Internal repairs and alterations are often best covered with titled reference to locations and where alterations do not involve significant changes in internal building layout, the work could be referenced on a room by room basis. This approach would assist in the following ways:

- thorough and comprehensive scoping of the works by the lead consultant
- client understanding where drawings are limited
- clear direction for the contractor during their limited time on site prior to tender; and
- assessment of client-led variations.

The lead consultant may anticipate the potential for excessive repetition and this can be prevented by good planning of the clause wording, with cross reference to repair types.

For external work of a similar kind, the schedule can resort to elemental heading beneath which the clauses are arranged in trade order. Existing buildings may demand earlier reference to location.

Work schedules for new extensions can be presented in elemental order. This approach would assist in the following ways:

- identification of construction cost during the tender stage; and
- post contract clarity (ordering and valuation tasks).

The elemental work sections are frequently adopted in performance specifications. The lead consultant may wish to consider their use in the schedule of works section of a largely prescriptive project specification where it has been determined and accepted that a full and comprehensive design is not to be completed. The elemental approach also tends to provide a better medium of communication with the client:

- each clause to refer to a single trade or element
- use of stated quantities that cannot be reasonably obtained from the contractor's site inspection; and
- avoid repetition by drafting of clauses to first define the common attributes of a work item and thereafter scheduling the difference and identifying similarity in items between separate headings; replacing one clause with a suitable cross reference.

8.1.1 Scheduling forms

The surveyor acting as lead consultant is charged with bringing together a number of project information sources into a coherent document and there is the opportunity to determine a format of schedule that can be readily co-ordinated, that handles repetition and provides additional spatial reference in a single effective presentation. The common types of alternative form include:

- accommodation schedules (finishes and fittings)
- finishes schedules, based on finish type with location reference door and window schedules; and
- specialist component schedules

8.1.2 Bill of Quantities (BOQ) and measurement standards

A fully detailed Bill of Quantities (BOQ) prepared during the pre-construction phase of the project is rare for the scale and nature of projects envisaged by this guidance.

On small projects, the contractor typically prepares a pricing schedule detailing work to be done and prices this schedule. The schedule is their interpretation of the scope of works.

Why is this relevant to design and specification? A Bill of Quantities essentially takes the design and specification from the lead consultant and qualifies all works based on the design information. The QS then arranges these measured items in 'elements' that are common i.e. finishes, walls, floors, etc. This provides a document that can be used to ensure all contractors are pricing on the same basis and is a control document during the construction period.

At the heart of the BOQ was the standard method of measurement (now referred to as ARM 4 - Agreed Rules of Measurement); a protocol that provides a comprehensive and structured description of typical work items using a familiar technical language and at the end of the categorisation, assigns a unit of measurement for the taking off process against the project scale drawings.

The lead consultant is advised to exercise such discipline when preparing their specification or reviewing others.

8.2 Working (or production) drawings

Approved concept design drawings and agreed revisions (if any) to the brief will allow the design of the larger project work to develop with the production of detailed layouts, sections and large scale construction detailing. The lead consultant should take this opportunity to anticipate further co-ordination issues between multiple designers and to promote a common systematic approach to the preparation of the drawings.

The advance of ICT based information systems is most advanced in the graphic medium and particularly, the production of general arrangement plans and of elevations and sections to a lesser extent. The CI/SfB classification system has been widely adopted for architectural design and is one such approach.

The lead consultant may find that different classification systems (if any) are used by structural, building services and other consultant disciplines. This should be established at an early stage for the larger project schemes and the lead consultant can obtain a register of anticipated drawings from each designer source. Architectural working drawings fall into four broad categories:

- general arrangement
- assembly/detailing
- component; and
- location.

The production of assembly drawings, more frequently referred to as 'working details' is the least advanced form of ICT compatible design presentations and the lead consultant may find that the level of graphic detailing is limited or if present, comes as a hand drawn sketch. The latter is not normally an issue providing the work is suitably cross referenced and co-ordinated.

The slower adoption of assembly type drawings may be explained by the following:

- poor detailing skills exercised by the current designer community disconnection between experienced designers who demonstrate a high degree of skill in detailing and their poor knowledge of and/or less than enthusiastic attitude towards ICT
- technical shortfalls in early ICT systems and their inability to co-ordinate drawn information across graphics views (plans, elevations, sections); and
- low returns of productivity in the use of graphic based ICT on smaller projects.

The provision of detailed notes on the production drawings can be difficult to control where a project involves more than one major design resource. The lead consultant can choose to restrict these notes to numeric cross references within a single specification document. In this way, co-ordination is simpler and the risk of the contractor by-passing the specification in favour of a relatively quick reference to the drawing is minimised. Strong referencing back to a central specification will give authority to the contents and avoidance of the provisions is not implied or otherwise encouraged.

Robust standard detailing is a central source of working details developed as a database, with the principal aim of achieving a minimum level of regulatory compliance. The initiative has taken hold possibly as a direct result of recent trends in project documentation appearing without proper working details. Incentives for the ICT preparation of full working drawings appear set to grow as portfolio owning clients become more knowledgeable of BIM and other cradle to grave systems through their facilities management advisers.

8.3 Reviews and audits

For larger project work during detailed design, the lead consultant role is expected to include regular meetings with the design team and the benchmarking of key events.

A recommendation will need to be made to the client for a tendering stage or other means of taking the project forwards. The lead consultant may wish to provide a context to the advice in the form of a detailed design report. The report may need to address a number of the following issues:

- highlight design gaps, resilient uncertainty; review provisional and contingent sums; advise on risk management techniques
- measure remaining design options against cost
- advise on project and external compliance
- identify procurement methods in light of achieved design levels
- consider programme and further design resourcing; and
- conclude on financial budgets and cash flow.

The co-ordination and review role undertaken by the lead consultant may involve identifying where a project designer has resorted to a partial design solution, possibly contrary to agreed commission requirements. Such documents are rarely labelled 'Performance Specification'. The lead consultant should quickly identify aspects of deferred design and the following provide a list of common characteristics found in the text to consider:

- regular reference in critical works areas to general industry or trade guidance
- products and materials identified by these standards as 'to be approved'
- significant testing, sampling and reliance on obtaining certification
- high levels of provisional (defined or otherwise) and contingent allowances
- general disregard given to defining attendance and builder's work; and
- reference to demonstrating compliance including the submission of calculations.

During the review process, the lead consultant should report on costs and the broad range of compliance issues, sometimes involving commentary by more detailed design reporting from the design team as a supplement to the main report. The effective completion of the concept stage should avoid the necessity for a review of the fundamentals.

The legitimacy of the review process can often be enhanced by reference to a quality assurance standard.

Checklist – Design production:	
<input type="checkbox"/>	Determine the form and presentation of the production information
<input type="checkbox"/>	Manage the use of data based information systems for specification writing
<input type="checkbox"/>	Control and review document consistency, coverage and co-ordination
<input type="checkbox"/>	Identify change and manage within the project environment
<input type="checkbox"/>	Review the design against the brief objectives and the project outcomes
<input type="checkbox"/>	Report on detailed design and make recommendations.

9. Towards building occupation

The detailed design is substantially complete and the lead consultant role moves on to the procurement stage, construction and final project completion. The full project involvement of the surveyor as lead consultant is assumed here and although this guidance goes no further than detailed design, the surveyor is encouraged to think about the critical link between design practice, construction, occupation and total asset life cycle.

As an organisational entity, the project will interact with the surrounding environment that exists during the project's own timeframe but it will also influence what comes afterwards.

How much the project organisation can influence post completion factors will depend on the scale and complexity of the project.

However, even in the creation of the simplest maintenance projects, the lead consultant will find opportunities to apply their role based on an understanding of the broader management process, and an effective project organisation with only a short lifespan can still generate model template behaviour for future projects.

9.1 Construction and commissioning

This guidance has assumed that design is substantially determined prior to the construction phase of the project. Given the client's commitment to front end design, the experienced surveyor will recognise how best practice can lower construction risk but can also establish a project environment within which residual uncertainty can be managed.

Common sources of uncertainty can be found in the following post-design phase:

- changes in briefing outcomes
- deviations in contractual obligations, duties, responsibilities and rewards
- variants against initial compliance interpretations
- reactions to site revelations, reality checks against persistent assumptions; and
- environmental changes external to the project.

Some of these matters will be closed off through a best practice approach at final design stage. Not all uncertainty can however fall within the control of the project team or their client and as has been previously mentioned, some areas of risk management might attract a disproportionate cost offset.

The lead consultant will be better placed to manage residual uncertainty if the project enters the construction phase with the attributes and clarity described by this guidance. In particular, the lead consultant should be able to draw on the following:

- a detailed brief against which change can be measured
- established clear and consistent lines of communication within the project team
- a project design history against which changes can be identified and recorded; and
- a project culture that can acknowledge change and is responsive.

Commissioning is a term closely associated with the building service system and installations. Nevertheless, the general ethos behind the commissioning process is applicable to the broader aspects of

construction completion, one of measured verification against the project outcomes and in particular, the technical specification.

The surveyor in the lead consultant role is advised to review the specification and to determine the extent and degree to which outcomes can be measured and verified in practical terms. Issues under consideration can include the following:

- What are the practical measures of successful performance apparent on completion?
- When can these attributes be measured effectively?
- Who is best placed to undertake the commissioning process?
- What provisions are in place for rectifying non-performance?

9.2 Facility management

The degree to which management of the facility influences the early definition of project objectives and outcomes will largely depend on whether or not the final occupier is known to the project team and their client.

For small projects involving maintenance and repair of an existing occupied property, the lead consultant will be able to work closely, for example, with a freehold owner occupier client and if available, their property management advisers, from the scoping of the repairs to commissioning of completed remedial works. This may be less technical than a larger scheme where planned maintenance regimes and complex specialist repair contracts abound. However, the relative influence against the scale of working in this class of project will be similar and the lead consultant should assess and plan for the interaction at an early stage.

An initially speculative project may involve the sudden application of very specific user requirements during the course of the design and specification. To some extent, a surveyor may be able to use their experience at project inception to judge the risk but a lead consultant is advised to work closely with the client's marketing agents to determine broad standards of facility.

Reference can be made to previously completed projects in the local market, to the agent's own market reports and their marketing material and to national guidance that is intended to provide a standard for anticipating a specific market use.

Wherever practical, the lead consultant should engage directly with the end user and their management team, having regard to the project client's requirements and their own service obligations.

The facilities manager (FM) will be able to advise on the long term management cost and sustainability issues based around the established strategies for an existing property in the following fields:

- occupational need
- maintainability; and
- fitness for purpose – measured through whole life costs.

The FM can assist in a regular feedback process during the detailed design and specification stage. The benchmarking of a product, service process or any construction related activity can be done in conjunction with the FM using their experience and data skills. The lead consultant can find out more about the participation of the FM in the 2011 RICS guidance note *The strategic role of facilities management in business performance*, 2nd edition.

Another source of longer term KPIs contained in the brief may be found from the specific maintenance strategy adopted by the FM. The lead consultant should bear this in mind when adopting value engineering principles to their design or reviewing others. Over engineering in this context can lead to a compromising effect on maintainability and the FM should be consulted in support of the decision making process.

The RICS publication *Building maintenance: strategy, planning and procurement* gives background guidance on formulating policy and how designs decision are key to that process.

9.3 Life cycles and performance feedback

For those clients with an established whole life cycle approach to their property, the lead consultant can review their policy and past project work to determine previous criteria and the likely level of client commitment for the specific project in hand.

Clients may be open to the application of life cycle practice who have little or no such established policy but who express a commitment to whole life management in their trading or non-construction activities. This may be introduced into the specific project as a model approach for future construction procurement.

The lead consultant should exercise caution not to underestimate the level of resource needed to effectively adapt an existing superficial policy or indeed, to formulate a new framework of assessing cost (i.e. cost benefit analysis) against the design and specification of work over the whole life cycle.

Performance feedback can be seen as a six stage process and the lead consultant who follows through to project completion should anticipate a pre-emptive role in the following tasks:

- defining the process of post project review
- establish information gathering procedures
- undertake data collection
- commence review exercises
- provide conclusive summaries and develop action programmes; and
- communicate lessons learned.

Bibliography

Surveyors with a lead consultant role over the whole project term are advised to read this publication in conjunction the latest companion guidance and professional information published by SCSi/RICS and, in particular, the following:

- *Managing the design delivery (Irish edition, 2013)*
- *Development management (2009)*
- *The management of risk (2000)*
- *Developing an appropriate procurement strategy*
- *Contract administration (2011)*
- *The strategic role of facilities management in business performance (2011)*
- *Public sector asset management guidelines (2008)*
- *New rules of measurement – Order of cost estimating and elemental cost planning*
- *Building maintenance: strategy, policy and procurement (2009)*
- *Sustainability and the RICS property life cycle (2009)*
- *Code of Practice for Inspecting and Certifying Buildings and Works (2014).*

In addition, the guidance makes reference to the following key external publications:

- CABI Defining the brief (Advisory Documents).
- Architect's job book, 8th edition, RIBA, 2008.
- *Production information: a code of procedure for the construction industry*, 1st edition, CPIC, 2003.
- *Applying facilities expertise in building design*, BRE, 2001.

Appendix 1: Lead consultant services

A range of professional services associated with the design and specification role undertaken by, or co-ordinated through, the lead consultant appointment and covered by this guidance. These services are abstracted from the list of services published by SCSL for appointment purposes.

Basic core services are those activities common to the design and specification process.

Supplementary services are areas of work that apply to a specific project type or outcome and may be peripheral to activities covered in this guide.

Basic core services		Supplementary services
Generally		
Attend client, design, project, site and other meetings as provided under the appointment.		
Liaise with the client and the professional team to determine the client's requirements and to develop the client's brief. Establish review, approval, variation and reporting procedures. Prepare recommendations for the client's approval.		
Advise the client on specialist services, including consultants, contractors, sub-contractors and suppliers required in connection with the project.		
Prepare regular reports. Advise the client of any decisions required and obtain authorisation.		
Liaise with the professional team and advise the client on its obligations under the PSDP Regulations.		
Comply with the PSDP Regulations insofar as they relate to the lead consultant appointment.		
Advise the client on the selection, the terms of appointment and the fee structures for the professional team. Conduct negotiations with, and prepare and complete the forms of appointment for, the professional team.		
Feasibility, building & measured surveys		
Visit the site and review record drawings/information provided by the client. Prepare a written report for the client on the adequacy of the information supplied.		
	Carry out specialist investigations, arrange specialist access, commission testing on behalf of the client, obtain an engineering services review, drainage survey, etc.	
	Evaluate and report to the client with recommendations for any further investigation works.	
Prepare a written report for the client describing the existing condition of the site/project and identifying any particular features that may affect the client's future interest.		

Basic core services		Supplementary services
Assess the cause of any defects and prepare a written report for the client with recommendations for rectification work. Advise on the employment of		
	Advise on the employment of consultants/contractors to carry out rectification work. Inspect work on behalf of the client and on completion, prepare a written report.	
	Carry out or obtain a measured survey of the site and prepare survey drawings and other documents.	
	Undertake fire audits and surveys. Prepare recommendations for client approval.	
	Undertake or obtain asbestos surveys. Prepare recommendations for client approval.	
	Undertake or obtain accessibility surveys. Prepare recommendations for client approval.	
Liaise with the client and professional team and prepare feasibility proposal(s) for the project including advice and recommendations on the technical feasibility of the works required, the quality standards, their approximate costs, design and programme and any statutory or other approvals. Prepare recommendations for client approval.		
Advise the client on any statutory or other consents that may affect the feasibility proposals including planning, legal, building regulations and ownership/ neighbourly matters.		
	Liaise with the client and the professional team and advise the client on alternative development options, including re-development, refurbishment or alterations.	
	Liaise with the client's legal advisers and the professional team and advise the client on matters concerning ownership, including boundaries and technical rights (party walls, rights of way, etc.)	
	Advise on grants and other financial assistance applicable to the project.	
	Provide specialist services in connection with conservation works including historical/ archaeological research and specialist recording. Carry out exceptional negotiations with statutory and non-statutory bodies.	
Design		
Liaise with the professional team and prepare a scheme design or similar report for the project.		
Prepare and maintain a project execution plan or similar management tool.		
Advise on the programme for the design and construction of the project.		
	Advise the client on demolition, strip out and enabling works required before the building contract.	
	Prepare (or have prepared) and submit planning, Building Regulations or other statutory applications. Conduct negotiations on behalf of the client.	

Basic core services	Supplementary services
Liaise with the professional team and identify any long delivery building components, materials and systems. Prepare a report for the client.	Carry out exceptional negotiations with planning, building control and other statutory authorities.
Liaise with the professional team and prepare detailed design proposals.	
Liaise with the professional team and establish a structure and procedure for design and quality management. Establish reviews, approval, variations and reporting procedures. Prepare recommendations for client approval.	
	Prepare or obtain from the professional team, life cycle cost studies and estimates of annual running costs.
	Advise on the cost of the project. Advise on the cost of alternative design and construction options.
	Confirm the scope of the building contract to the client and advise on additional works required by third parties.
	Carry out off-site inspections of sub-contractor and supplier premises.
Post design, construction and occupation	
	Provide services for the client or third party organisational move to new/alternative premises.
	Provide services for the client or third party fitting out/direct works contracts.
	Facilitate, set up and manage an electronic document management system.
	Facilitate, set up and manage a value engineering exercise.
	Prepare a programmed maintenance plan.

Appendix 2: Briefing agenda

Date	Subject
Location	Reference
Attendees	

Topic

1.0 Project introduction

1.1 Outline project description

1.2 Defining stakeholders

1.3 Critical success factors

2.0 The team/project resources

2.1 Roles and responsibilities – initial/forecast

2.2 Project directory and appointment planning

2.3 Communications

2.4 Relevant asset information/knowledge sources

3.0 Uncertainty and risk management

3.1 Initial risk registers and ownership

3.2 Feasibility requirements

3.3 Designer assessments

3.4 Contingency planning

4.0 Data management

4.1 Reliance and confidentiality

4.2 Document control systems

4.3 ICT protocols

5.0 Programme and cost management

5.1 Planning activities, milestones

5.2 Change control

5.3 Reporting requirements, sign off and approvals

6.0 Summary and team review

7.0 Any other business

8.0 Date of next review meeting:

Circulation

Appendix 3: Initial design review

Initial design review

Project title			
Project stage			
Client		Construction value	
Programme period		Contract type	

Designer 1		Designer 3	
Designer 2		Other	
Lead consultant			

Reviewer 1	
Reviewer 2	
Date	

1.0 The brief

Guide notes:

Is the brief defined?

Is the brief achievable?

Do the team members fully understand the client's requirements and constraints?

Are the building areas defined?

Has the net to gross area been defined?

Has the previous project stage been signed off by the client – were there any caveats?

Initial design review (continued)

2.0 Response to site	
	Guide notes:
	Brief
	Concept robustness
	Orientation
	Plan, section and elevation Entrance
	Form and massing Approach to sustainability Approach to PSDP health and safety
Information, drawings or action required:	

3.0 Response to building	
	Guide notes:
	Brief
	Concept robustness
	Orientation
	Plan, section and elevation Entrance
	Form and massing Approach to sustainability Approach to PSDP health and safety
Information, drawings or action required:	

Initial design review (continued)

4.0 Technical issues

Guide notes:

Is it buildable in the budget?

Coordination within the design team?

Low energy solutions for building fabric?

Technical solution for MEP including renewables?

Is it working (escape, toilet provision, lifts, etc.)?

How good is the quality of the outputs?

Have engineering technical reviews taken place?

Information, drawings or action required:

5.0 Response to stakeholders

Guide notes:

Have planning authorities been consulted?

Have building control been consulted?

Information, drawings or action required:

Initial design review (continued)

6	
	Guide notes:
	Has a PSDP been appointed?
	What consideration has been given to limiting construction, maintenance and operational safety risks in our design?
	Have safety aspects associated with material selection and detailing been considered?
	Is plant access and maintenance provision adequate?
Information, drawings or action required:	

7.0 Contractual issues arising	
	Guide notes:
	What is the programme?
	What is the contract type?
	What are the design and specification obligations?
	Have they been fulfilled?
Information, drawings or action required:	

Initial design review (continued)

Any major actions required:	By when:
Any exemplar issues identified:	
Any escalation necessary:	By when:
Other feedback:	By when:

Signatures:

Reviewer 1

Reviewer 2

Lead consultant

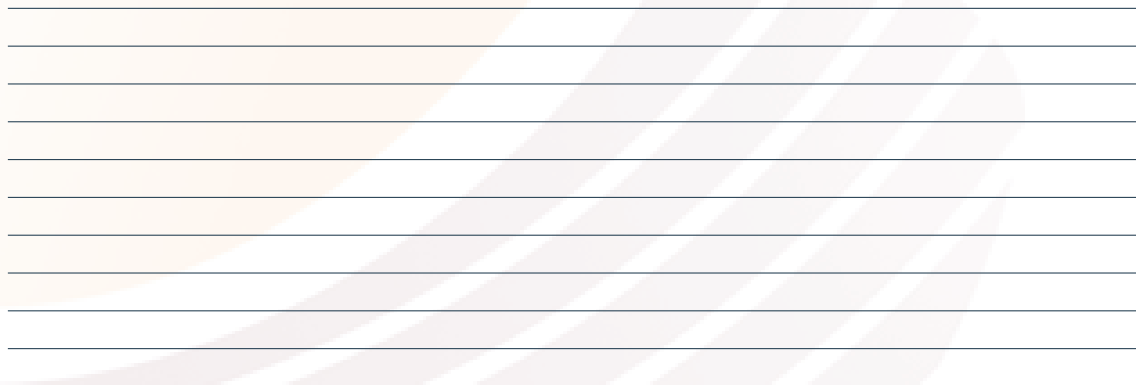
to confirm they have read the review findings

Design Change Request

Employer:	Lead consultant:
Project:	Reference
Request	Issue date:
no.	

Section A – Details of the design change

Description of change:



Appended drawings and documents:



Section B – Cost and programme implications:

a) Implications (if any) on the established budgets with reasons:

b) Please separately identify changes to design fees.

c) Delay implications (if any) of instructing the change.

d) If applicable, latest date for instruction of this change so as not to cause a delay to the works.

Date: _____

Issue:				
<input type="checkbox"/> Client	<input type="checkbox"/> Lead consultant	<input type="checkbox"/> Designer 1	<input type="checkbox"/> QS	<input type="checkbox"/> File
<input type="checkbox"/> Designer 2	<input type="checkbox"/> Designer 3	<input type="checkbox"/> Stakeholder 1	<input type="checkbox"/> Stakeholder 2	<input type="checkbox"/> PSDP coordinator



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