

**PRE-CONSTRUCTION
DEVELOPED DESIGN/ TECHNICAL DESIGN
DESIGN**

4

PRE-CONSTRUCTION	<i>CIOB</i>
DEVELOPED DESIGN/ TECHNICAL DESIGN	<i>RIBA</i>
DESIGN	<i>BIM DIGITAL PLAN OF WORK 2013</i>

Stage checklist

Key processes:

- Design delivery process
- Technical design and production information
- Value management
- Procurement of supply chain
- Contractual arrangements
- BIM strategy

Key objective:

- What do we need to build?
- How would it look like and function?
- How would we deliver it and manage it?

Key deliverables:

- Design outputs
- Contractual arrangements

Key resources:

- Client team
- Project manager
- Design team
- CDM coordinator

Stage process and outcomes

This stage involves implementation of the plans developed during the strategy stage to ensure all aspects necessary for the commencement of works on site have been resolved. These involve execution of the design process, obtaining of all required statutory and legal consents and the selection and appointment of the contractor(s).

Outcomes:

- fully developed design information
- fully developed tender documentation
- design freeze
- tender process
- update Health and Safety Plan and File
- resolution of all statutory and legal consents and approvals
- selection and appointment of contractor(s)
- completion of development of site logistics
- confirmation of BIM strategy
- confirmation of readiness to commence work on site
- client approval to proceed with the construction works

Design process

Design development is rarely completely linear. It involves experiment and revisiting solutions which turn out not to be ideal. Getting design right is therefore a process which requires insight, flexibility and collaboration. Planning and managing design delivery inherits these considerations, too.

Design involves various players, and during the process the intensity of their involvement changes. For instance, the architect may have a formative role during briefing and in the phase following it, and then in the later design stages and during construction the architect's role diminishes, while the role of specialist designer-contractors will probably start late and be very intense during parts of the construction process.

Project management processes hold the key to tackling the problems associated with design delivery, and it is right that managers should accept responsibility for making sure that the required processes are identified and implemented. For example, the brief is the client's statement of requirements, but often the client cannot be expected to understand fully what the briefing process comprises. It is up to the managers involved (project manager, design team leader) to guide the client through it and to ensure the development of the design brief fully reflects the client's requirements. The project manager has an ongoing responsibility in checking that the design, as it evolves, complies with the design brief.

The design process follows the sequence set out by the RIBA Plan of Work with each stage being sanctioned by a formal sign-off before commencement of the following stage. An adequately run project team cannot reasonably complain of inadequate briefing, unless the client has failed to respond fully to their questions.

Managing the design delivery

The project manager will need to convene a meeting of the design team and any other consultants/advisors to review all aspects of the project to date. A dossier of relevant information should be circulated in advance. The object of the meeting will be to formulate a design management plan. The plan should at least cover:

- who does what by when
- the size and format of drawing types
- schedules of drawings to be produced by each discipline/specialist
- relationships of interdependent CAD (computer-aided design) systems
- transfer of data by information technology
- estimates of staff hours to be spent by designers on each element or drawing
- monitoring of progress and the effect of design resources expended compared to productivity achieved
- schedules of information required/release dates
- initiating procedures for design changes to be made and their effects predicted
- incorporation within the design schedule of key dates for review of design performance

to check

- strategy and technical options to meet the sustainability brief
- compliance with brief
- cost acceptance
- value engineering analysis
- health and safety issues
- completeness for tender

The project manager is ultimately responsible for ensuring that there is a system in place for monitoring and controlling the production of design information in line with the agreed schedule. The project manager should convene and attend regular design team meetings to review progress and ensure that the design team are performing in accordance with their duties. Responsibility for the coordination and integration of the works, which involves input from other designers, consultants, service providers, statutory authorities and utilities, etc., normally would lie with the design team leader, which in most cases will be the architect.

Project coordination and progress meetings

To aid control of the design process, the project manager will arrange and convene project progress meetings at relevant intervals to review progress, resources and productivity on all aspects of the project and initiate action by appropriate parties to ensure that the design management plan is adhered to or establish reasons for departure and the effects of departure. In the event of a departure, the project manager should address contingency planning and mitigatory/recovery strategy and initiate recovery. Distributing minutes of meetings to all concerned is an essential part of the follow-up action.

Design team meetings

Design team meetings are convened, chaired and minuted by the design team leader. It is not essential for the project manager to attend all team meetings as a matter of course, although he normally has the right to do so. The project manager will receive minutes of all meetings and will report to the client accordingly.

Managing design team activities

Key specialist contractors may need to be involved at an early stage and managed equally with the design team (see Figure 4.1).

The project manager has several responsibilities:

- Monitoring progress, resources and productivity against the design management plan in association with the team. This is essential in view of their interrelationship. However, effective interrelationship cannot be finalised until the full team has been appointed and had time to get to grips with the project and its complexities.
- Advising the design team leader of the requirement to agree the detail and integration of the design team activities and to submit an integrated design production schedule for coordination by the project

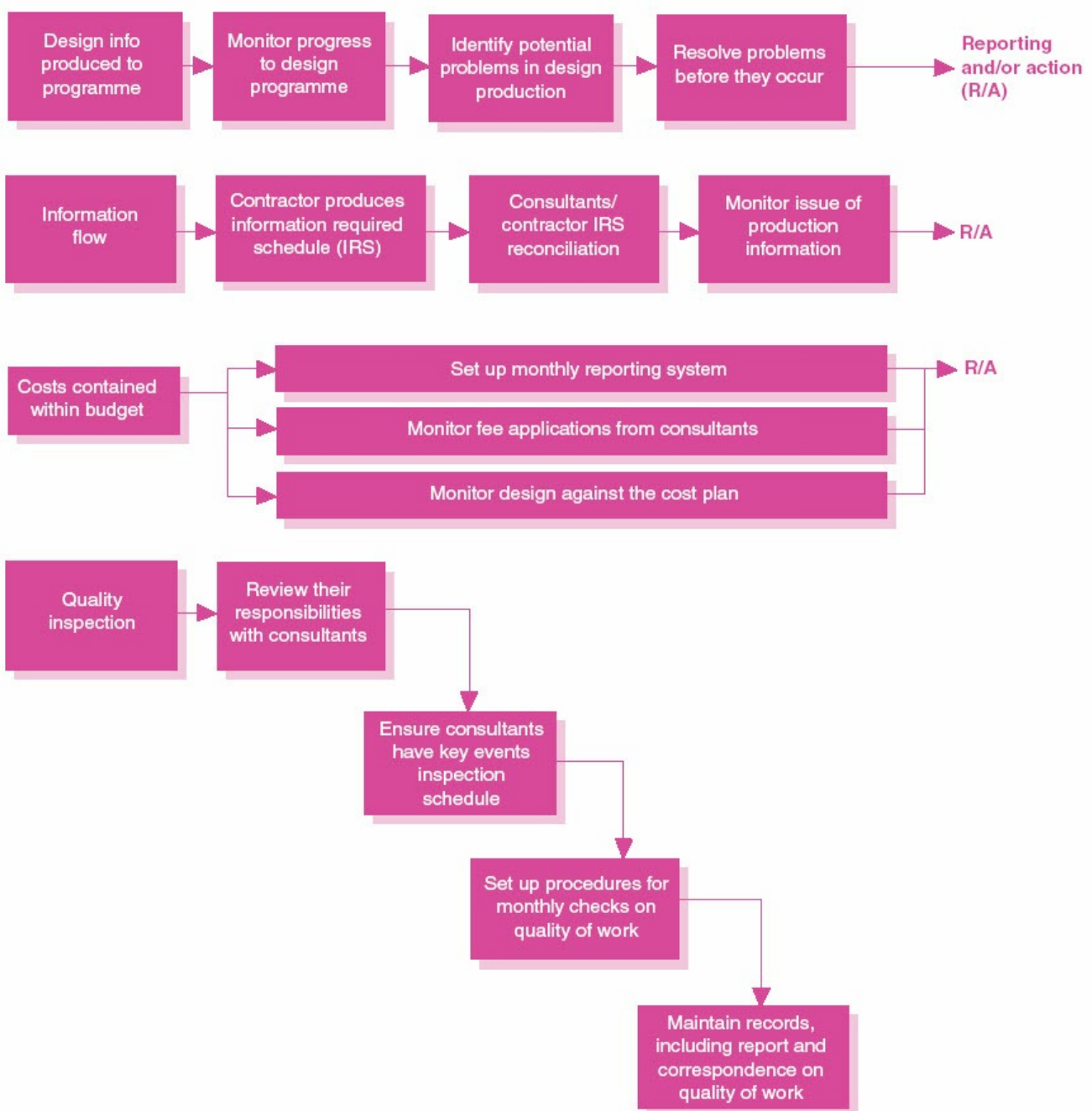


Figure 4.1 Design Team Activities

- Incorporating into the project schedule the dates for the submission of design reports and periods for their consideration and approval.
- Commissioning, as necessary, or arranging for the team to commission, specialist reports, for example, relating to the site, legal opinions on easements and restrictions and similar matters.
- Ensure a competent consultant is appointed as CDM coordinator as required by CDM regulations.
- Drawing to the attention of the client and the designers their respective duties under the CDM Regulations and monitoring compliance.
- Arranging for the team to be provided with all the information it requires from the client in order to execute its duties. It is an important function of the project manager to coordinate the activities of the various (and sometimes numerous) participants in the total process. CDM coordinator, solicitors, accountants, tax advisors, development advisors, insurance brokers and others may all be involved in the pre-construction stage.
- Submitting, in conjunction with the design team leader, design proposals, reports and design development (formerly scheme design) drawings to the client for approval (see Figure 4.2).
- Conveying approvals to the team to proceed to subsequent stages of the project.
- Obtaining regular financial/cost reports and monitoring against budget/cost plans.
- Initiating remedial action within the agreed brief if the cost reports show that the budget is likely to be exceeded. Solutions to problems that cannot be resolved within the agreed brief, or likely substantial budget under spend, should be submitted to the client with recommendations. The necessity to agree firm budgets at an early stage is most essential. It could, in certain cases, lead to the client modifying the project brief.
- Preparing schedule of consents with action dates submission documents, status, etc., and monitor progress.

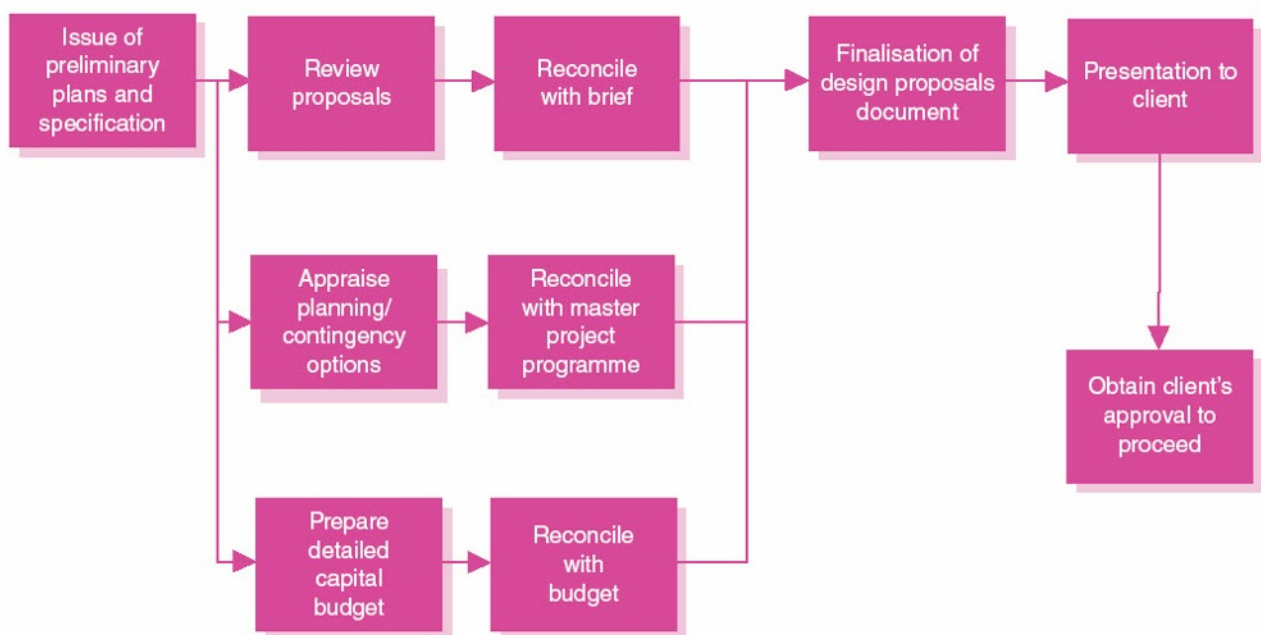


Figure 4.2 Development of Design Proposals

- Checking that professional indemnity insurance policies are in place and remain renewed on terms that accord with conditions of engagement.

Statutory consents

Although a great deal of the detailed work involved in obtaining statutory consents, such as planning permission and Building Regulations approval, is carried out by the design team and other consultants, the project manager has a vital facilitating role to play in what can be critical project activities.

Planning approval

Planning consultants

On many schemes today, the complexity of the planning process is such that the project manager may appoint a planning consultant to advise on the approach most likely to secure planning consent for a scheme together with the information that will be required to support the application, including an environmental impact assessment incorporating sustainability appraisal, traffic assessment, green travel plan and ecology report. In conjunction with the other members of the design team, the planning consultant will organise and participate in key meetings with the planning officer and other departments, such as highways.

Legislation

The primary legislation governing the planning process is contained in several Acts of Parliament. The grant of planning does not remove the need to obtain any other consents that may be necessary, nor does it imply that such consents will necessarily be forthcoming.

Timing

Planning permission cannot be guaranteed or assured in advance of the local planning authority (LPA) decision within the statutory period and the project manager must recognise this by allowing a contingency in the master development schedule.

Negotiations

The project manager will normally assist the design team leader in negotiations with officers of the local authority and report to the client on the implications of any special conditions, or on the need to provide *planning gain* through the appropriate statutory agreements. The client's legal advisors are briefed to act for the client accordingly.

Presentations

The project manager will arrange, should it be necessary, any presentations to be made to LPAs and local community groups. He will also organise meetings, including agreeing publicity and press releases with the client.

Refusal

Should planning permission be refused the advice of the relevant consultants should be obtained and action initiated, either to submit amended proposals or to appeal the decision.

Appeal

In the event of an appeal, arrangements are made for the appointment and briefing of specialists and lawyers, including managing the progress of the appeal. Applicants who are refused planning permission by an LPA, or who are granted permission subject to conditions which they find unacceptable, or who do not have their applications determined within the appropriate period, may appeal to the Secretary of State. Appeals are sent to the Planning Inspectorate.

Enforcement powers

In the event of a breach of the planning legislation, the local authority's main enforcement powers are:

- to issue an enforcement notice, stating the required steps to remedy an alleged breach within a time limit (there is a right of appeal to the Secretary of State against a notice)
- to serve a stop notice which can prohibit, almost immediately any activity to which the accompanying enforcement notice relates (there is no right of appeal to the Secretary of State)
- to serve a breach condition notice if there is a failure to comply with a condition imposed on a grant of planning permissions
- to apply to the High Court or County Court for an injunction to restrain an actual or apprehended breach of planning control
- to enter privately owned land for enforcement purposes following the landowner's default, to enter land and carry out the remedial work required by an enforcement notice, and to charge the owner for the costs incurred in doing so. It is a criminal offence not to comply with an enforcement notice's requirements or to contravene the prohibition in a stop notice.

Other statutory consents

It is the duty of the design team to facilitate that the design complies with all other statutory controls, for example, consents for Building Regulations, means of escape, the storage of hazardous materials, fumes and emissions, and pollutants. Generally, statutory controls make the owner or occupier responsible for the aspect of continuing duties in relation to the statute. The project manager obtains from the design team and/or other relevant sources, all consents and arranges for the client to be advised of these continuing duties. Others, such as specialist subcontractors, submit and obtain Building Regulations approval for their product/ system.

Building Regulations

The Building Regulations comprise 19 approved documents (A-P), plus references to numerous EN and British Standards and other technical documents, which take up several volumes. The Building Regulations represent the technical standards that the building must comply with, ranging from fire resistance and acoustics, to structure, means of escape and accessibility. Ensure that advice is sought early in the design process. Achieving compliance later in the project can result in abortive design work or once on site costly changes to built work.

Building Regulations compliance will be dealt with through the Local Authority Building Control department, or by using an Approved Inspector.

Frequently a Conditional Approval is issued. This will contain a number of conditions to be discharged by the submission of further information.

In most cases this is information to be supplied by the Design Team, and sometimes by particular subcontractors. This process of discharging conditions must be managed to ensure that conditions are discharged and the design is approved before work is ordered or installed. Otherwise the finished work will be at risk, and the Building Inspector may require changes once the work has been installed.

The simplest method of dealing this is to compose a schedule (tracker) listing:

- The conditions.
- Information required to discharge.
- Who is the owner/or lead on the condition?
- Who will produce the information?
- The schedule should be reviewed regularly at Design Team Meetings or Project
- Team Meetings, until completely discharged.

Disability Discrimination Act (DDA)

This Act provides for access requirements for anyone with a disability whether physical, visually impaired, aural, etc., within buildings. This goes beyond part M of the Building Regulations. Under the planning/development control process, schemes over a certain size will need an access statement as part of the information submitted for planning approval, usually completed by an access consultant.

Impact of utilities on project planning/scheduling

Due to the long lead periods required by utilities providers, that is, gas, water, electricity and communications, the project manager should ensure that the requirements in respect of diverting or increasing existing supplies or installing new supplies are identified at an early stage in the development process. The procurement of these utilities should be monitored closely to ensure that they do not affect the completion of the project. The project manager should also be aware that supplies are often required prior to construction completion to enable commissioning of the building services installations.

Technical design and production information

The project manager's monitoring and coordinating role will entail extensive liaison with members of the project team and will include the tasks shown in Figure 4.3, :

- Reviewing the project strategy, control systems, procedures and amending the project
- handbook, as required.
- Amplifying the design brief as necessary during design development.
- In conjunction with the project team, prepare updates to the master development
- schedule for the detailed design and production information stage, defining tasks

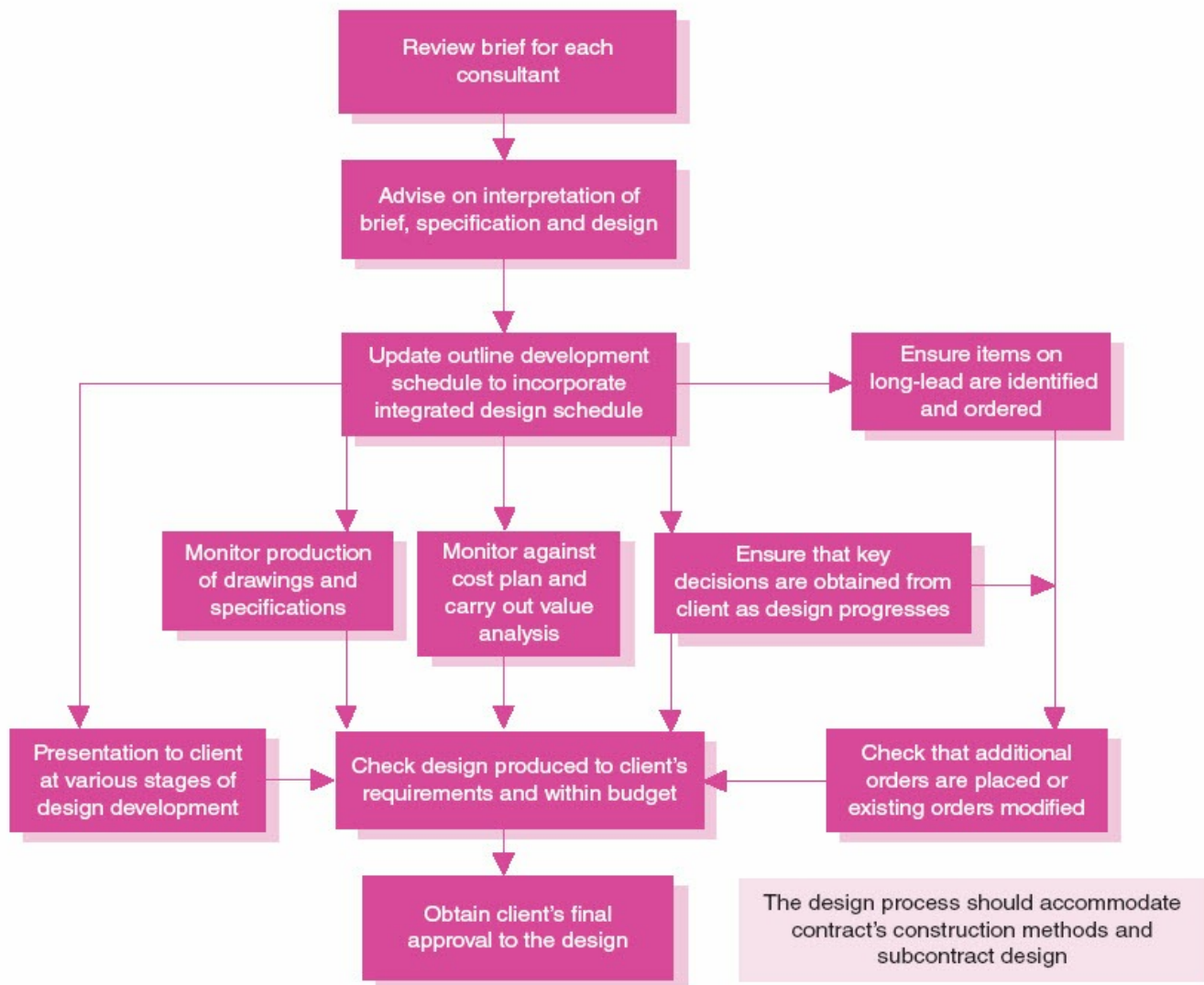


Figure 4.3 Coordination of design work up to design freeze

- and allocating responsibilities.
- Updating the schedule to establish timely flow of information from the design team for cost checking client approval
- tender preparations
- construction processes
- Coordinating the activities of the client and the project team in the management of the production of the design information.
- Formulating, in collaboration with the consultants, recommendations to the client/owner in respect of the quality control system, including:
 - ❑ on-site and off-site inspection of work for compliance with specifications, and testing of materials and workmanship
 - ❑ performance testing and the criteria to be used

- updating the schedule to incorporate requirements for samples and mock-ups, their updating and monitoring progress of approvals; copy of the schedule is to be included in the relevant monthly reports.
- Listing the key criteria in terms of performance benchmarking that in all areas of design make clear how the design will be judged, that is, air changes or faults with current facilities.
- Monitoring the emerging technical design against the risk register, cost plan and the master development schedule.
- Liaising with the client and project team and the local authority and utility companies and other statutory bodies to obtain permissions and approvals.
- Evaluating changes in the client' requirements for cost and time implications and incorporating approved items into the design process.
- Reviewing progress, updating the master development schedule and providing regular reports incorporating information relating to:
 - project status
 - intervening events and their effects
 - cost against budget/cost plan, together with reconciliation statement
 - forecast of total cost and date of completion
 - risk register and contingency planning
 - mitigation and recovery plan
- Obtaining the client' approval to the detailed design and production information phase
- Coordinate and liaise with the CDM coordinator to ensure arrangements for health and safety of planning and design work to enable satisfaction of the risk management hierarchy (Eliminate –Reduce –Inform –Communicate).
- Initiating arrangements for implementation of approved design and production information, to ensure that contractors' reasonable information requirements are fulfilled.

Value management

Value management, as outlined in the previous section, usually incorporates a series of workshops, interviews and reviews, through which the project requirements can be evaluated against the means of achieving them.

The approach taken on value management will vary depending on the procurement route chosen, but generally it is a technique which encourages to view projects on whole lifecycle basis. The application of value management, as a formal technique, will largely depend on the value of the project and the level of risk involve.

For a high-risk, high-value project, a full value management procedure is almost always justified. For high-risk, low-value projects or low-risk, high-value projects, desk top value management studies will often suffice, provided there is input from all stakeholders. For low-risk and low-value projects, a value management exercise is not often necessary. Value engineering (VE), which forms a key element of value management and requires input from contractors and specialists, has been detailed at a later part of this section.

Contract award

Following the tender procedure, once the entity with the best bid is selected, the contract has to be formally awarded to the successful bidder which also confirms acceptance of the bid and the commitment to budget expenditure. Prior to the award of the contract, typically the funding must be secured in entirety and located within the control of the client.

It is also good practice to write to all unsuccessful bidders advising them the outcome of the process and providing some feedback where appropriate. Public sector entities will have their own specific processes and procedures governing the Contract award and where the EU Directives apply, there are specific processes and notifications which have to be undertaken for the Contract award process.

Pre-start meeting

The pre-start meeting with contractors and consultants (project team) is held to establish proper working arrangements, roles and responsibilities, lines of communication and agree procedures to be followed throughout the contract (project on-site). If bonds are required they must be provided before possession of site is granted. The principal contractor's construction phase health and safety plan must be in place before work starts on the site.

Agenda items at pre-start meeting

- Introduction
- Introduce the representatives who will regularly attend progress meetings and clarify their roles and responsibilities. The client, contractor and consultants may wish to introduce themselves.
- Briefly describe the project and its priorities and objectives, and any separate Contract that may be relevant (preliminary, client's own contractors, etc.).
- Indicate any specialists appointed by the client, for example, for quality control, commissioning, for this contract.

Contract

- Describe the position with regard to preparation and signature of documents.
- Handover any outstanding production information, including nomination instructions, variation instructions. Review situation for issuing other important information.
- Request that insurance documents be available for inspection immediately, remind the contractor to check specialist subcontractors' indemnities. Check if further instructions are needed for special cover.
- Confirm the existence, status and use of the information release schedule, if used.
- Establish a procedure for agreeing adjustments to the schedule should they be necessary.

Contractors matters

- Check that the contractors' working schedule is in the form required and that it satisfactorily accommodates the specialist subcontractors.

It must:

- contain adequate separate work elements to measure their progress and integration with services installations
- allocate specific dates for specialist subcontract works, including supply of information, site operations, testing and commissioning
- accommodate public utilities, etc.
- Agree a procedure for the contractor to inform the architect of information required in addition to any shown on the information release schedule. This is likely to involve the contractor's schedule of information required, which must relate to their working schedule and must be kept up to date and regularly reviewed. It should include information, data, drawings, etc., to be supplied by the contractor/specialist subcontractors to the design team.
- Review in detail the particular provisions in the contract concerning site access, organisation, facilities, restrictions, services, etc., to ensure that no queries remain outstanding. Ensure that the contractor has a copy of any conditions placed on the client in respect of the planning consent. Also provide the contractor with legal drawings showing the curtilage of the site ownership.
- Quality control is the contractor's responsibility. Remind the contractor of the contractual duty to supervise standards and quality of work during the execution of the works.
- Determine the information that will require to be provided by the contractor to meet the sustainability strategy such as timber certificates and reports on waste management.
- Numerous other matters may need special coverage, for example, check whether immediate action may be needed by the contractor over specialist subcontractors and suppliers
- emphasise that drawings, data, etc., received from contractor or specialist subcontractors which are yet to be approved will remain the responsibility of the originator until approval review outstanding requirements for information to or from the contractor in connection with specialist works
- clarify that the contractor is responsible for coordinating performance of specialist works and for their workmanship and materials, and for coordinating site dimensions and tolerances
- The contractor must also provide competent testing and commissioning of services as set out in the contract documents, and should be reminded that the time allocated for commissioning is not a contingency period for the main contract works.
- The contractor must obtain written consent before subletting any work.

Resident engineer/clerk of works matters

- Clarify that inspections are periodic visits to meet the contractor's supervisory staff, plus spot visits.
- Explain the supportive nature of the various roles and the need for cooperation to enable the clerk of works and resident engineer to carry out their duties.
- Remind the contractor that the resident staff must be provided with adequate facilities and access, together with information about site staff, equipment and operations.

- Confirm procedures for checking quality control, for example, through: certificates, vouchers, etc., as required sample material to be submitted
- samples of workmanship to be submitted prior to work commencing
- test procedures set out in the bills of quantities
- adequate protection and storage
- visits to suppliers and manufacturers works

Consultants' matters

- Emphasis that consultants will liaise with specialist subcontractors only through the contractor. Instructions are to be issued only by the architect/contract administrator. The contractor is responsible for managing and coordinating specialist subcontractors.
- Establish working arrangements for specialists' drawings and data for evaluation (especially services) to suitable timetables. Aim to agree procedures which will speed up the process; this sector of work frequently causes serious delay or disruption.

Quantity surveyor' matters

- Agree procedures for valuations; these may have to meet particular dates set by the client to ensure that certificates can be honoured.

Clarify:

- the process and procedures to deal with foreseeable and unforeseeable changes
- tax procedure concerning VAT and 'ontractor's status status of precedence among the construction issue specifications, drawings and bills of quantities if appropriate

Communications and procedures

- The supply and flow of information will depend on the updated working schedule and will proceed smoothly if:
 - ☐ there is regular monitoring of the contractor' working schedule
 - ☐ requests for further information are made specifically in writing not by telephone
 - ☐ the design team responds quickly to queries
 - ☐ technical queries are raised with the clerk of works (if appointed) in the first instance
 - ☐ policy queries are directed to the architect/contract administrator
 - ☐ discrepancies are referred to the architect/contract administrator for resolution
- On receiving instructions, the contractor should check for discrepancies with existing documents; check that documents being used are current.
- Information to or from specialist subcontractors or suppliers must be via the contractor.
- All information issued by the design team should be via the appropriate forms, certificates, notifications, etc. The contractor should be encouraged to use standard formats and classifications.
- All forms must show the distribution intended; agree numbers of copies of drawings and instructions required by all recipients.

- Clarify that no instructions from the client or consultants have any contractual significance and should not be acted on by the contractor or any subcontractor but should immediately be referred to the contract administrator for decision; only written instructions from the contract administrator are to be actioned under the contract and all oral instructions must be confirmed in writing. Explain the relevant procedure under the contract. The contractor should promptly notify the contract administrator of any written confirmation outstanding.
- Procedures for notices, application or claims of any kind are to be strictly in accordance with the terms of the contract; all such events should be raised immediately the relevant conditions occur or become evident.
- It is advisable that a communication plan is agreed in advance so as to provide a clear direction to all parties involved, particularly in complex projects with multiple stakeholders.

Meetings

- Review format, procedures, timing, participants and objectives of the next stage: meetings, that is, site (progress) meetings, policy/principal' meetings and contractor production information meetings
- site inspections

See Table 4.1 for a specimen agenda for a pre-start meeting.

1. Introductions
Appointments, personal Roles and responsibilities Project description
2. Contract
Priorities Handover of production information Commencement and completion dates Insurances Bonds (if applicable) Standards and quality
3. Contractors' matters
Possession Schedule Health and safety files and plan Site organisations, facilities and planning Security and protection Site restrictions Contractor's quality control policy and procedures Subcontractors and suppliers Statutory undertakers Overhead and underground services Temporary services Project information dissemination
4. Resident engineer/architect/clerk of works/lead consultant/design coordinator's matters
Roles and duties Facilities Liaison Instructions
5. Consultants' matters
Structural Mechanical Electrical Others
6. Quantity surveyor's matters
Adjustments to tender figures Valuation procedures Remeasurement if appropriate VAT
7. Statutory utilities
Gas Water Electricity Drainage Telecommunication
8. Communications and procedures
Information requirements Distribution of information
Valid instructions Lines of communication Dealing with queries Building control inspections Notices to adjoining owners and occupiers
9. Meetings
Frequency and proceedings Status of minutes Distribution of minutes

*Table 4.1
Specimen agenda
for pre-start
meeting*

Contractual arrangements

The project manager has to ensure that all statutory and contractual formalities are in place prior to allowing work to start on site. It may mean that the project manager has to ensure that others have given the relevant notice and, if appropriate, received the relevant approval. A log will help to keep track of notices and approvals together with the owner of the task.

These are likely to include:

- planning consent with conditions to be discharged
- third-party agreements (such as landlord's approval, party wall and rights of light)
- CDM notification
- insurances (such as professional indemnity, employer's liability, project insurance and third party)
- notice to start work under the Building Regulations
- Fire Regulation compliance
- performance bonds

On completion various completion certificates are required, these should be specified in the particular specification, and would include:

- Fire Regulation compliance
- electrical completion certificate
- test certificates both manufacturing and installation
- lifting beams tests and marking
- Building Regulation compliance
- pressure vessel and boiler certificates

For special buildings or processes, for example, nuclear power projects, pharmaceutical plants, oil and gas facilities and rail infrastructure, particular licences and certificates may be required. If there is any doubt, ask the design team for their advice, then manage the process.

Establish site

Once the design has been finalised and the contracts signed, the project is ready to go on site. It is imperative that the site set-up process is carried out and completed in the most efficient manner prior to the start of the main construction works. The issues that the project manager must be aware of and monitor with the contractor at this stage are not only practical and physical operations but also administrative plans and procedures agreed by the parties. The areas where the project manager is to agree and monitor site set-up are:

- Site boundaries clearly identified with the contractor.
- Establish the contractor's proposal for security.
- Establish the contractor's proposal for emergency plans in case of fire or any serious incidents.
- Establish the contractor's proposal of site accommodation; specifically the suitability of welfare facilities.
- Carry out a survey of existing conditions of the site and the adjacent properties.

Record any relevant issues.

Establish with the contractor the administrative procedures such as request for information (RFIs), confirmation of verbal instructions (CVIs), daily returns, daily diaries, faxes, e-mail facility, drawing issues, etc. This activity is one of the most important action to do as it will set out the communication route between all the participants throughout the project. The findings and agreements with the contractor should be recorded by the project manager and distributed to all professionals involved.

- Ensure that the contractor is aware of, and is attending to, any issues that may be present due to neighbours being close to the site including the terms of any party wall awards or rights of light issues.
- Ensure that the contractor has clearly identified the health and safety risks that exist on the site.
- Ensure all signage is displayed correctly.

The above issues are to be agreed with the contractor. The project manager cannot dictate how the contractor is to set up the site. The project manager' role must be advisory and thus monitor that the correct actions as agreed are being implemented.

Control and monitoring systems

It is the project manager' prime duty to make sure that all necessary control and monitoring systems are properly set up and implemented by the contractor. The project manager should endeavour that these systems produce the most appropriate information and reports, on a regular and timely basis, so that they can be used to monitor and manage the project to its successful conclusion.

By carrying out audits and checks of the systems, the project manager must be fully satisfied with the accuracy of the information produced and that it does indeed indicate the 'real' position at any point in time and, where appropriate, accurately forecast the final position for the project.

Contractor control and management systems will generally be (but not limited to) the following:

- quality management system
- schedule management system
- quality control system
- cost monitoring and management system
- health, safety and welfare system
- environmental management system including waste management
- IT and communication
- document management and sharing system

It is of absolute importance that the project manager fully understands the relevance of the information being produced from these systems. The project manager must proactively use this information to manage the contractor and the project team through the regular management meetings. The aim is not only to understand where the project is and where it is ultimately going, but also to identify any potential problem areas at such a sufficiently early stage so that any rectification procedures and/or mitigation measures can be taken to ensure best delivery of the project.

Contractor's working schedule

The project manager has a duty to the client to monitor the performance of the contractor. In order to adequately carry this out, the project manager needs to ensure the contractor has prepared a construction schedule (working schedule) in sufficient detail to enable the construction works to be closely monitored.

The project manager needs to receive and review the contractor's working schedule prior to the commencement of the works in order to:

- check it complies with the client's time requirements
- check it acknowledges any restraints imposed on the construction of the works
- ensure that the level of detail is appropriate for illustrating the progress of the works
- ensure it is suitable for monitoring the progress of the works
- confirm the sequencing and logic of the schedule

The working schedule must incorporate an information requirement schedule so that it realistically informs the project manager when outstanding design information is required in order for the contractor to achieve the schedule dates. Regular reports recording the progress achieved against the schedule must be received from the contractor, and a progress status agreed with the contractor.

Any rescheduling of the works necessary to recover delay situations need to be received, reviewed and agreed. In addition to the detailed analysis of progress, the project manager should examine high-level progress trends to obtain an overall view of project status. This can involve graphically comparing accumulative planned progress against actual achieved. Typically a contract will require that the contractor's tender schedule becomes part of the contract. This schedule does not normally go into a great deal of detail, as timescales, dependencies and interfaces may yet to be agreed with subcontractors to the main contractor. The project manager will need to obtain a working schedule detailing all specific sections of work. Rescheduling required as a result of changes or slippages will be required to show how time can be recovered or the effect on the completion dates.

It is the duty of the project manager to not only to monitor the contractor's progress, but also to monitor any work being undertaken by other advisors, suppliers or companies that have an independent input into the completion of the project. These should all be monitored against the development schedule with its own milestones and targets. The project manager is managing the overall project for the client and its successful delivery.

Value engineering (related to construction methods)

Value engineering (VE) is an exercise that most of the project team undertakes as the project develops, by selecting the most cost-effective solution. However, VE is about taking a wider view and looking at the selection of materials, plant, equipment and processes to see if a more cost-effective solution exists that will achieve the same project objectives.

VE should start at project inception where benefits can be greatest; however, the contractor may have significant contributions to be made as long as the changes required to the contract do not affect the timescales, completion dates and incur additional costs that outweigh the savings on offer. There is, however, still a place for VE, especially at the start of construction. The application of the job plan (see Table 4.2) remains consistent, but the detail

Information
Function analysis
Speculation
Evaluation
Development
Recommendation
Implementation

Table 4.2 Value engineering job plan

Avoid generalities
Get all available costs
Use information from best source
Blast, create and refine
Be creative
Identify and overcome roadblocks
Use industry experts
Price key tolerances
Use standard products
Use (and pay for) specialist advice
Use specialist processes

Table 4.3 Result accelerators

available is obviously more than during the design and pre-design stages. The 'results accelerators' still act as useful guides to VE at the construction stage (see Table 4.3). In all of this, it is most important to remember the relationship between cost and value: value is function divided by cost. Concentrating on the function of the project or product will avoid mere cost cutting.

The project manager must take a proactive role in both giving direction and leadership in the VE process, but must above all ensure that time and effort is not wasted and does not have a detrimental effect on the progress of the project.

Management of the supply chain

The contractor has overall responsibility for the management of the supply chain to meet the contractual obligations. The project manager has the duty to ensure that this chain is being effectively managed so as to avoid any potential delay, unnecessary cost implications or any other adverse effect on the delivery of the project. This is an important issue as it is so very often the case that problems further down the contractual chain can be responsible for long delays and/or major disputes right back up through the whole chain. They can potentially result in the deterioration of relationships with the contractor and have a knock-on effect with not only the contractor's performance but also the performance of the project team as a whole.

Duties and responsibilities should include:

- Receive and understand the details of the contractors supply chain and the controls to manage it.
- Establish key members and linkages within the chain.
- Receive and interrogate reports from the contractor of the ongoing progress, including any reports from procurement managers and expeditors.
- Implement a regular monitoring system to check the progress of key suppliers or subcontractors (against the contractor's delivery schedule) so that there are timely warning signals of any potential delays or failures that could have an adverse effect on the progress and financial stability of the project.

- Agree with the contractor any appropriate remedial action that may be needed to rectify any problem areas.

Risk management

The risk register is a document that should be prepared at the earliest stages of the project, identifying potential risks throughout the project. This register should be reviewed and updated according to circumstances, and stages of the contract. At the construction stage the risk register should be reviewed to include any new construction risks.

In addition to monitoring those construction-related risks previously identified in the project-wide risk register, the project manager should require the contractor to instigate and maintain a risk management system for those risks likely to impact on the actual construction works. The project manager should also require the contractor to:

- establish a fully detailed listing of construction risks
- determine the likely probability and impact of each risk
- review the risks with the project team
- prepare method statements and action plans demonstrating how risks will be mitigated or managed out
- identify, and inform, the person responsible for managing each risk
- prepare contingency plans for any key risks having a significant impact
- regularly review and report on the status of risks

Payments

The traditional practice in the construction industry is for the contractor to be paid monthly during the execution of the works. The value of these payments is determined by agreement between the respective Quantity Surveyors of the employer and the Contractor.

An advance based on measurement is a system of payment which requires detailed and time consuming management. It does not reward achievement nor does it distinguish between the inefficient and efficient contractor. It is questionable whether it delivers best value for money. It is often said that cash is king and in construction contracting, cash is the contractors' (and subcontractors' primary concern.

Over the years, contractors have come up with innovative ways of enhancing cash flow. Some of these ways have been found in more efficient management processes and information systems by which contractors minimise outstanding balances owed by clients. Some have been found through pricing policies (e.g. unbalancing and front-end loading) or somewhat unfair procedures such as over-measurement and delaying payments to subcontractors and suppliers. The extent to which cash flow influences planning of construction activities on site is however an unknown element and an issue that has not attracted much interest yet. One possible reason for this perhaps is the traditional mechanism of payment itself.

Construction programmes although will undoubtedly influence clients' cash flow, they have very limited effect on contractors' net cash flow unless the payment mechanisms are based on programme milestones or activities. Contractors get paid (typically monthly) for the work they manage and in turn distribute most of these payments to subcontractors and suppliers in accordance with their contractual arrangements (leaving them with the balance which is usually overhead and profit minus retentions). The recent changes in legislation are aimed to simplify the payment mechanisms in the construction supply chain and to completely banish the 'pay when paid' scenario between the main contractors and the subcontractors and suppliers.

Change and variation control

The project manager should carry out the following tasks to control variations:

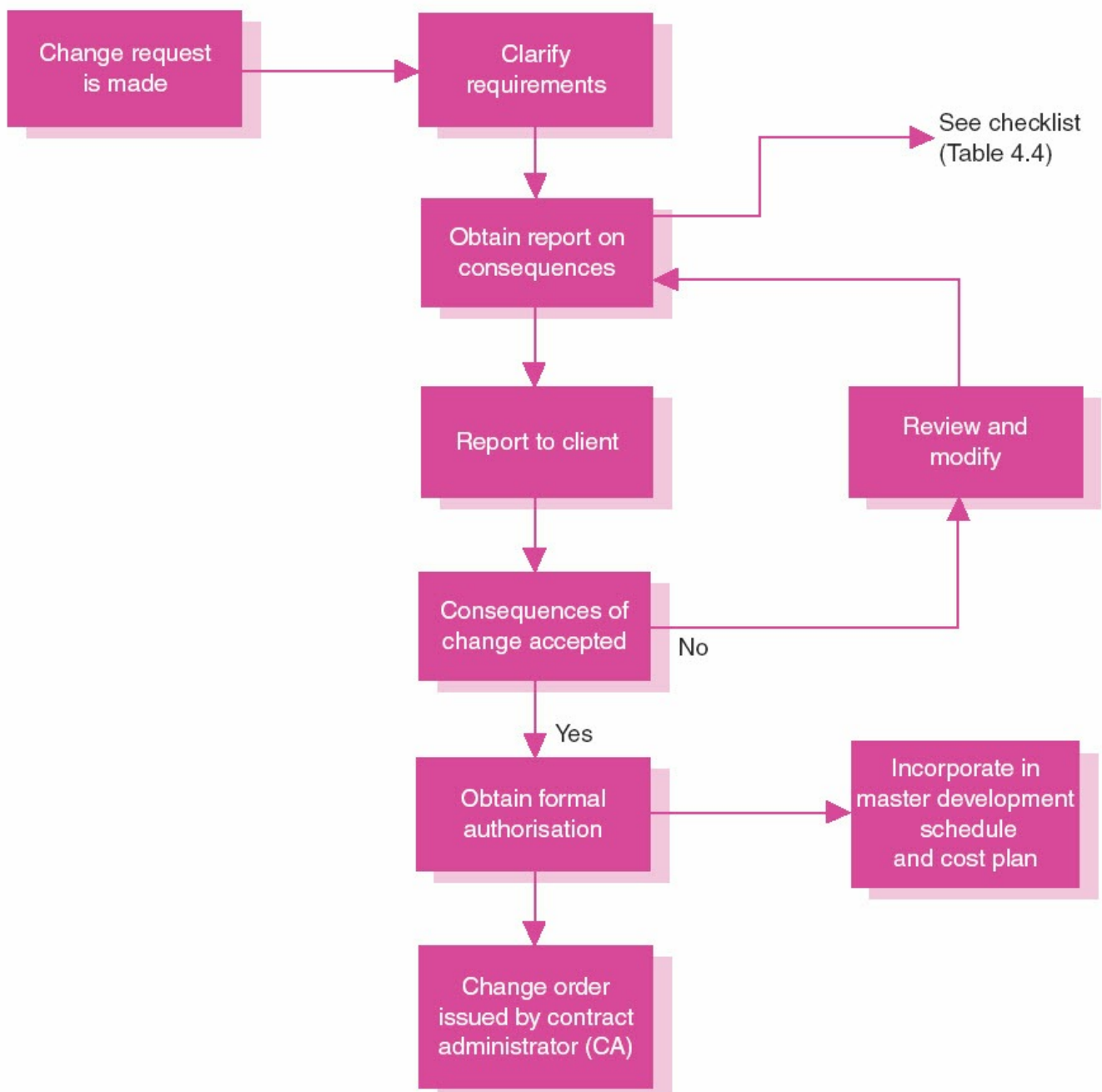


Figure 4.4 Changes in the client brief

- Monitoring and controlling variations which result from changes to the project brief to be avoided whenever possible (Figure 4.4) or design/schedule modification (e.g. Clients request, architects or site instructions) must follow a procedure which:
 - identifies all consequences of the variation involved
 - takes account of the relevant contractual provisions
 - defines a cost limit, above which the client must be consulted and, similarly, when specifications or completion dates are affected
 - authorises all variations only through the appropriate change procedure
 - Identifying, in consultation with the project team, actual or potential problems and providing solutions which are within the time and cost limits and do not compromise the clients requirements, with whom solutions are discussed and approval obtained.
 - Checking the receipt of scheduled and/or ad hoc reports, information and progress data from project team members.

The main effect on the reduction of claims or variations is to ensure the brief is clearly defined, and the contract documents and drawings accurately and completely reflect the detail (Table 4.4).

Managing change control at design development stage is far more effective than managing the process when

Activity	Action by
1. Request for change received from client	Project manager
2. Client's need clarified and documented	Project manager/contract administrator (CA)
3. Details conveyed to project team	Project manager/CA
4. Review of technical and health and safety implications	Consultants and project manager
5. Assessment of programme implications	Planning support staff and project manager
6. Evaluation/calculation of cost implications	Quantity surveyor
7. Review engineering services commissioning	Commissioning manager
8. Preparation of report on effect of change	Project manager in consultation with
9. Reporting to client	Project manager
10. Consequences accepted/not accepted by client	Project manager/CA
11. Non-acceptance: further review/considerations as per items 4–6 and action items 7 and 8	Project manager assisted by consultants
12. Further reporting to and negotiation of final outcome with client	Project manager assisted by consultants
13. Agreement reached and formal authorisation obtained	Project manager/CA
14. Incorporation into master development schedule and cost plan (budget)	Project manager and quantity surveyor
15. Change order issued (see Briefing Note 3.13)	CA

Table 4.4 Changes in the client brief: checklist

To avoid unnecessary complications in agreeing valuations and accounts, it is imperative that the variation instructions are issued from one source. Design consultants must raise (in writing) RFI to the project manager who will in turn issue the instructions to the contractor. *All variations must* have an instruction (in writing) against them in order to be valued.

Dispute resolution

The Woolf reforms (1999) recommended that litigation should be seen as a last resort and alternative dispute resolution such as mediation and other methods of resolving disputes are actively encouraged; parties who do not participate in mediation must justify their position to a judge. Adjudication may be used to resolve disputes using the provisions of the Housing Grants, Construction and Regeneration Act, 1996 and subsequent amendments. Although it is hoped that the non-adversarial approach and the increasing choice of alternative procurement options and partnering will lead to a reduction in disputes, nevertheless, the project manager should make every effort to pre-empt any dispute that may arise and endeavour to mitigate and resolve the problem. Arbitration is a procedure that may be used following adjudication and before initiating litigation.

BIM strategy

The project BIM execution protocol will establish the progression of the level of development or detail specification for the project BIM and requirements for associated data sets. The level of detail and maturity of information will relate to the relative design stage. The Level of Development (LOD) specification will define information required at every stage from all the designers and any other stakeholders inputting to the model, including supply chain with a design responsibility. It will also define permitted uses of the model at each stage for say, estimating, programming and so on. The integrated design schedule will define the key milestones, activities and outputs linked to the LOD spec stages, so that at each stage it is clear what level of detail the design team need to achieve in the model. These are illustrated in the RIBA BIM Overlay, stages 1–7.

Hand out Date 09/01/17

Hand In Date 23/01/17

NAME

COURSE

Grade

1. Name the 6 key processes for the Pre-Construction stage.

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2. Following the tendering procedure, what happens next?

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3. List 5 items that should be included in the Design Delivery Plan.

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4. Name the key resources.

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5. Design Team meetings are chaired by whom?

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6. List 5 critical project activities that the Project Manager has to organise at this Stage of the project.

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7. Schemes over a certain size require what to satisfy the DDA?

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8. What are the key objectives for Stage 4?

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9. Who has responsibility for the management of the supply chain?

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10. Draw a diagram showing the development of the design proposals.