**Chapter 1: The Context of Refurbishment**

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**Note: Answers to review tasks are coloured blue**

**1.1 Definitions of refurbishment  
  
Reflective Summary**

* The extent of refurbishment required will vary from situation to situation
* There is an escalating 'scale of intervention' which spans between superficial 'face lifting' of a building and extensive remodelling and upgrading
* Refurbishment can be defined as:  
  *"Extending the useful life of existing buildings through the adaptation of their basic forms to provide a new or updated version of the original structure"*
* The amount of work that is required in order to achieve this definition will be very different on different projects and will depend on a number of factors:
* Terms that are often used instead of or in conjunction with refurbishment are conversion, renovation, restoration, and retrofit.
* There is no 'fixed' time in the whole life of a building when refurbishment should take place. It will be depend on the required building performance of the owner/occupier

**Review Tasks**  
  
Explain the terms refurbishment, conversion and retrofit

* Refurbishment can be defined as:  
  *"Extending the useful life of existing buildings through the adaptation of their basic forms to provide a new or updated version of the original structure"*
* The amount of work that is required in order to achieve this definition will be very different on different projects and will depend on a number of factors:
* In reality the term is flexible in that the general concept of refurbishment can be taken to mean one of several things. Renovation and restoration tend to be the terms used when referring to the process of bringing the condition or state of a building back to its original form. Refurbishment means something greater than this in that there will be a definite element of updating or betterment to bring the building up to current standards rather than simply recreating the original.

Conversion often includes elements of refurbishment, but in its truest sense the term relates to the process of changing the form, layout and or use\of a building to change it from its original state into something that satisfies a different purpose such as\conversion of offices into residential accommodation for example.

Retrofit is a term often associated with building services and it relates to the process of fitting a component or sub-system into an existing building at some point after its original construction.

Discuss the issues that could affect the amount of work required in a refurbishment project:  
  
Issues that could affect the level of work required in a refurbishment project might include:

* Building size
* Building structure and form
* Condition of the building and its component parts
* Intended use of the building following refurbishment
* Building location and status (eg listed)
* Building age
* Proximity to other buildings
* Presence of unknown elements such as deleterious materials
* The amount of work required to the existing structure to enable compliance with current Building Regulations
* Adequate funding being available
* Whether the work can be carried out safely

**1.2 The amount of refurbishment work undertaken in the UK and associated costs**  
  
**Reflective Summary**

A common reason for clients requiring refurbishment of existing buildings is that the building structure is sound, but the plan layout of the building is unsuitable for modern purposes.

* There is a common misconception that to refurbish will cost less than to demolish and build new.
* Over half of the value of construction work to buildings undertaken in the UK is used in refurbishment.
* There are a number of factors that can make it difficult to price refurbishment work accurately. Clients are therefore generally advised to set aside a sum of money for any contingencies that may arise during the works.
* There is a far greater tendency for refurbishment contracts to be completed over the tender price than new build contracts. A significant number of new build contracts are completed for the tender price or below.

**Review Task**  
  
Produce a list of the factors that may incur additional costs during refurbishment work.  
  
The following factors may result in cost increases during refurbishment projects, however, this is by no means an exhaustive list:

* There will always be a high level of 'unknowns' in refurbishment, that will only become apparent during construction work.
* Since these items cannot be shown on a drawing they are often priced as the work proceeds on a day-work basis. This will always be more expensive than bill rates.
* The building may remain occupied during the works and this will require additional cost for protections etc.
* Protection may be required to areas of the building that are listed, and it may be difficult to price this accurately before work starts.
* The work may be very 'bitty', with small amounts of work required all over the building.
* Small amounts of material may be required and it is difficult to get competitive prices for small amounts of materials
* Health and Safety issues may be more difficult to determine before the contract proceeds.
* Demolition is usually required in refurbishment projects. Restrictions may apply regarding health and safety, noise control and the work may have to be undertaken out of hours, which will increase costs
* In new build work, methods of work are fairly standard and can be priced accurately. This may not be the case in refurbishment work, and solutions to construction problems may need to be decided on site.
* Most refurbishment work is priced using drawings and a specification. The work to be undertaken will never be 'standard' and each tendering contractor will interpret the documents in a different way. This can lead to large differences in tender bids, and can affect competition.
* It is common to come across what are now classified as dangerous materials in existing buildings. If the presence of these materials is not known at the time of pricing, additional costs will be incurred. Specialist subcontractors are required for the removal of these materials and it can be an expensive process.
* Whilst undertaking refurbishment, older technologies may be uncovered that need restoration and repair
* All of the above could lead to the contract duration being increased. This will increase costs because elements such as site accommodation will be required for longer.
* From a client perspective this increased duration will mean that revenue cannot be generated from the building as early and potential rental income will be lost. If the proposed occupier is to move from another building into the newly refurbished building, they may have to change arrangements for the move which could incur costs.

**1.3 Issues that affect the decision to refurbish  
  
Reflective Summary**

* The decision to refurbish a building is made when a building is not deemed to be 'fit for purpose'
* Generally, the layouts of older buildings do not suit modern requirements and this is a major reason to refurbish, but refurbishment is also required where buildings have failed.
* Buildings may fail because of faulty initial design, faulty construction, faulty use, faulty maintenance or faulty materials. Commonly a combination of the above leads to building failure
* Refurbishment work can be classified by the extent of work required to make it 'fit for purpose'
* An appraisal of an existing building is essential when deciding whether a refurbishment scheme is feasible and viable.
* The cost of undertaking an appraisal may deter clients from pursuing the potential of a refurbishment scheme

**Review Task**  
  
Produce a list of how buildings can fail and give examples in each case.  
  
Buildings and their components may fail for several reasons, these can be broadly categorised as follows:  
  
*Faulty design*: this typically accounts for 38% of building failures.  
Examples of this may be encountered where the designer has chosen to combine incompatible materials. The failure to account for differential movement between roofing membranes and substrates is a common example of this. Another may be the failure to provide a sufficient foundation design to resist structural movement.  
  
*Faulty construction*: this accounts for 23% of building failures.   
In reality there is a strong link between design and construction failings. Many of the failures that we associate with poor construction practice could be avoided if the design adopted a greater degree of buildability. Details that are difficult to create on site invite the potential for 'short-cutting' and subsequent premature failure. Examples may include complex DPC details. In addition the nature of construction work is such that a lack of familiarity with certain techniques results in some construction practices that are inappropriate and will result in failures. The large-scale failings of timber framed housing in the 1980' s illustrates this well.  
  
*Faulty maintenance*: this accounts for a further 23% of building failures. Buildings require maintenance from the moment that they are completed. However, maintenance is the 'Cinderella' of the construction industry and is often neglected and/or undertaken ineffectively. A simple example of how this can result in building component failure is the failure to provide regular protective treatments to timber, resulting in decay. Another may be the failure to regularly clean gutters and gulleys, resulting in leakage and moisture penetration to the building.  
  
*Faulty materials*: these account for 8% of building failures. The user of new materials that are untried can result in failure prior to the expected life, however, materials and components are also sometimes subject to manufacturing faults etc. An example of this may be seen in the early use of wall ties which were insufficiently protected with galvanising and, hence, failed prematurely.   
  
*Faulty use*: this accounts for the final 8% of building failures.   
The use and abuse of buildings can have significant effects on failure. For examples of this consider buildings that are 'hard-worn' such as schools, train stations etc.  
  
  
Outline the procedures that need to be undertaken when carrying out an appraisal of an existing building  
  
The appraisal of an existing building may typically seek to identify the following:

* Whether the building is in a state of serious deterioration, and a collapse is possible
* Whether the building is suffering from significant deterioration, this may indicate that major remedial works are necessary i.e. works to the structure
* Whether or not there are any evident defects in the original design and/or construction that have caused or are causing damage.
* Whether or not there has been any accidental damage to the building
* Whether it is feasible that the building could be used for an intended change of use
* If a further and more detailed structural survey is required.

The process of appraisal may include the following sequence of events:

* Establish the client's brief and intended use of the building
* Identify Health and Safety issues
* Identify access limitations/restrictions
* Undertake an 'overview' assessment of the building
* Exploratory examinations/investigations
* Evaluation of initial findings
* Identification of defects/problems
* Consideration of proposed use/feasibility
* Specification of further, detailed investigations
* Undertaking detailed investigations
* Detailed evaluation of findings
* Legal issues
* Proposed remedial works
* Preliminary cost report
* Feedback to client with recommendations

**1.4 Refurbishment v Redevelopment from an environmental perspective**  
  
**Reflective Summary**

* Buildings are believed to account for 50% of all energy used globally. Half of that energy is consumed during the construction of the building and half during the life of the building.
* Refurbishment, rather than redevelopment is currently seen to be the more sustainable option because the amount of new build work is reduced.
* Part L of the Building Regulations(England and Wales) and Part J of the Building Technical Standards(Scotland) deal with the energy efficiency of buildings
* There are a number of methods to prove compliance with the regulations, both for domestic and industrial and commercial buildings
* The changes to the regulations have been made in order to reduce the negative environmental impact of buildings. However there is a danger that the regulations will lead to a reduction in refurbishment projects because of the concern over non compliance with the regulations when work is complete

**Review Task**  
  
Outline the methods for testing that buildings comply with Part L of the Building Regulations and/or Part J of the Building Technical Standards  
  
Compliance with these standards varies in terms of requirements for dwellings and buildings other than dwellings:  
  
For dwellings the assessment of compliance may be as follows:  
  
**Elemental U value method**  
In this method the builder has to ensure that the elements of the new building comply with the prescribed U values given in the regulations.   
In England and Wales the values are linked to the efficiency of the heating system. This is based on boiler efficiency and uses the governments rating system as a standard. The builder is only allowed to demonstrate compliance using elemental U values if the heating system meets or exceeds SEDBUK ratings. Otherwise a different trade off method must be used. In Scotland, under the elemental method there is an immediate trade off available, but more onerous U values need to be adopted.  
Further, the window U value must not exceed 25% of the total floor area, in order for the elemental U value method to be used.   
  
**The Target U value method**  
This is a simple method that includes for a high level of design flexibility and includes the option of taking into account not only the U values but also the performance of the heating system and the performance of the areas of glazing. It variation of elemental U values within certain limits. The regulations give guidance as to the poorest acceptable U values that would be expected in certain elements. This trade off method of compliance allows builders to compensate for poorer U values in some elements of the building, by having better U values in other elements.   
  
**The Carbon Index method**  
This method is an extension to the 1998 SAP procedure. SAP ratings need to be calculated but will not be accepted as a way of complying with the new regulations, and there is no obligation to achieve a certain rating. Under this method the regulations will be met if the calculated carbon index for the house is not less than the prescribed value. This method also allows a variation to elemental U values within certain limits.  
  
  
For buildings other than dwellings the methods are:  
  
**Elemental U value method**  
Under this method U values should be no worse than those prescribed in the tables set out in part L (J) which prescribe U values to be achieved for each construction element of the external envelope.  
  
There are also maximum prescribed glazed areas depending on the size of building.  
  
In addition, the regulations call for the building to be constructed so that there are no gaps of bridges in thermal insulation, at joints or edges.  
  
**The Whole Building method**  
This approach allows for greater flexibility than the elemental method. For office buildings the heating, ventilation, air conditioning and lighting systems should, when in full operation, emit no more carbon per square metre than a specified Carbon Performance Rating or CPR., minimum U values should be met and airtightness requirements should be met. The maximum CPR will depend on whether the building is classified as a naturally ventilated, mechanically ventilated or air-conditioned building. Air-conditioned offices produce the highest levels of carbon dioxide, especially refurbished air-conditioned offices.  
  
**The Carbon Emissions Calculation method**  
This method also considers the performance of the building as a whole, but can be used for any building. The calculated annual carbon emissions should be no greater than those for an equivalent reference building that has been designed to comply with the elemental method. An acceptable calculation method must be used that will have been produced by a relevant authority such as CIBSE.  
Energy conservation measures, solar and internal heat gains can be taken into consideration.   
  
**U value Calculation Method**  
  
The U value of exposed elements of the building fabric should be calculated in accordance with:

* BS EN ISO 6946:1997 for walls and roofs
* and BS EN ISO 13370:1998 for ground floors
* Combined methods that allow for the effects of thermal bridging to be taken into account.

Produce a matrix to compare the environmental impact of refurbishment schemes compared to new build schemes. This should be developed by identifying criteria to compare the two types of construction work and then grading the criteria.

|  |  |  |
| --- | --- | --- |
| **Criteria** | **New Build** | **Refurbishment** |
| Recycling potential |  |  |
| Energy costs in use |  |  |
| Embodied Energy |  |  |
| Materials manufacture |  |  |
| Materials in use |  |  |
| Whole life costs (running costs) |  |  |
| Raw materials used |  |  |
| Local Env. impact |  |  |

**1.5 Issues relating to the listing of Buildings**



**Here we see a very unsympathetic development of a stark commercial building adjacent to a listed structure. The process of listing aims to avoid development that is inappropriate**  
**Reflective summary**  
  
**Review Task**  
  
In the area that you live or study, try to find out which buildings are listed and why.  
  
The Local Authority in your area will generally have a 'Conservation Officer' whose role is to ensure that the treatment of listed buildings and monuments is appropriate. It may be possible to identify conservation areas and listed buildings from the Local Authority website. Normally the basis of listing is associated with specific architectural and/or historic interest.  
  
Outline the difficulties for a developer when proposing works to a listed building.  
  
The implications of developing a listed building are significant and can have major effects upon the viability of commercially driven schemes. The controls that are applied to Listed Buildings are far stricter than normal planning controls that apply to other buildings. Although changes can be made listed buildings; there is a requirement to apply for Listed Building Consent and the flexibility of alterations allowed may be restrictive.   
lf a Listed Building is demolished, altered or extended without consent the Local Authority may serve a Listed Building Enforcement Notice requiring reinstatement. lf this is not possible, the building owner may be fined, imprisoned, or both.

In practice, most repair, maintenance and alteration to Listed Buildings requires Listed Building Consent. Work which involves replacing building elements, components and finishes in different styles or materials from the original will need consent, as will demolition works and extension or alteration. The listed elements of many buildings may be restricted to the external elevations but it is important to remember that the interiors of some buildings are also protected. Architectural features of the building interior such as staircases may often need to be retained. Boundaries to properties may also form part of the listed building and work to these elements may also require consent.

The vast majority of listed buildings are of considerable age and the need for ongoing repair and maintenance increases as they get older. In some situations the building may fall into a state of disrepair such that its special interest as a listed building is in danger. In such situations the Local Authority is may be forced to serve a "Repairs Notice". The notice will specify work that should be undertaken to bring the building up to an acceptable condition. If the required work is not carried out within a defined period, the Local Authority may acquire the building by compulsory purchase. They also have the power to undertake works and claim the cost from the owner. 

**1.6 Overview of statutory control of buildings**

**Reflective summary**  
With reference to statutory control remember:

* This is a process only recently applied in the history of building
* The first set of national building regulations was published in 1965
* Part M of the Building Regulations deal specifically with adapting buildings to accommodate disability
* Health and Safety needs to be considered in great detail when building forms, systems materials are specified.
* Major references for health and safety include:
* The Health and Safety at Work Act 1974
* The Management of Health and Safety at Work Regulations 1999
* Construction Health Safety and Welfare Regulations 1996
* COSHH (Control of Substances Hazardous to Health) Regulations(revised 1999)
* CDM(Construction Design and Management)Regulations(1994)

**Review Task**

What are the main implications of the requirements of Part M of the Building Regulations and how can these be difficult to achieve in refurbishment contracts?  
  
Part M deals with the principles of building design and construction that cater for improving access to buildings and providing suitable facilities for people with disabilities.  
Before any design is undertaken, the designer should assess the existing building, identify where there is non compliance and design in solutions to these problems. It may be deemed that it is impossible to comply with the regulations when undertaking a minor refurbishment and a more major scheme may be required. This will have a cost implication for the client who may wish to choose another building to refurbish. The statutory requirements concerning the provision of suitable adaptations of refurbishment of buildings is contained in the Building Regulations 2000, Access and Facilities for Disabled People-approved document M. Part M offers guidance on where the requirements apply, new buildings, extensions, alterations and external features. The specific matters dealt with are summarised as follows:

* Section 1: Means of access to and into buildings other than dwellings
* Section 2: Means of access within buildings other than dwellings
* Section 3: Use of buildings other than dwellings
* Section 4: Sanitary conveniences in buildings other than dwellings
* Section 5: Audience or spectator seating in buildings other than dwellings
* Section 6: Means of access to and into the dwelling
* Section 7:Circulation within the entrance storey of the building
* Section 8: Accessible switches and socket outlets in the dwelling
* Section 9: Passenger lifts and common stairs in blocks of flats
* Section 10: WC provision in the entrance storey of the building

The main areas that are likely to provide problems are associated with access provision such as ramps, widened door openings and so on as the capacity to deal with these in an existing building is limited.  
  
What are the requirements of clients and designers under the CDM regulations, and how are these roles made more difficult in refurbishment projects?