2009 PART IIB 4D16 CONSTRUCTION AND MANAGEMENT
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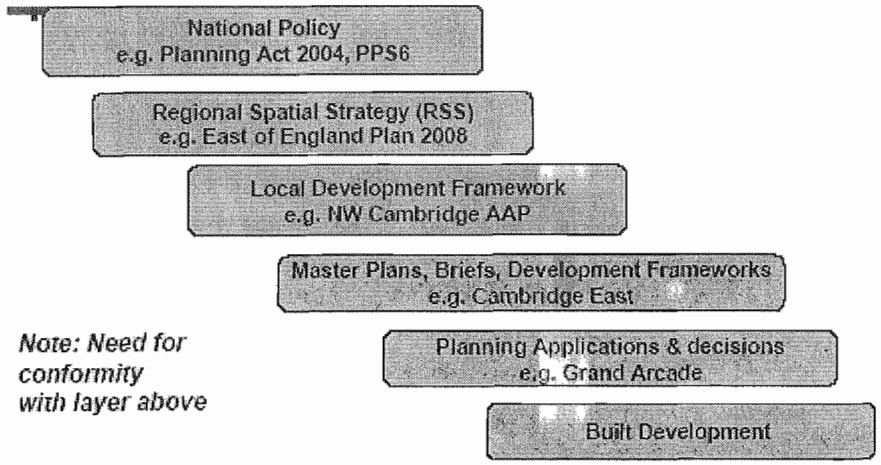
1. This question relates to the lectures given by Brian Human and Peter Guthrie.

(a) hierarchy of plans and planning guidance for new major developments in England and Wales



National Planning: Primary Legislation: TCPA 1947, Planning and Compulsory Purchase Act 2004, Planning Act 2008, Planning and Energy Act 2008. Other Legislation, Policy and Guidance: Sustainable Communities Plan 2003, Housing Green Paper 2007, Climate Change Act 2008. No prescriptive national land use plans or planning for whole country. Legislation supported by policy and guidance for local planning authorities, developers and inspectors. Circulars, PPS, PPG, MPG and RSS.

Regional spatial strategy: Provides broad development strategy: Articulate a spatial vision, Integration of policies and programmes spatially, Scale and distribution of new housing, Priorities for the countryside, Transport infrastructure, economic development, agriculture, minerals, waste, 15-20 years, Guides LDDs and LTPs, Prepared by RPB/RDA, approved by Government.

Local development framework: Folder of land use planning documents, LDS lists proposed LDDs, scope and content, LDDs include: DPDs (Core strategy, Site Specific allocations, Proposals Map, Area Action Plans, Other DPDs, e.g. Minerals), Non DPDs: Statement of Community Involvement, Supplementary Planning Documents, Local development Orders and simplified planning zones, Annual Monitoring Report. Plans and policies: Evidence based, Subject to sustainability appraisal. Broad content: Housing, Employment, Retail, Leisure, Community facilities, Public services, Transport, Sustainable development, e.g. energy. Development control policies: Protecting residential amenity, Protecting landscapes and natural resources, Nature conservation, Accessibility, Highways and transport, Protecting vitality and viability, Addressing visual impact.

Planning application: Outline, Full, Detail/reserved matters, Submit: Location/site plans, Drawings and plans, Supplementary information, e.g. Design and Access Statements, EIA/ES on larger schemes, Transport Impact Assessment (TIA).

Decisions: By local Planning Authority: District Council, County Council, e.g. minerals. Test against: National policy, Dev Plan Policy – primary consideration, Other material considerations, e.g. appeal decisions, public consultation. Issues: Land use, Size, Siting and design, Access, infrastructure.

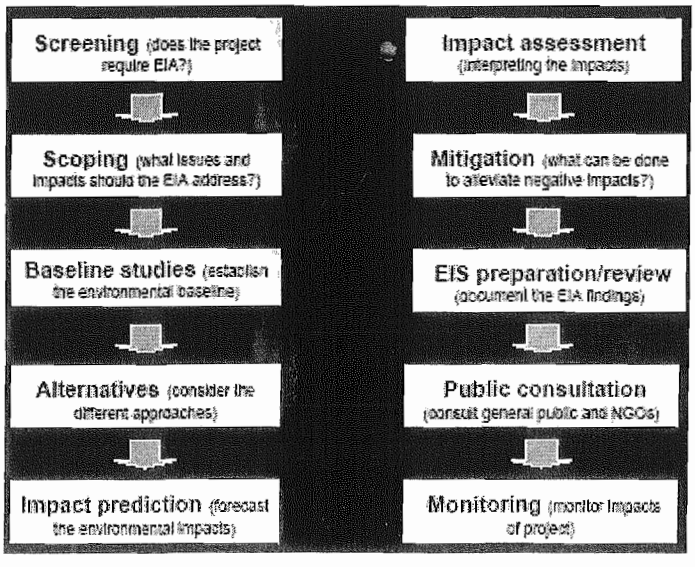
Section 106 agreements (S.106) are legal agreements between local authorities and developers, which are linked to a planning permission. These are also known as planning gain, planning benefits, community benefits or planning obligations. S106 legal agreements are associated with a particular development and as they are a legal charge on the land, they transfer automatically with any change in ownership. Section 106 agreements are drawn up when it is considered that a development will have negative impacts that can't be dealt with through conditions in the planning permission. For example, a new residential developments place additional pressure on the existing social, physical and economic infrastructure in the surrounding area. Planning obligations aim to balance the extra pressure from development, with improvements to the surrounding area, in order that a development makes a positive contribution to the local area.

Examples; Cambridge city centre Grand Arcade: Consistent with Local plan: Location, Land use, Amount. Strict design controls: Good design, Respect setting. Access and parking agreements. S106 agreements, e.g. Fisher Square, secure cycle parking cycle. [50%]

(b) Environmental impact assessment is a procedure that ensures that the environmental implications of decisions are taken into account before the decisions are made. The process involves an analysis of the likely effects on the environment, recording those effects in a report, undertaking a public consultation exercise on the report, taking into account the comments and the report when making the final decision and informing the public about that decision afterwards. In principle, environmental assessment can be undertaken for individual projects such as a dam, motorway, airport or factory ('Environmental Impact Assessment') or for plans, programmes and policies ('Strategic Environmental Assessment'). It is a Environmental Impact Assessment is a process, set down as a repeatable series of steps to be taken, to allow the environmental consequences of a proposed development to be assessed. The environmental consequences have to be those incremental effects which are due to the proposed development, and not those which are due to the passage of time or other developments not included in the proposal. It has 5 key principles: Procedural, Informational, Preventative, Participatory, Iterative. EIA directive: 97/11/EC.

Content of ES: Non Technical Summary, Description of the proposals, Assessment of Baseline conditions, Assessment of no development conditions, Assessment of conditions with development, Mitigation proposals. All conditions assessed for Construction phase (Temporary, Higher levels of impact usually deemed acceptable, Difficult to predict, very difficult to enforce conditions, Usually well influenced by effective consultation) and Operation phase (Long Term, Much less room for compromise on standards, Relatively simpler to predict, Less difficult to enforce conditions, as the conditions are on the project owner, Usually less influenced by effective consultation at scheme level, more at detailed level).

Stages of EIA:



Screening: Is an EIA needed? Some projects may have no significant environmental effects. A screening mechanism seeks to identify those projects with potentially significant adverse environmental effects. Two principal approaches to screening: the use of thresholds and case-by-case examination against criteria. Under the EIA Directive: EIA is mandatory for projects listed in Annex I of the Directive. EIA is required subject to Member States' thresholds and criteria for projects listed in Annex II of the Directive.
Scoping: The scope of an EIA is the issues and impacts it addresses. Scoping is the process of deciding which of a project's possible alternatives and impacts should be addressed in the EIA. An EIA should focus only on the significant issues and impacts. Scoping is carried out in discussions between the developer, the competent authority, relevant agencies and, ideally, the public. Effective scoping enables limited resources to be allocated to best effect (i.e. through investigation of only the most significant impacts). Scoping is not mandatory under the EIA Directive.
Baseline studies: Following the scoping phase, it is essential to assemble all the relevant information on the current status of the environment. The baseline study should anticipate the future state of the environment assuming the project is not undertaken - the 'no action alternative'. This provides the 'baseline' against which future impacts can be assessed. Baseline studies should be undertaken for each alternative site so that the relative severity of the impacts for each alternative can be assessed. New field work may necessary (e.g. ecological survey) if relevant data is not already available
Alternatives: EIA is ideally undertaken for a project and its alternatives (e.g. different locations, scales, designs). Alternatives are the 'raw material' of EIA. The US Council on Environmental Quality (CEQ) has described the discussion of alternatives as the 'heart' of the EIS. Many EISs fail to consider alternatives.
Impact prediction: Impact prediction involves forecasting the changes in the environment which will occur as a result of the development. Changes are forecast *relative* to the baseline. Various impact dimensions to consider (direct, indirect, cumulative, synergistic etc.). Forecasting methods include modelling, GIS, professional judgement. Key issues include uncertainty and the time horizon over which impacts are assessed.
Impact assessment: Impact assessment involves *evaluating* the **significance** of the impacts identified. Significance can be determined through professional judgement, reference to regulations etc. Potential for bias in determining what is significant. The conclusions of the impact assessment can ultimately be used by decision-makers (i.e. the local planning authority) when determining the fate of the project application.
Mitigation: Negative impacts on the environment identified during the EIA can be alleviated through mitigation measures. The mitigation hierarchy: Avoid - Reduce - Remedy - Compensate – Enhance. Impacts remaining after mitigation are known as residual impacts
EIS preparation/review: The Environmental Impact Statement (EIS) is a formal document which includes information on the development and information relating to screening, scoping, baseline studies, alternatives etc. Common requirement to include a non-technical summary. Once complete, the EIS is submitted to the competent authority (along with the planning application). The EIS is often reviewed (either formally or informally). The review enables the competent authority to decide whether the EIA is adequate, accurate and unbiased.
Public consultation: The EIA Directive provides for public consultation on the application for development and the EIS.
Monitoring: Monitoring should determine: the accuracy of the original predictions, the degree of deviation from the predictions, the possible reasons for any deviations, the extent to which mitigation measures have achieved their objectives.

Severn Tidal power scheme or any others. Air quality: Looking for: Oxides of nitrogen (NOx), Oxides of sulphur (SOx), Ozone O3, Particulates PM10 and now PM2.5, Dioxins and Furans for Incinerators, Particulates (dust), Odour. No legal standards. Most projects have very limited impact. Dioxins and Furans have become significant concerns since the extremely low levels

could be measured. Roads schemes always show improvement in air quality over next twenty years. Water quality: Aquifer protection zones, River designations, Ecology impacts, Hazard assessment from spills etc, Flooding, Drainage, Water supply, Wastewater treatment.

2. This refers to the make-up of a design team which would consist of an Architect who should have experience with stadium design, Structural engineers, services engineers, and a QS. The original engineer should decide whether the stadium, which is of modest size, should be built under a "design and build contract" or under a Management Construction contract via a 2 stage tender process. Ideally the student should give reasons for the selection related to the risks of cost and or time overruns.

Describe what stage the design team should be asked to take the design to for tender and what documents should be prepared for the tender.
If it is a D&B contract the design team would prepare the client's requirements documentation. These would consist of a concept design, performance specifications and trade specifications. For a 2 stage tender process the design would be taken to Scheme design stage, or possibly Design Development, plus performance and trade specifications for the selection of the Management Contractor.

Describe how the successful contractor would organise the final design and the work packages, how he would control his costs and where the design responsibility would lie. Use examples from the lectures where possible.
If it is D&B the Contractor would have to employ his own design team to take the design to at least scheme stage to agree the prices for the subcontracts before the full tender is submitted. Similarly the Management Contractor would employ a design team to prepare construction documents in order that the subcontractor prices can be agreed and the total agreed with the Client.

In both cases the contracts would require the Contractor to take full design responsibility but he would then pass this on to the design consultants through their agreements. In many cases the original design team is passed on to the contractor through a process whereby their contract is novated to the contractor. In this there is a novation agreement that provides for changes to the consultants agreement to meet the requirements of the contractor. In either case the consultants ongoing design responsibility is passed back to the Owner by means of a co-lateral warranty. Responsibility for the performance of the building lies with the contractor but the design responsibility lies with the design team who can be sued directly by the owner or his successor through the warranty.

3. Subcontracting: Relates to the talk by Peter Miller and other presentations on contractor's activities.

Main contractors do not always have expertise right across board, so they need to bring in specialist sub-contractors (e.g. to put up just the steel frame for a building) who does just that and goes away. Or there may be a need for a special piece of kit from a supply-only sub-contractor. Or rather than apply labour direct, and have problem of keeping them occupied at all times, the main contractor may use domestic sub-contractor to come in and do fairly ordinary work (carpentry etc) only when needed. So planning and supply driven towards sub-contracting and some advantages (tax) for domestic subcontracting hence prevalence. But some problems e.g. responsibility for safety as employees.

Expertise by appointing a preferred specialist early (as done with Watson Steel at Arsenal), consult over detailed design/get input on programme (Watson thoughts of several erection schemes – chose one best suited to overall scheme not just their own narrow purposes)
Control: by main contractor, programmes, supervisors etc
Example to come from the lectures.
(b) Various examples form the lectures.

4. (a) This refers to the lecture by Anthony Lavers. Under the traditional contract, or the law of tort, a professional was legally expected to exercise 'reasonable care and skill' in doing his/her work. Should do things consistent with what an 'ordinary competent practitioner' would have done. Reasonable steps have to be taken to ensure the suitability of a specified component etc. But in some contracts, e.g. Design and Build, the contractor is expected to ensure 'fitness for purpose' and would be liable for any defect whatever level of skill he had applied. Professionals should ensure that when working for a contractor (who has such liability) the liability is not somehow passed onto them. For example, if asked to give a warranty of their work, to ensure that the level is ' reasonable care and skill' and not the more onerous 'fitness for purpose'. Of course the professional could attempt to take out insurance against having held liable in such ways.

(b) This refers to the lecture given by Charles Hayward. Professional indemnity insurance is necessary in consultation work, but a significant overhead – protecting the professional against claims (or paying them when he is found liable for some action, inaction or deficiency) but also giving reassurance to a client (who would not employ someone without P11, against whom he could not recover if things went wrong). Hallmark of quality.
Cover legal liabilities for breach of contract, negligence or breach of statute (but not against fines in criminal courts). Usually has a limit of indemnity, norm say £5m: each and every claim.
Covers claims made in a certain time period (not claims for a certain project etc) – so it has to be maintained (even after retirement) until all possibility of a claim has passed. Requires notice to insurer of any potential claim.
Should be taken out by all professional firms, and all individuals acting as lone professionals – and kept alive as above. Claims can be for design errors, over-design (i.e. excessive cost of contractor), acting beyond experience or brief, delays in design information to contractor etc.

5. This question relates to the lectures on health and safety given by Chris Morley and risk management by Paul Craddock.

(a) 'Risk assessment' is a concept used frequently in health and safety, and in the CDM regulations. The idea is to think of all the hazards to which a construction job might be subject – all the things which might go wrong, from anyone's point of view not just site accidents – and attempt to assess the risk of each, i.e. the probability of occurrence and the severity of the consequence if it did happen. A professional in charge of some aspect of the job is expected to do, or ensure is done, a risk assessment for everything under his control – to try to ensure that all eventualities have been thought of, and steps taken to minimise the risk and/or its consequences. Risks can then by mitigated by avoidance, transfer (insurance) reduction and control measures.

'Risk management' as presented by Cradock was a rather wider concept, in that risk assessment was embedded within it, but essentially one was trying to arrange who (contractor, client, designer etc) bore the brunt of each risk – by for example having a sensible form of contract at the start, clear on such things. Thus, in a traditional form of contract there is a risk to the client that the contractor will complain about late delivery of information (drawings etc) and being held up therefore (and so wanting more money) – but in a design-and-build contract (a 'one-stop-shop') there is no risk to the client of such claims, because the designer is now working for the contractor. In some sense the risk has been transferred to the contractor, by the very form of contract. This would be an example as required under (i). Under (ii) there are obvious hazards to do with site working – injury due to dropped objects, or people falling from scaffolding – which may be provided against by site rules (e.g. wearing hard hats, or having rails and toeboards on the scaffolding). Other hazards may be to do with inclement weather – not so easy to predict, but provided against by arrangements in the contracts (e.g. the reporting arrangements under NEC, where teams must indicate how they are getting on, risks to programme completion on time (e.g. due to weather) so that steps can be taken to resolve the issue).

(b) Scales of risk on simple assessments, for any sort of hazard, can be quite simple – just likelihood (high, medium, low) and severity of consequence (also high, medium, low) so that one can see where the hazard falls on a diagram. Or you might have scales from one to five on each axis, and regard the 'risk' as the multiple of the two, ranging from 1 to 25. The idea is to point up the severe risks, so that mitigation efforts can be concentrated on the real dangers – precise measurement is not needed here. In the design phase, we have to consider the designer's responsibilities, e.g. under the CDM regulations – he is making decisions about what is to be done. So has to assess where the decision process might go wrong – inexperienced staff?, incorrect information for some reason, insufficient understanding of what the client wants, inappropriate decisions with consequences for safety on site (e.g. welding at height, operations required which are vulnerable to possible weather conditions). Here the designer is allowed to assume that the work will be undertaken by an experienced contractor – and does not have to assess the risk and possible consequences of an inexperienced contractor being appointed, only risks arising from the design which an experienced contractor would not have foreseen. Obvious problems of definition here – and what if you want to build a very innovative structure, of which no contractor has experience? And we must in all this have the concept that some level of risk will be acceptable, otherwise nothing would get built at all – but obvious scope for debate about what that level is (and simple scales like high/medium/low are not adequate to answer such questions; surely some estimated probabilities of loss or delay must be required).