

UNIVERSITY OF BOLTON

**SCHOOL OF THE BUILT ENVIRONMENT &
ENGINEERING**

**BSc(HONS) QUANTITY SURVEYING &
COMMERCIAL MANAGEMENT**

SEMESTER ONE EXAMINATION 2010/2011

CONSTRUCTION PROJECT ECONOMICS

MODULE NO: BLT2006

Date: Friday 21 January 2011

Time: 10.00 am – 12.00 noon

INSTRUCTIONS TO CANDIDATES:

This paper contains **FOUR** questions.

Answer **ALL** questions from Section A
and **ANY TWO** questions from Section
B.

ALL questions carry equal marks.

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Scenario

Doyle Hotels Ltd operates a large chain of budget hotels in Ireland. The chain currently owns and operates a portfolio of 28 separate budget hotels located predominantly in the Republic of Ireland. The firm uses a standard 78-bedroom format for each hotel which also incorporates breakfast facilities, bar and two meeting rooms, all provided within a three storey building with a typical gross internal floor area of 2,550m², with bedroom having a gross internal floor area of 20m².

Doyle Hotels now wish to expand into the UK market place, predominantly focusing on Scotland and Northern England. To facilitate this expansion Doyle hotels are looking to develop a total of 30 new hotels over the next ten years.

It is intended that the company's standard design comprising of a three storey, L Shaped, concrete framed building with brick cladding and aluminium doors and windows and a basic level of finishing's throughout.

Cost data from a similar 78 bedroom Holiday Inn Express development in Wellingborough, Northamptonshire completed in November 1998, indicates a tender price of £2,065,000 which is inclusive of professional fees breaking down to £795.00/m² G.I.F.A. An additional sum of £400,000 was also expended which covered fixtures and fittings (Building, 1999)

Doyle Hotels have identified two possible sites for the initial development.

Glasgow

A Greenfield site near to the M8 Motorway, located on the periphery of a recently constructed out of town shopping complex (bulky items only) the site is fairly level with a slight north facing slope with a rectangular shape, measuring some 3000m² overall. The site is well serviced for both utilities and infrastructure connections and the Site Investigation report revealed excellent load bearing strata.

The client feels the site is well located with excellent infrastructure connections allowing the development to attract business travellers heading to both Glasgow and Edinburgh.

Newcastle

A city centre Brownfield site, located close to the Eldon Garden Shopping Centre and Newcastle University the site is in a prime location, however access to the front of the site is restricted by a large pedestrianised area. In addition, the site would only allow for the construction of a building with a maximum footprint area of 400m². However, the client feels this site presents an ideal business opportunity given its location and proximity to the city centre.

Please turn the page

Section A – Compulsory Question

1. The client has provided you with some previous tender data for a similar development completed in 1998 (see paragraph four in the scenario) to allow you to extrapolate the initial costs for the scheme.
- a) Using the tables in appendix one, update the figures quoted above to provide an initial budget cost for the project.
(6 Marks)
- b) Explain the principles of this type of Early Cost Advice, highlighting the relative merits and drawbacks associated with various techniques available.
(10 Marks)
- c) Discuss the reliability of the raw cost data provided for forecasting the costs on this development.
(14 Marks)
- d) Elemental Cost Plan One at Sage C in the RIBA Plan of works (Stage 3a in the OGC Gateway) has resulted in a revised cost of £3,350.00/m² GIFA. How would you advise the client to deal with this situation?
(10 Marks)

Total 40 Marks

Section B – Answer ANY TWO of these questions

2. Given the site conditions in Newcastle, the architect has developed the following two proposals:
- Rectilinear shaped building over five storeys.
 - 'L' shaped building over seven storeys.

Advise the architect on the economics of design for the two proposed solutions. Your answer should also comment on how these changes affect the reliability of the cost estimate you produced in response to the question contained in section A of this examination paper.

20 Marks

3. The architect has suggested to Doyle Hotels Ltd that a steel framed solution might provide a more economical alternative to the use of in-situ concrete. Using both the tables in appendix one and the BICS cost data in appendix two of this examination paper, appraise the relative economic merits of using a steel frame for this development (you can use either site as a basis for your answer to this question)

20 Marks

4. Wolstenholme's (2009) seminal report for Constructing Excellence calls on construction professionals to consider how buildings provide long term value benefits to the user over their anticipated life cycle.

To what extent do you think cost planning aligns with this vision?

20 Marks

END OF QUESTIONS

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Appendix One

Tender Price Indices Data:

Date	Index	Status	Sample	On Year	On Quarter	
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1Q1998	141		52	5.2 %	0.7 %	
2Q1998	147		59	7.3 %	4.3 %	
3Q1998	148		65	5.7 %	0.7 %	
4Q1998	146		66	4.3 %	-1.4 %	

1Q2006	228		76	3.2 %	0.9 %	
2Q2006	231		85	1.3 %	1.3 %	
3Q2006	228		75	3.2 %	-1.3 %	
4Q2006	232		61	2.7 %	1.8 %	

1Q2009	223		64	-10.4 %	-7.1 %	
2Q2009	216		52	-12.6 %	-3.1 %	
3Q2009	215		61	-12.6 %	-0.5 %	
4Q2009	212		57	-11.7 %	-1.4 %	

1Q2011	210	Forecast		1.0 %	0.5 %	
2Q2011	212	Forecast		1.4 %	1.0 %	
3Q2011	213	Forecast		1.9 %	0.5 %	
4Q2011	215	Forecast		2.9 %	0.9 %	
1Q2012	217	Forecast		3.3 %	0.9 %	
2Q2012	219	Forecast		3.3 %	0.9 %	
3Q2012	220	Forecast		3.3 %	0.5 %	

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Location Data

Location	Index	90% confidence interval	Standard Deviation	Range	Sample
Wellingborough	95	90-100	10	74-110	12
Glasgow City	105	103-106	10	84-139	145
Newcastle upon Tyne	96	93-99	11	71-130	52
Doncaster	102	98-106	10	82-117	20
Chesterfield	92	89-96	8	75-107	18

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Appendix Two

BCIS *Online* - Elemental analysis number 24512

Building Function :	852. - Hotels		
Type of Work :	New build		
Gross Floor Area :	3,895 m ²		
Job Title :	Hotel, Robin Hood Airport		
Location :	Doncaster, South Yorkshire		
District :	Doncaster		
Grid Reference :	SE5703		
Dates :	Receipt : 31-Jul-2006 Base : 31-Jul-2006		
Project Details :	4 storey 100-bed hotel together with external works including macadam and precast concrete paving, fences and gates, landscaping, services, drainage, site lighting, refuse store.		
Site Conditions :	Level green field site with good ground conditions. Unrestricted working space and access.		
Market Conditions :	No details. Excludes £237,936 design fees.		
Client :	Peel Investments (North) Ltd		
Selection of Contractor :	Selected competition		
No of Tenders :	Issued : 5 Received : 5		
Contract :	JCT with Contractor's Design 1998		
Contract Period (mths) :	Stipulated : 11 Offered : - Agreed : 11		
Cost Fluctuations :	Fixed		
Basis of Analysis :	Contract sum excludes fees and charges		
Tender List :	£ 4,295,743	-	
	£ 4,716,158	9.8%	
	£ 4,846,503	12.8%	
	£ 6,329,815	47.4%	
	£ 6,898,907	60.6%	
Contract Breakdown			
Measured Work	£ 4,610,376		
Provisional Sums	£ 0		
Prime Cost Sums	£ 0		
Preliminaries	£ 818,881		
Contingencies	£ 2,500		
Contract Sum	£ 5,431,757		
Accommodation and Design Features : 4 storey 100-bed hotel. Concrete pad/strip foundations and bed. Steel frame and roof. Brick and metal clad walls; curtain walling. Partitions and doors. Plaster and tiles to walls; vinyl, timber laminate, carpet and tile flooring; suspended ceilings. Bedroom, restaurant and bar fittings. Electric light, power and heating, air conditioning, ventilation. Lifts. Fire, intruder and panic alarms, CCTV, door entry, PA, data cabling, kitchen equipment, fall arrest, PA, firefighting, TV, emergency lighting. External works, services, drainage, site lighting, refuse store.			
Basement	0 m ²	Area of External Walls	- m ²
Ground Floor	974 m ²	Wall to Floor Ratio	- %

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Upper Floors	2,921 m ²	Average Storey Heights	
		Basement	- m
Gross Floor Area	3,895 m ²	Ground	- m
		Upper	- m
Usable Area	- m ²		
Circulation Area	- m ²	Internal Cube	- m ³
Ancillary Area	- m ²		
Internal Divisions	- m ²	Spaces Not Enclosed	- m ²
Gross Floor Area	3,895 m ²	Number of Units	1
Storeys as % of Gross Floor Area:			
		4 storeys	100.00%

Analysis

Element	Total Cost	Cost per m ²	Element Unit Quantity	Element Unit Rate	Percentage
1 Substructure	£ 104,645	£ 26.87			2 %
2A Frame	£ 217,946	£ 55.96			4 %
2B Upper floors	£ 134,238	£ 34.46			2 %
2C Roof	£ 213,383	£ 54.78			4 %
2D Stairs	£ 92,576	£ 23.77			2 %
2E External walls	£ 350,354	£ 89.95			6 %
2F Windows and external doors	£ 32,004	£ 8.22			1 %
2G Internal walls and partitions	£ 194,042	£ 49.82			4 %
2H Internal doors	£ 123,970	£ 31.83			2 %
2 Superstructure	£ 1,358,513	£ 348.78			25 %
3A Wall finishes	£ 123,060	£ 31.59			2 %
3B Floor finishes	£ 205,034	£ 52.64			4 %
3C Ceiling finishes	£ 115,109	£ 29.55			2 %
3 Internal finishes	£ 443,203	£ 113.79			8 %
4 Fittings	£ 636,416	£ 163.39			12 %
5A Sanitary appliances	£ 492,255	£ 126.38			9 %
5B Services equipment	£ 37,320	£ 9.58			1 %
5C Disposal installations	Included in element 5F				
5D Water installations	Included in element 5F				
5E Heat source	Included in element 5F				
5F Space heating and air treatment (Costs include other elements)	£ 356,131	£ 91.43			7 %
5G Ventilating systems	Included in element 5F				
5H Electrical installations (Costs include other elements)	£ 675,080	£ 173.32			12 %
5I Gas installations					
5J Lift and conveyor installations	£ 44,140	£ 11.33			1 %

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5K Protective installations	Included in element 5H			
5L Communications installations	Included in element 5H			
5M Special installations				
5N Builder's work in connection				
5O Builder's profit and attendance				
5 Services	£ 1,604,926	£ 412.05		30 %
Building sub-total	£ 4,147,703	£ 1,064.88		76 %
6A Site works	£ 271,417	£ 69.68		5 %
6B Drainage	£ 127,361	£ 32.70		2 %
6C External services	£ 63,895	£ 16.40		1 %
6D Minor building works				
6 External works	£ 462,673	£ 118.79		9 %
7 Preliminaries	£ 818,881	£ 210.24		15 %
Total (less Contingencies)	£ 5,429,257	£ 1,393.90		100 %
8 Contingencies	£ 2,500	£ 0.64		
Contract sum	£ 5,431,757	£ 1,394.55		100 %

Specification

Element	Specification
1 Substructure	Concrete strip and pad foundations; RC floor slab and lift pit.
2A Frame	Steel frame.
2B Upper floors	PCC floor slabs.
2C Roof	Steel roof with undefined cladding. Fall arrest system.
2D Stairs	Undefined.
2E External walls	Brick and metal clad walls. Curtain walling.
2F Windows and external doors	Undefined windows.
2G Internal walls and partitions	Block partitions.
2H Internal doors	Undefined.
3A Wall finishes	Plaster, paint only and ceramic tiles.
3B Floor finishes	Vinyl, carpet, ceramic tile and laminate flooring.
3C Ceiling finishes	Suspended ceilings.
4 Fittings	Fittings, including bar and restaurant fittings.
5A Sanitary appliances	Sanitaryware.
5B Services equipment	Kitchen equipment.

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5C	Disposal installations	Soil and waste pipes.
5F	Space heating and air treatment	Electric heating. Air conditioning.
5G	Ventilating systems	Local and ducted ventilation.
5H	Electrical installations	Electric light and power.
5J	Lift and conveyor installations	Lifts.
5K	Protective installations	Firefighting equipment.
5L	Communications installations	PA, fire, intruder and panic alarms, CCTV, TV, data cabling, door entry, induction loop.
5N	Builder's work in connection	Builder's work in connection with services.
6A	Site works	Site preparation. Block and macadam paving, landscaping, walls.
6B	Drainage	Drainage.
6C	External services	Services. Site lighting.
6D	Minor building works	Refuse stores; services enclosure.
7	Preliminaries	17.76% of remainder of Contract Sum (excluding Contingencies).
8	Contingencies	0.05% of remainder of Contract Sum (excluding Preliminaries).

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BCIS Online - Elemental analysis number 25910**B - 7 (5) - 7,338**

Building Function :	852. - Hotels
Type of Work :	New build
Gross Floor Area :	7,338 m ²
Job Title :	Hotel and Offices, Lockoford Lane
Location :	Chesterfield, Derbyshire
District :	Chesterfield
Grid Reference :	SK3871
Dates :	Receipt : Jun-2009 Base : Jun-2009 Acceptance : 30-Jul-2009 Possession : 17-Aug-2009
Project Details :	100-bed hotel and offices together with external works including paving and roads, services, drainage, site lighting, sub-station, refuse store and pavilion.
Site Conditions :	Level demolition site with good ground conditions. Excavation above water table. Unrestricted working space and access.
Market Conditions :	Two stage tendering, design and build tender.
Client :	Bradbury Hall Developments Ltd
Tender Documentation :	Employers Requirements (for Design and Build)
Selection of Contractor :	Design and build - negotiated
No of Tenders :	Issued : 4 Received : 4
Contract :	JCT design and build contract 2005 edition
Contract Period (mths) :	Stipulated : - Offered : 12 Agreed : 12
Cost Fluctuations :	Fixed
Basis of Analysis :	Altered - no details
Contract Breakdown	
Measured Work	£ 11,119,831
Provisional Sums	£ 132,250
Prime Cost Sums	£ 1,587,606
Preliminaries	£ 1,143,622
Contingencies	£ 14,250
Contractor Design Fees	£ 343,588
Contract Sum	£ 14,341,147
Accommodation and Design Features : 100-bedroom, 7 storey hotel with 150 seat restaurant, 250 seat theatre, function, meeting and conference rooms to ground and first floors with insitu concrete frame, bedrooms to second, third and fourth floors with PCC frame and 1816m ² offices on fifth and sixth floors with steel frame. Piles. Upper floors, stairs, walls, roof, windows, partitions and doors. Vinyl and carpet flooring; plasterboard and suspended ceilings. Fittings. Sanitaryware. Electric light	

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and power. Lifts. Kitchen equipment, fire alarm, CCTV. External works, services, drainage.			
Basement	0 m ²	Area of External Walls	- m ²
Ground Floor	1,064 m ²	Wall to Floor Ratio	- %
Upper Floors	6,274 m ²	Average Storey Heights	
		Basement	- m
Gross Floor Area	7,338 m ²	Ground	- m
		Upper	- m
Usable Area	- m ²	Internal Cube	- m ³
Circulation Area	- m ²	Spaces Not Enclosed	- m ²
Ancillary Area	- m ²		
Internal Divisions	- m ²		
Gross Floor Area	7,338 m ²	Number of Units	-
Storeys as % of Gross Floor Area:			
		5 storeys	13.38%
		7 storeys	86.62%

Analysis

Element	Total Cost	Cost per m ²	Element Unit Quantity	Element Unit Rate	Percentage
1 Substructure	£ 231,870	£ 31.60			2 %
2A Frame	£ 926,640	£ 126.28			7 %
2B Upper Floors	£ 385,987	£ 52.60			3 %
2C Roof	£ 165,277	£ 22.52			1 %
2D Stairs	£ 172,602	£ 23.52			1 %
2E External Walls	£ 1,354,109	£ 184.53			10 %
2F External Windows and Doors	£ 796,971	£ 108.61			6 %
2G Internal Walls and Partitions	£ 773,004	£ 105.34			6 %
2H Internal Doors	£ 558,909	£ 76.17			4 %
2 Superstructure	£ 5,133,499	£ 699.58			37 %
3A Wall Finishes	£ 128,780	£ 17.55			1 %
3B Floor Finishes	£ 303,176	£ 41.32			2 %
3C Ceiling Finishes	£ 338,709	£ 46.16			2 %
3 Finishes	£ 770,665	£ 105.02			6 %
4 Fittings and Furnishings	£ 2,191,425	£ 298.64			16 %
5A Sanitary Appliances	£ 565,005	£ 77.00			4 %
5B Services Equipment					
5C Disposal Installations	Included in element 5H				
5D Water Installations					
5E Heat Source					
5F Space Heating and Air Conditioning	Included in element 5H				
5G Ventilating Systems					
5H Electrical Installations (Costs	£ 2,277,131	£ 310.32			16 %

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include other elements)				
5I Fuel Installations				
5J Lift and Conveyor Installations	£ 305,752	£ 41.67		2 %
5K Fire and Lightning Protection				
5L Communications and Security Installations				
5M Special Installations	£ 337,594	£ 46.01		2 %
5N Builder's Work in Connection				
5O Management of the Commissioning of Services				
5 Services	£ 3,485,482	£ 474.99		25 %
Building Sub-total	£ 11,812,941	£ 1,609.83		84 %
6A Site Works	£ 734,018	£ 100.03		5 %
6B Drainage	£ 191,978	£ 26.16		1 %
6C External Services	£ 90,000	£ 12.26		1 %
6D Minor Building Works	£ 10,750	£ 1.46		
6E Demolition and Work Outside the Site				
6 External Works	£ 1,026,746	£ 139.92		7 %
7 Preliminaries	£ 1,143,622	£ 155.85		8 %
8 Contingencies	£ 14,250	£ 1.94		
Total (less Design Fees)	£ 13,997,559	£ 1,907.54		100 %
9 Design Fees	£ 343,588	£ 46.82		2 %
Total Contract sum	£ 14,341,147	£ 1,954.37		102 %

Specification

	Element	Specification
1	Substructure	Piled foundations.
2A	Frame	Insitu concrete frame to ground and first floors; PCC frame to second, third and fourth floors; steel frame to fifth and sixth floors.
2B	Upper Floors	Undefined.
2C	Roof	Undefined.
2D	Stairs	Undefined stairs with steel balustrades.
2E	External Walls	Undefined.
2F	External Windows and	Undefined.

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	Doors	
2G	Internal Walls and Partitions	Undefined.
2H	Internal Doors	Undefined.
3A	Wall Finishes	Undefined.
3B	Floor Finishes	Vinyl and carpet flooring.
3C	Ceiling Finishes	Soundbloc, plasterboard ceilings. Suspended ceilings.
4	Fittings and Furnishings	Fittings.
5A	Sanitary Appliances	Bathroom pods and sanitaryware.
5B	Services Equipment	Kitchen equipment.
5C	Disposal Installations	Soil and waste pipes.
5F	Space Heating and Air Conditioning	Undefined.
5H	Electrical Installations	Electric light and power. Emergency lighting.
5J	Lift and Conveyor Installations	Lifts.
5L	Communications and Security Installations	Fire alarm and CCTV.
5M	Special Installations	Hotel management system.
5N	Builder's Work in Connection	Builder's work in connection with services.
6A	Site Works	176 space car park and undefined works.
6B	Drainage	Drainage.
6C	External Services	Gas, water and electricity mains.
6D	Minor Building Works	Sub-station, refuse store and wedding pavilion.
7	Preliminaries	8.91% of remainder of Contract sum (excluding Contingencies).
8	Contingencies	0.11% of remainder of Contract Sum (excluding Preliminaries).
9	Design Fees	2.45% of Contract sum.