

**UNIVERSITY OF SOUTH AUSTRALIA
SCHOOL OF GEOINFORMATICS, BUILDING AND PLANNING**

FIRST SEMESTER EXAMINATION 1998

**QUANTITY SURVEYING 2N
(Professional Practice)**

Subject Code: 10290

Date of Examination: Saturday, 27th June 1998

Examiner: J Deans

General Instructions to Candidates:

Time: 3 hours

Write your name on the examination answer booklet.

This is a **Closed Book** examination.

Candidates must include all loose worksheets with their answer books and be clearly marked with their Student ID No.

The paper is divided into three parts (equal marks)

**BREAKDOWN
OF MARKS**

(i) PRE-CONTRACT PRACTICE

QS Services prior to signing of construction contract

Answer Question 1 (compulsory) (20%)

plus any other 1 question from this section (10%)

(ii) POST CONTRACT PRACTICE

QS Services during construction works

Answer Question 1 (compulsory) (20%)

plus any other 1 question from this section (10%)

(iii) OTHER QS SERVICES

Answer Question 1 (compulsory) (20%)

plus any other 1 question from this section (10%)

NEATNESS & GENERAL PRESENTATION (10%)

(i) PRE-CONTRACT PRACTICE

QUESTION 1 (COMPULSORY)

CONSTRUCTION CASH FLOW

You are a successful Quantity Surveyor/Developer and intend building a 2-storey block of student apartments on North Terrace to keep for your own long-term investment. In 1 hour you have to present to your bank for a loan application an Indicative Construction Cash Flow, but you do not have access to "Fincash".

Your Trade Budget Estimate for the construction work amounts to \$3,040,700 and it has been decided to deduct a 10% retention sum from each payment to the builder in lieu of a retention bond and that the period for payment is to be one (1) month.

Prepare a tabulated monthly cash flow on Worksheet No. 1 based on the preliminary construction program and trade cost information extracted from your cost plan and as scheduled on Worksheet No. 1 showing the estimated net and cumulative monthly draw down amounts for the proposed construction work.

(i) PRE-CONTRACT PRACTICE (cont)

QUESTION 2 (OPTIONAL)

COST PLANNING PROCEDURES

(a) Define the following cost estimate terms and describe the level of detail and the source of information used for the preparation of each estimate:

1. Indicative Cost Estimate
2. Preliminary Cost Estimate
3. Limit of Cost Estimate
4. Pre-Tender Cost Estimate

What percentage range of accuracy would be expected for each level of estimate?

(b) You are a consultant quantity surveyor preparing an Elemental Cost Plan for a proposed 10-storey apartment building in a major city.

In which "ELEMENT" would you include the estimated cost of the following items of work:

1. Temporary water supply
2. Formwork to suspended floor slabs
3. Ground floor reception counter
4. Fire sprinklers
5. Office suspended ceilings
6. Lift shaft walls
7. Fire doors
8. Basement excavation
9. Tower crane
10. Contractors all risk insurance
11. The builder's managing director's company car
12. Wheelbarrows

If the item is a "PRELIMINARIES" item state if this is a "Time Related" of "Non-Time Related" item or a combination of both.

(c) A construction cash flow can be represented by a "Lazy S" curve.

1. Draw a graphical representation of a typical curve and annotate the horizontal and vertical axes.
2. Why is the curve an "S" rather than a straight line.
3. On a typical "S" curve why is it that only 50% of the contract cost will be expended at 60% of the contract period.

(i) PRE-CONTRACT PRACTICE (cont)

QUESTION 2 (OPTIONAL)

COST PLANNING PROCEDURES (cont)

4. List the major items that determine the shape of a Construction Cash Flow 'S' curve and briefly explain each.
- (d) When preparing a Construction Cash Flow, should the activities be based on "elemental" or "trade" costs. Give your reason with an example.

(i) PRE-CONTRACT PRACTICE (cont)

QUESTION 3 (OPTIONAL)

TENDER ACCEPTANCE

The following tenders (based on Bills of Quantities) for the construction of a new medical centre in Adelaide have just been opened and the results in order of price are as follows:

Digerydo Builders Pty Ltd	2,850,000
WamBam Construction Pty Ltd	3,445,000
Speedie Builders Pty Ltd	3,455,000
Harold Wilson & Sons Pty Ltd	3,510,000
Go Go Developments Pty Ltd	3,590,000
Fast Erect Pty Ltd	4,000,000
Q.S Pre-tender Cost Estimate	3,485,000

You are the consultant Q.S for the project and you have been asked by the client to explain to him how you will check and advise him on the importance of the scrutiny of the lowest tenders received and in particular:

1. The price range of tenders received
2. Acceptance of the lowest tender - Risks/benefits
3. Checking of the unit rates in the B.Q's
4. "Front End Loading" of prices/trades
5. Breakdown of **Preliminary** items
6. Any conditions/alternatives/qualifications submitted by the tenderers.

The tenders received are for a "Fixed Lump Sum Price" (no rise and fall) and a construction period of 9 months. However, the second lowest tenderer has offered an "alternative" reduced tender price of \$3,350,000 but with the proviso that he will be paid for any escalation in costs. Your assessment of the likely Building Price Indices from the date of tender to the estimated completion date are as follows:

	DATE OF TENDER	Mont h 1	Mont h 2	Mont h 3	Mont h 4	Mont h 5	Mont h 6	Mont h 7	Mont h 8	Month 9
PROJECTED BP/INDEX	111.5	112.3	113.6	114.2	115.7	116.2	117.1	118.3	118.9	119.75

What would be your advice to the client?

(i) PRE-CONTRACT PRACTICE (cont)

QUESTION 3 (OPTIONAL)

TENDER ACCEPTANCE (cont)

On checking the bills of quantities submitted by the lowest tenderer the following trades are found to have arithmetical errors:

TRADE	SUBMITTED TENDER PRICE	CORRECTED TENDER PRICE	PC/ PROVISIONAL SUMS IN TRADE
STRUCTURAL STEELWORK	\$192,260	\$203,450	NIL
HARDWARE	\$109,205	\$110,750	\$85,000
PLUMBING & DRAINAGE	\$75,210	\$71,970	NIL

What would be the percentage adjustment to be applied to each of the above trades for pricing of any variations that may occur during the course of the contract.

Explain the importance of the following documents that should be produced by the builder and scrutinised by you at the time of the signing of the contract or shortly thereafter:

1. Contractors all risks insurance
2. Contractors public liability insurance
3. Performance bond
4. Retention bond
5. Construction works program.

(ii) POST CONTRACT PRACTICE

QUESTION 1 (COMPULSORY)

RISE & FALL CONTRACT PROGRESS PAYMENTS

1. In January '97 a builder signed a contract for the construction of a new shopping centre in Adelaide and he commenced work on site on 1st March 1997 and completed the work on 31st May 1998. The contract conditions provided for the payment of "Rise and Fall" based on an agreed construction cost index published by the government.

Worksheet No. 2 tabulates the actual progress payments made to the builder together with the appropriate construction cost index for each month. Complete the schedule on Worksheet 2 to show the escalation payable to the builder each month, the total escalated value for each month and the escalated final account sum.
2. What is:
 - a) the "overall percentage" for escalation from the date of tender to the completion date?
 - b) the approximate equivalent "annual percentage" for escalation?
3. Using a "Rule of Thumb" show how you would calculate the estimated final building cost for the same project (excluding variations).
4. Discuss the advantages and disadvantages of a "Rise and Fall" type contract for both the builder and proprietor and the various associated risks.

**(ii) POST-CONTRACT PRACTICE
QUESTION NO. 1**

WORKSHEET NO. 2

Student ID No

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ACTUAL VALUE OF WORK EXECUTED

MONTH	COST ADJUSTMEN T INDEX	VALUE OF WORK AT BQ RATES	VALUE OF VARIATION S AT BQ RATES	TOTAL VALUE OF WORK AT BQ RATES	VALUE OF ESCALATION	TOTAL ESCALATED VALUE
TENDER DATE JAN 97	123.47					
MAR 97	125.15	\$130,400	-			
APR 97	125.95	\$187,800	\$10,500			
MAY97	126.70	\$196,800	\$3,500			
JUN 97	127.60	\$215,500	\$35,500			
JUL 97	128.20	\$327,300	-			
AUG 97	129.30	\$426,300	\$27,800			
SEPT 97	130.10	\$606,700	-			
OCT 97	130.85	\$709,800	\$10,500			
NOV 97	131.75	\$597,900	-			
DEC 97	132.65	\$438,000	-			
JAN 98	133.50	\$278,900	\$15,500			
FEB 98	133.75	\$199,700	-			
MAR 98	134.40	\$197,900	\$6,000			
APR 98	134.70	\$177,900	-			
MAY 98	135.10	\$177,800	-			
		\$4,868,700	\$109,300			

Contract Sum: \$4,868,700

Date of Tender: 30th January 1997

Cost adjustment index at Date of Tender: 123.47

(ii) POST CONTRACT PRACTICE (cont)

QUESTION 2 (OPTIONAL)

SITE ADMINISTRATION

- (a) Draw a typical construction project "Organisation Chart" showing the position and inter-relationship of the Client, Consultant Team, the Builders Team and his Sub-contractors.
- (b) Give a brief definition of the roles and responsibilities of the following key members of the project team:
1. Builders Project Manager
 2. Builders Site Engineer
 3. Builders General Foreman
 4. Consultant Design Architect
 5. Consultant Quantity Surveyor
- (c) Define the following terms and explain briefly their purpose and how they are used to adjust the original contract sum:
1. Liquidated and ascertained damages
 2. Site instruction
 3. Provisional sum
 4. Daywork schedule
 5. Variation order
- (d) What is the importance of:
1. A site diary
 2. Maintaining a drawing receipt register
 3. Date/time rubber stamp
 4. A site camera
 5. Site survey plan showing original ground levels

(ii) POST CONTRACT PRACTICE (cont)

QUESTION 3 (OPTIONAL)

MONTHLY PROGRESS CLAIM

- (a) You are the owner of a building company who have recently won a contract for the construction of a new night club entertainment venue in the campus grounds of the University of South Australia. The tender was based on specification and drawings (i.e. No. B.Q) and you have already agreed with the consultant QS the cost breakdown of the various trades for the purpose of progress payments.

You are now preparing progress payment claim No. 3 and Worksheet No. 3 shows your estimation of the percentage progress of work for each trade.

The salient points of the contract are as follows:

Preliminaries	\$113,000
Main Building	\$843,000
Siteworks	\$104,000
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	\$1,060,000
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Contract Period: 5 months

Retention Fund: 10% of value of work executed up to a maximum of 5%.

Total value of previous payments on account (1 & 2) = \$255,500

Prepare progress payment claim No. 3 on Worksheet No. 3 and show the retention sum to be held and the net amount now due to you, the builder.

- (b) From a builders point of view, discuss the various advantages/disadvantages of the following contractual arrangements:
1. A retention bond provided by your bank in lieu of a retention sum being held on progress payments.
 2. The use of Bills of Quantities on this size of project.
 3. The period for payment of progress claims to be 7 days in lieu of 30 days.
 4. Liquidated damages for late completion \$5,000 per day.
 5. A bonus to be paid for early completion/a penalty to be claimed for late completion.
 6. A shorter or a longer construction time.

**(ii) POST CONTRACT PRACTICE
QUESTION 3**

WORKSHEET NO. 3

Student ID No.

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Preliminaries

Pre-Agreed Stage Payment Schedule

Progress Payment No. 3

Work Completed

Month 1	15,700	✓
Month 2	30,000	✓
Month 3	30,000	✓
Month 4	30,000	
Month 5	7,300	
	<u>\$113,000</u>	

Main Building

Pre-Agreed Stage Payment Schedule

Progress Payment No. 3

% of Work Completed

Stage	Description	\$ Value	% of Work Completed
	Concrete Raft	184,000	100%
	Wall Framing 1	54,000	100%
	Wall Framing 2	43,000	100%
	Hot & Cold 1	12,000	100%
	Plumber 1	15,000	70%
	Brickwork 1	79,000	100%
	Roof Framing	55,000	100%
	Roof Covering	42,000	95%
	Electrician 1	15,000	50%
	Timber Flooring	65,000	5%
	Wet Area Floors	18,000	25%
	Entrance Floor	15,000	5%
	Ceilings	26,000	40%
	Wall Linings	35,000	30%
	Flushing & Cornice	9,000	10%
	Wall Tiling	22,000	5%
	Carpenter 2	72,000	25%
	Electrician 2	11,000	5%
	Hot & Cold 2	13,000	-
	Plumber 2	21,000	-
	Painting	32,000	5%
	Finish Key/HO	5,000	
		<u>\$843,000</u>	

Site Works

Pre-Agreed Stage Payment Schedule

Progress Payment No. 3

% of Work Completed

Description	\$ Value	% of Work Completed
Water Reticulation	5,000	60%
Stormwater Drain	10,000	40%
Electrical Dist.	12,000	80%
Kerbs/Gutters/Edging	8,000	30%
Paving & Driveway	25,000	20%
Fence/Gate/Ret. Walls	18,000	5%
Roadway	9,000	15%
Sewer Drainage	12,000	80%
Lawns & Garden	5,000	10%
	<u>104,000</u>	

Progress Payment No. 3 - To Builder

\$

(iii) OTHER QS SERVICES

QUESTION 1 (COMPULSORY)

REPLACEMENT INSURANCE VALUATION

You are a consultant QS and have been requested by a building owner to provide a Certificate for Replacement Insurance for a suburban shopping centre as at today's date.

The salient factors are:

Current Estimated Construction Cost of Building	\$6,750,000
Current Estimated Cost of Demolition of Building	\$50,000
Insurance "Renewal" Date	30th June 1998

Time allowance from today for:

(1)	Demolition)	2 months
(2)	Design & Approval, Documentation, Tender Period & Acceptance)	7 months
(3)	Construction Period)	15 months

Allow for architects and consultants fees - 11%

Allow price escalation 3% per annum.

Prepare a statement showing the build up of the total estimated cost of replacement.

State what items are specifically excluded from the estimated cost of replacement.

The building owner has suggested that he may reduce the replacement value shown on your certificate in order to lower his insurance premium. What would be your advice to him?

(iii) OTHER QS SERVICES

QUESTION 2 (OPTIONAL)

You have been asked to give evidence as an "expert witness" in a legal dispute between a builder who is claiming loss of profit and loss of opportunity due to alleged delays caused by the default of the proprietor.

As an expert in your profession explain:

1. What are your duties and role as an expert witness?
2. What would be the ideal qualities an expert witness should have?
3. What do you understand by the term "Weight of Evidence"?
4. What is meant by the term "Discovery"?
5. What is a Scott Schedule?
6. In collecting the best possible evidence to submit to the court you would source the following documents:
 - i) Original contract
 - ii) Bills of quantities
 - iii) Specifications
 - iv) Contract drawings
 - v) Architects site instructions
 - vi) Variation orders
 - vii) Site diaries
 - viii) Site meeting minutes
 - ix) Site photographs
 - x) Original site survey levels

Explain the possible relevance of each in compiling your evidence.

In terms of dispute resolution define the following options and their advantages/ disadvantages:

1. Negotiation
2. Alternative dispute resolution viz.
 - Expert Appraisal
 - Mediation
 - Disputes Board of Review
3. Arbitration
4. Litigation

(iii) OTHER QS SERVICES

QUESTION 3 (OPTIONAL)

Construction finance is being provided by the A.B.C Development Bank Pty Ltd to a local developer to a maximum of \$10m for the construction of a new multi-function cinema/entertainment complex. It appears that the developer has a cash flow problem and is having difficulty in paying the builder and for materials supplied to the project. The Bank has appointed you as a consultant Quantity Surveyor to review the developer's financial situation before the Bank decides whether or not to appoint a receiver/manager. After review of the developer's accounts for the project, the following situation is revealed:

	DEVELOPER'S "ORIGINAL BUDGET" PROVIDED TO BANK	DEVELOPER'S EXPENDITURE TO DATE (EXCLUDING CREDITORS)	DEVELOPER'S OUTSTANDING EXPENDITURE (CREDITORS)	Q.S ESTIMATE OF COSTS TO COMPLETE THE PROJECT
LABOUR COSTS	2,750,000	1,300,000	-	1,400,000
PLANT COSTS	2,050,000	1,200,000	200,000	300,000
MATERIAL COSTS	3,150,000	1,850,000	900,000	950,000
OVERHEAD COSTS	550,000	350,000	-	250,000
PROFIT	1,000,000	-	-	-
CONTRACT BUDGET	9,500,000	4,700,000	1,100,000	2,900,000

Progress payments made to date to the builder are as follows:

Total Gross Payment Certified	\$3,600,000
Less Retention 10%	\$360,000
Total Net Payment	\$3,240,000

(iii) OTHER QS SERVICES

QUESTION 3 (OPTIONAL) ... cont.

Draft a report to the bank manager covering the following points:

- (A) If the developer is allowed to continue with the project and the bank continues to provide funds:
1. What is the potential profit to be gained by completing the project and how does this compare with the origin estimated profit?
 2. Does it appear that the builder has been fairly paid for the work he has done to date?
 3. How much money will be required immediately to satisfy the creditors?
 4. What component of the ongoing expenditure will have to be very carefully monitored?
- (B) If the bank decides to withhold any further funding of the project:
1. What are the bank's potential risks/losses?
 2. Would it be possible to recover any of the bank's money spent to date - maybe auction the half completed entertainment complex.

Considering all of the foregoing factors and in particular:

1. The amount of money paid to date by way of progress payments to the builder.
2. The money due to the creditors
3. The potential profit to be made.

Do you think it would be a reasonable commercial risk to allow the developer to complete the project **or** do you think that the bank should force the developer into receivership?