

Name: _____

Student Number: _____

FINAL EXAM DECEMBER 2001
CIV 420F - Construction Engineering

Department of Civil Engineering
Faculty of Applied Science and Engineering
University of Toronto

Examiner: B. McCabe

Exam Type C: Approved Aid Sheet Only

If you do not understand a question, state reasonable assumptions and continue with the problem.

Examiner's Report	
1.	/7
2.	/30
3.	/18
4.	/25
5.	/20
Total	/100

Question 1 Definitions [7 marks]

a) Dental concrete

b) AN/FO

c) Air Track

d) Fly rock

e) Cascade generation system

f) Stiff leg derrick

g) Echelon paving

Question 2 Describe the differences [30 marks]

a) **[5]** Cable strands vs. solid bars for tie-backs

Cable strands	Solid bars

b) **[5]** Fixed costs vs. Variable costs

Fixed costs	Variable costs

c) [5] Cofferdam vs. Caisson wall

Cofferdam	Caisson wall

d) [5] Critical path method vs. Line of balance

Critical path method (CPM)	Line of balance (LOB)

e) [5] Type 1 vs. Type 3 Asbestos Removal

Type 1	Type 3

f) [5] RAP vs. Riprap

RAP	Riprap

Question 3 Short Answers [18 marks]

a) **[3]** Why were articulated rock trucks used instead of fixed body trucks at the High Falls project?

b) **[3]** Why are caisson walls not used as the building foundation in Toronto?

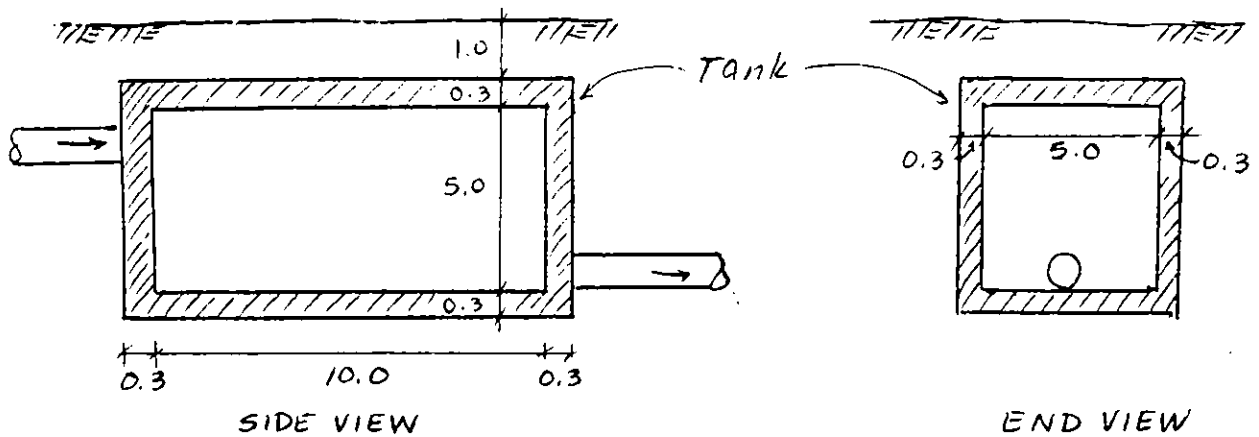
c) **[3]** Describe 3 methods for bracing excavation walls.

d) **[3]** Briefly describe 3 methods for dewatering an excavation.

e) **[6]** Discuss three major considerations when planning a construction project in Northwest Territories.

Question 4 Formwork Analysis [20 marks]

You have to build an underground tank in a vacant block of land, as shown below. The soil is undisturbed, dry packed earth.



- a) [5]
- What is the volume you must excavate to build the tank safely?
 - Using the 315B Excavator and its largest bucket, how long will it take to excavate?

- b) **{10}** You noticed that some gang forms are stacked in the materials yard. You are hoping that you can use them for the walls of the tank to reduce costs. The forms are:
- plywood: 20.5 mm, 7 ply
 - studs: 38mm x 140mm at 350mm centres

Can you use them? Show why or why not.

c) [5] How will you construct the top of the tank?

d) [5] Why are different equations used to calculate P_{\max} ? Why don't we just use the fluid pressure?

Question 5 Tunnelling [20 marks]

The City currently maintains a ferry for people, vehicles, supplies, fuel etc to access the Toronto City Centre Airport on Toronto's Ward Island. It is expensive to run, especially during the winter, when they have to call the icebreakers in to keep the path clear. They have decided to build a tunnel across the gap so that the ferry could be decommissioned, vehicles could go through the tunnel, and pleasure boats in Toronto Harbour will be able to pass into the lake unencumbered. The gap between the 2 pieces of land is 100 metres. Aside from airport buildings, there is an old 7 story masonry structure about 100 metres from the proposed path.

a) [5] What are the most important five factors in this specific case?

b) [5] What method of tunnelling would you use? Why?

- c) **[5]** A tunneling operation produces muck at a rate of 51m^3 per hour. The conveyor system can carry a cross-sectional area of muck of 0.1 m^2 . What speed must the conveyor move in *metres per minute*? If the conveyor is not capable of moving this fast, what practical options do you have?

- d) **[5]** One year after completion of the tunnel, the owner of the masonry building wants to tear the building down and build a new condominium complex. If you are the demolition contractor, describe in point form the process you will use to demolish the building. What are your concerns?