| Group | Last Name Initial | First Name | Last Name | Student # |
|---|---|---|---|---|
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**Carleton University**
**Department of Civil and Environmental Engineering**

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|---|---|
| 1a | |
| 1b | |
| 2a | |
| 2b | |
| Total | |

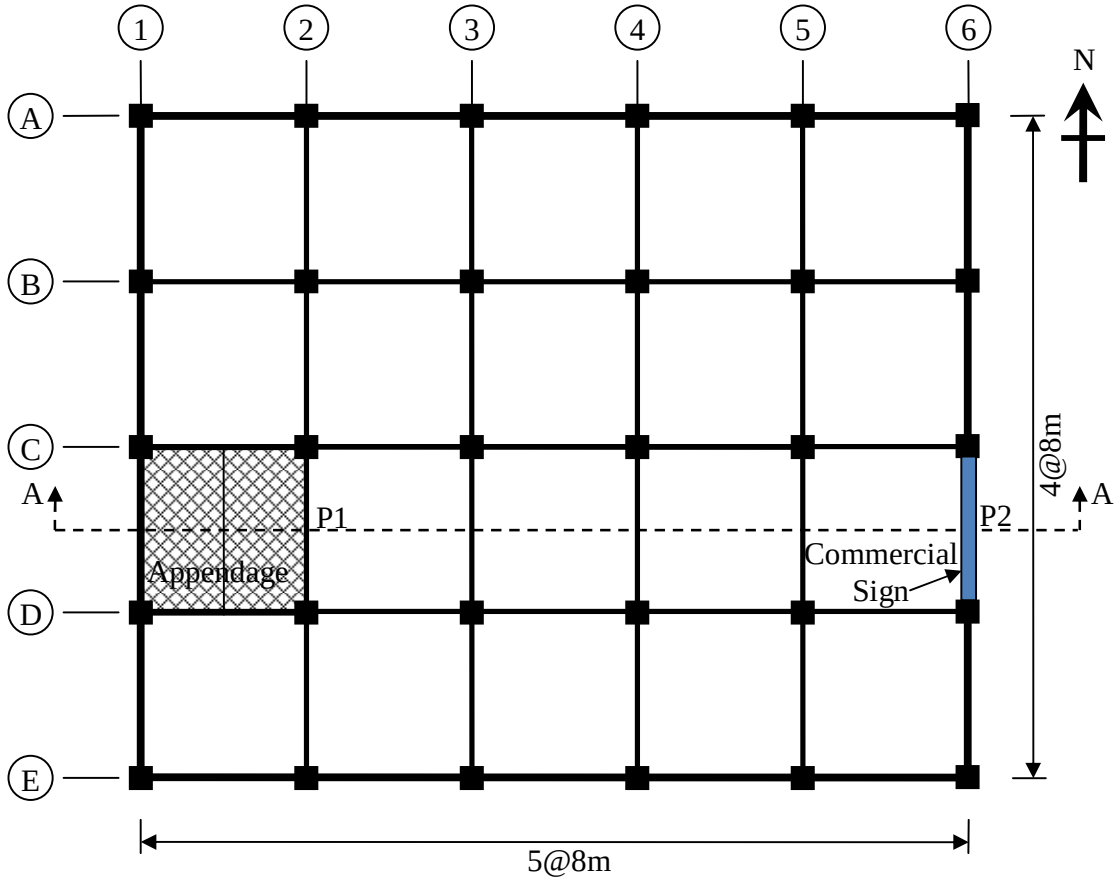
# CIVE 3204 Introduction to Structural Design (Fall 2013)

## Assignment 5

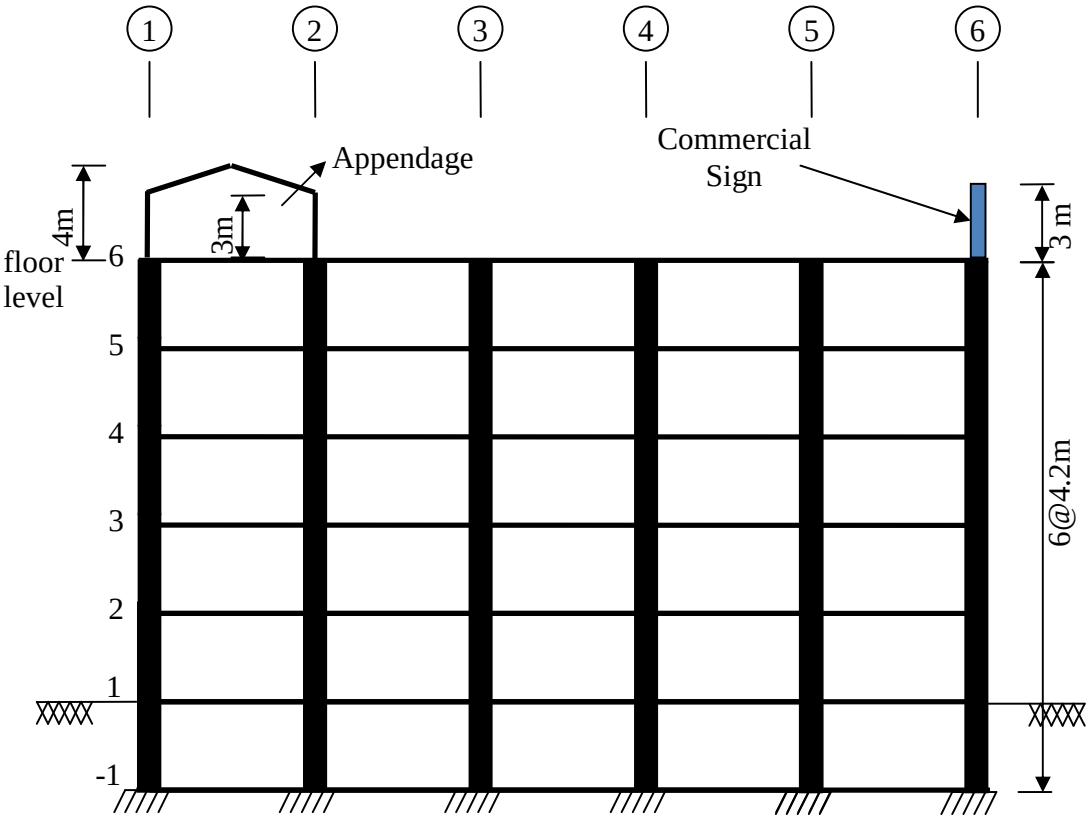
**Due: Monday Dec 9, 2013 at 16:00; Submission to the assignment drop box** (located at the 3rd floor in Mackenzie Building between 3300's & 3400's)

Note: Please fill in the above blanks and use this page as the cover page of your assignment. If registered in Section A1E, Group=1; and if registered in Section A2E, Group=2.

**Question 1:** [50 marks]
The following figures show the multi-storey building of assignment #4.




**Plan view**




**Section A-A**

The building structure is designed using concrete members according to CSA-A23.3. The lateral seismic force resistant system is designed and detailed to ensure a moderate ductile behavior under earthquake loads. All frames are capable of resisting moment without using any lateral bracing or shear walls. The building is located in Cornwall. The typical story mass lumped at the each floor level is $800x10^3$ kg, and the roof mass lumped at the roof level is $600x10^3$ kg. The total snow load on the roof area is estimated as 2200 kN.

The soil condition at the site is as following:

Revised → Top 5m: sand with an average standard penetration resistance of 20 ($N_{60} = 20$)

From 5 to 40m: soil with an average standard penetration resistance of 50 ($N_{60} = 50$)

a) Calculate the design base shear for the earthquake effect in the N-S direction

b) Calculate the lateral force applied at each story in the N-S direction

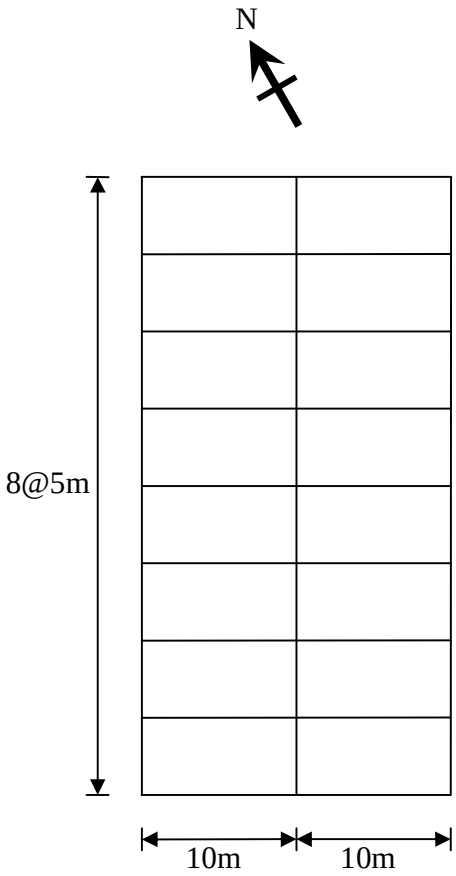
**Question 2:** [50 marks]

Following figures show the structural framing system of an industrial building which is located in Ottawa. The building is considered as being exposed to rough terrain and it has large doors on all sides for shipping purpose. The ridge of the building makes an angle of about 30˚ with the North.

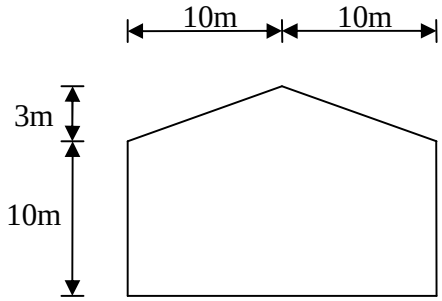
For the case where wind blows in E-W direction, determine and show the following wind pressure profile which will be used to design primary structural members.

a) Net wind pressure profile for the interior zones

b) Net wind pressure profile for the end zones




Plan View




Elevation View