

Assignment 01 – Water Supply Systems, Drainage and Sewage Disposal (2022-2023)

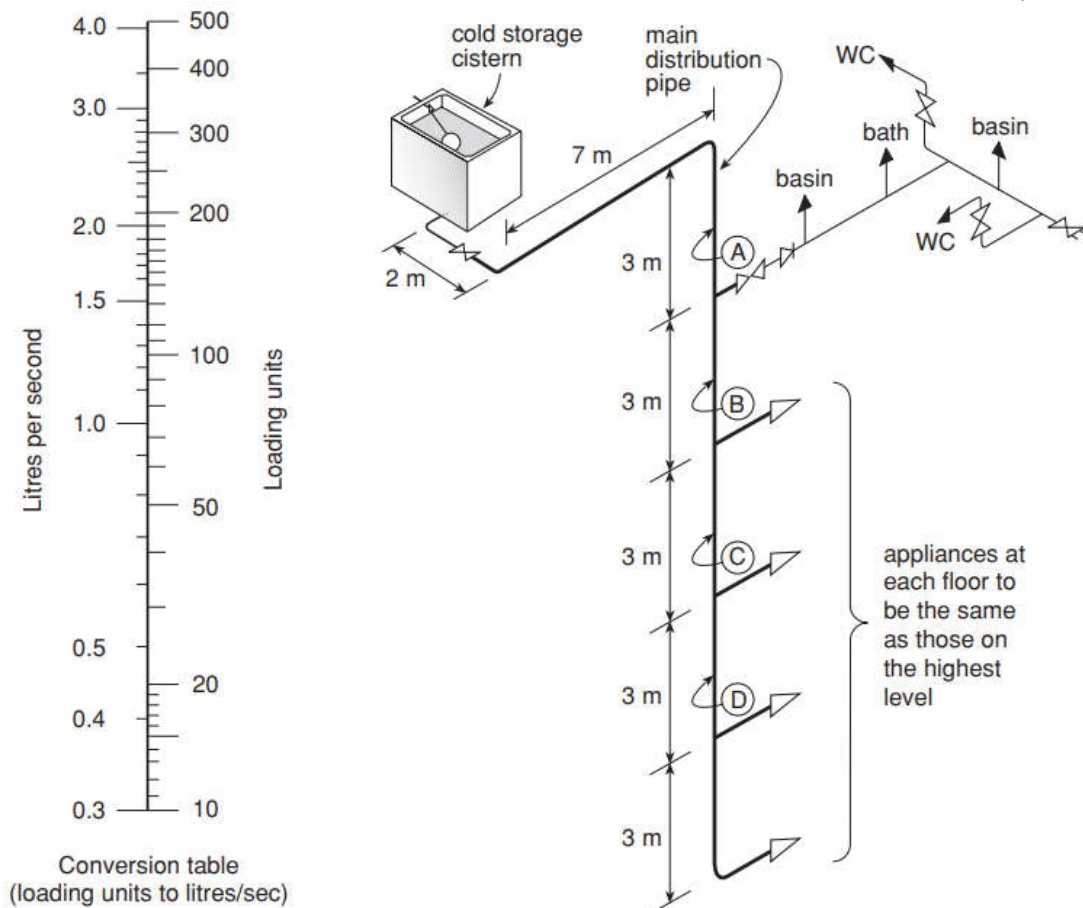
1. Cold and Hot Water Supply Systems

1.1 Briefly describe the different types of utilities buried underground in Hong Kong. Discuss the important factors to be considered for planning and designing the utility services infrastructure.

(10 marks)

1.2 A cold water supply system is shown on the following figure. Determine the loading units and flow rate for the pipe sections A, B, C and D. Explain the principle and key factors of simultaneous demand used for the water supply piping system.

(10 marks)



Sanitary appliance	Loading unit
WC cistern	2
Bath	10
Wash basin	1.5

- 1.3 Explain the typical water treatment process in Hong Kong. Discuss the key factors to be considered to ensure good water quality from the taps in the buildings. (10 marks)
- 1.4 The Total Water Management (TWM) strategy in Hong Kong has mapped out the strategy for sustainable use of water to ensure water security and support the development of the society. Describe the major areas of the TWM strategy and discuss its implications to plumbing engineering design. (10 marks)
- 1.5 Solar hot water system is considered an environmentally friendly renewable energy system. Explain the principles of direct type and indirect type solar water heating systems. Illustrate with schematic diagrams. What are the benefits of using the evacuated-type solar collectors? (10 marks)
- 1.6 Briefly describe the pros and cons of using the following pipe materials in water supply systems: (a) copper, (b) stainless steel and (c) lined galvanised steel. Which one is not suitable for hot water system? Explain why. (10 marks)

2. Sanitation and Drainage

- 2.1 A uPVC drainage pipe of 225 mm diameter is flowing 0.5 proportional depth (half full bore). If the flow velocity is 1.0 m.s^{-1} , determine the minimum gradient using Chezy's formula. Briefly explain the statutory requirements for sizing vertical stormwater drainage stacks under the Building Ordinance of Hong Kong. Discuss the important technical considerations on velocities of flow for the stormwater drainage pipes. (10 marks)
- 2.2 Explain the possible reasons for the loss of water seal in building drainage systems. Discuss how the sanitary drainage system could be a risk for the spread of COVID-19 and SARS disease in high-rise buildings. (10 marks)

3. Sewage Disposal

- 3.1 Explain the three common acceptance tests of drainage systems. Illustrate with diagram(s). Discuss the major design considerations and different methods for sewage pumping. (10 marks)
- 3.2 Briefly describe the different types of sewage treatment facilities in Hong Kong. Draw a diagram to show the basic concept of grey water recycling and rainwater harvesting system. Give two examples of the potential end use of the reclaimed water. (10 marks)