IBTM5660 Utility Services

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Assignment 01 – Water Supply Systems, Drainage and Sewage Disposal (2024-2025)

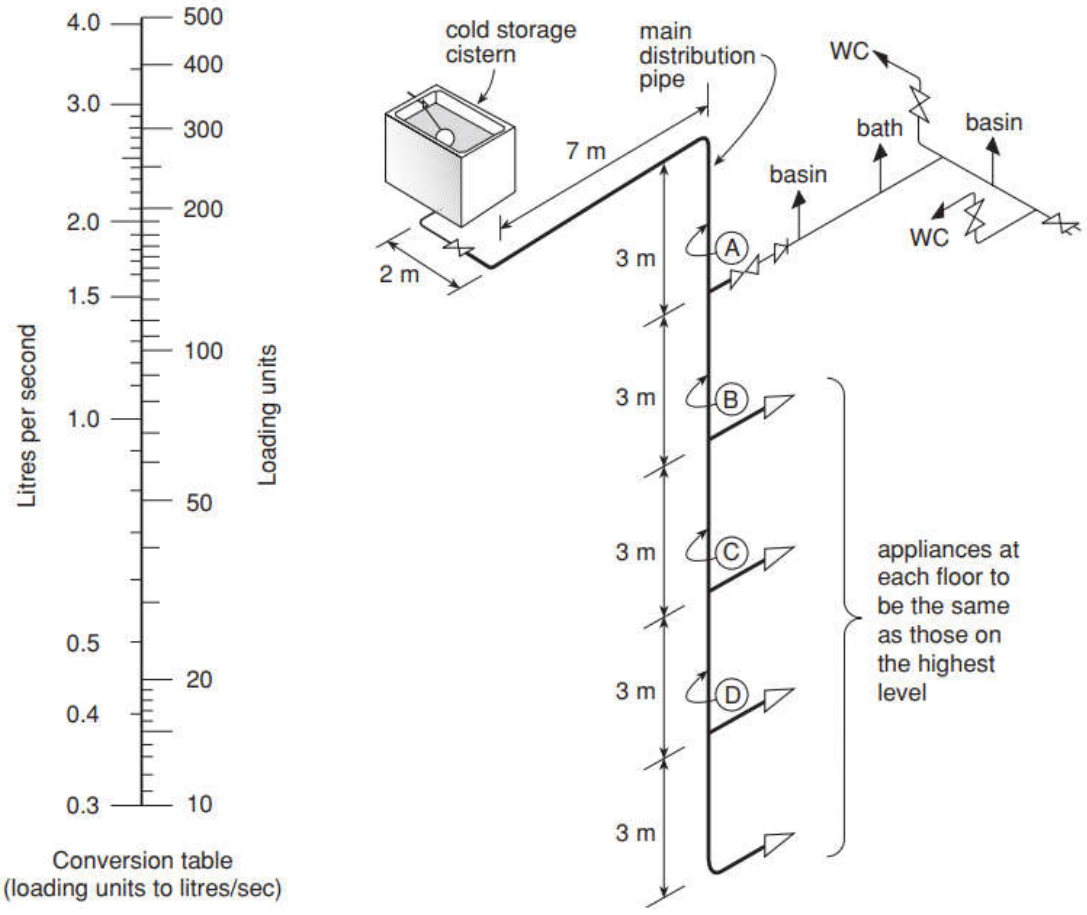
1. Cold and Hot Water Supply Systems

1.1 Explain the two important dimensions to be considered when planning and designing utility services connections for buildings. Discuss the recommended depth of utility services under the footpath and roadway with supporting reasons for the arrangement. Illustrate with diagram(s).

(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 Briefly describe the five categories of water resources in Hong Kong. Discuss the important areas of Total Water Management (TWM) strategy in our society and the implications to plumbing engineering design.

(10 marks)

1.5 Describe the government design practice requirements in Hong Kong for non-centralised and centralised hot water systems. Explain the meaning and effects of 'dead legs' in hot water systems and discuss how to avoid them.

(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 Septic tank is a common method of sewage disposal to partially treat raw sanitary wastewater. Explain the basic principles of septic tank and illustrate with diagram(s). Briefly describe the statutory requirements for septic tanks in Hong Kong.

(10 marks)