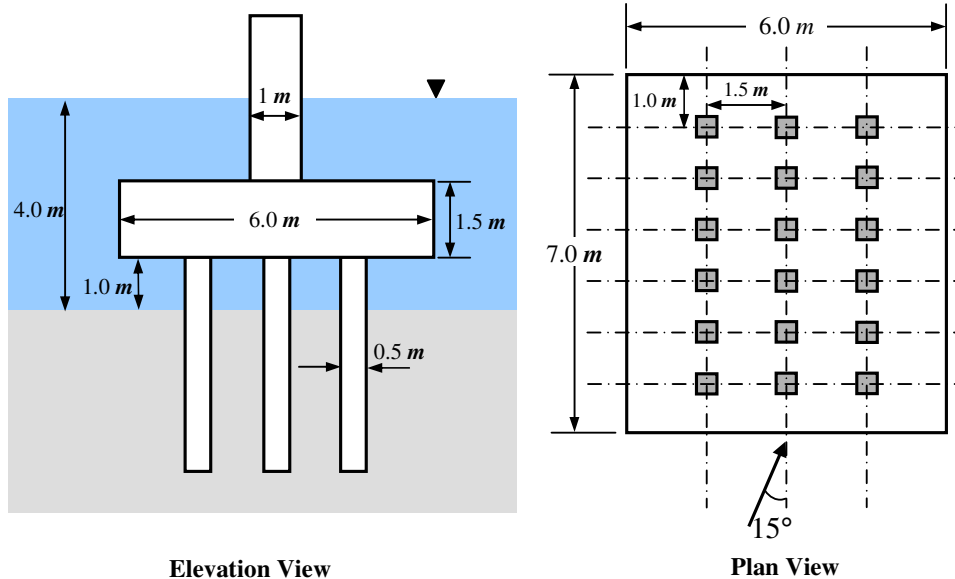


- 1 Select a research paper on flow pattern around a cylindrical pier. Summarize (not translate) the whole paper in 3 or 4 pages and write a critical review on the paper. List the main assumptions and show in details, the main feature of the flow characteristics. Your summary should include details of the research project, assumption and findings.
- 2 Use the Melville & Sutherland (1988) method to find the scour depth at a 1.5-m-diameter cylindrical pier under the following conditions,
 $D_0 = 1.5 \text{ m}, \quad U = 0.8 \text{ m/s} \quad \alpha = 15.$
 Use the data of the sample you have obtained from Zayandeh-Roud river.
- 3 Calculate the scour depth for the complex pier shown below. It was determined that the water velocity would be 1.0 m/s for the Q_{100} . Use plane bed condition and $d_{50} = 1.0 \text{ mm}$. The pile and pier stem cross sections are square.



Elevation View

Plan View