Determine the required storage (m^3) water capacity (Ground and Elevated) for a city, if the population is 400000 capita and the average water consumption is 300 Lit/cap./day. The plant works 24 hr/day and the maximum monthly and the maximum daily water consumption are 140 % and 180% of annual average consumption. The average consumption per capita are as follows:

Time	Consumption (L/2h)	Time	Consumption (L/2h)
12M.N.-2	7	12N-2	46
2-4	10	2-4	41
4-6	15	4-6	31
6-8	20	6-8	29
8-10	32	8-10	15
10-12 N	39	10-12M.N.	15

Note: The fire demand is approximately 120 m^3 for each 10000 capita and emergency time is 8 hours.

$Q_{max.\ monthly}$ = 1.4 * 400,000 * 300/1000 = 168,000 m^3/d

$Q_{max.\ daily}$ = 1.8 * 400,000 * 300/1000 = 216,000 m^3/d

Ground Storage

C1 = $Q_{max.\ monthly}$ x 0.5 hr
= 168000/24 * 0.5 = 3500 m^3

C2 = $Q_{max.\ monthly}$ x 8.0 hr
= 168000/24 * 8 = 56,000 m^3

C3 = $O_{max.\ daily} - Q_{max.\ monthly}$
= 216000 – 168000 = 48,000 m^3

C4 = 4/5 x Pop/10000 x 120 m^3
= 4/5 * 400,000/10000 * 120 = 3840 m^3

$C_{design\ Ground}$ = Bigger of C1, C2, Or C3 + C4
= 56,000 + 3840 = 59,840 m^3

Elevated Storage

C_{design} = (a + b)/1000 x Pop x 1.5 + 1/5 x Pop/10000 x 120 m^3
= (50 + 20) /1000 * 400,000 * 1.5 + 1/5 * 400000/10000 * 120

= 42,000 + 960 = 42, 960 m^3