Figure 10. Leopold dual lateral air–water underdrain system
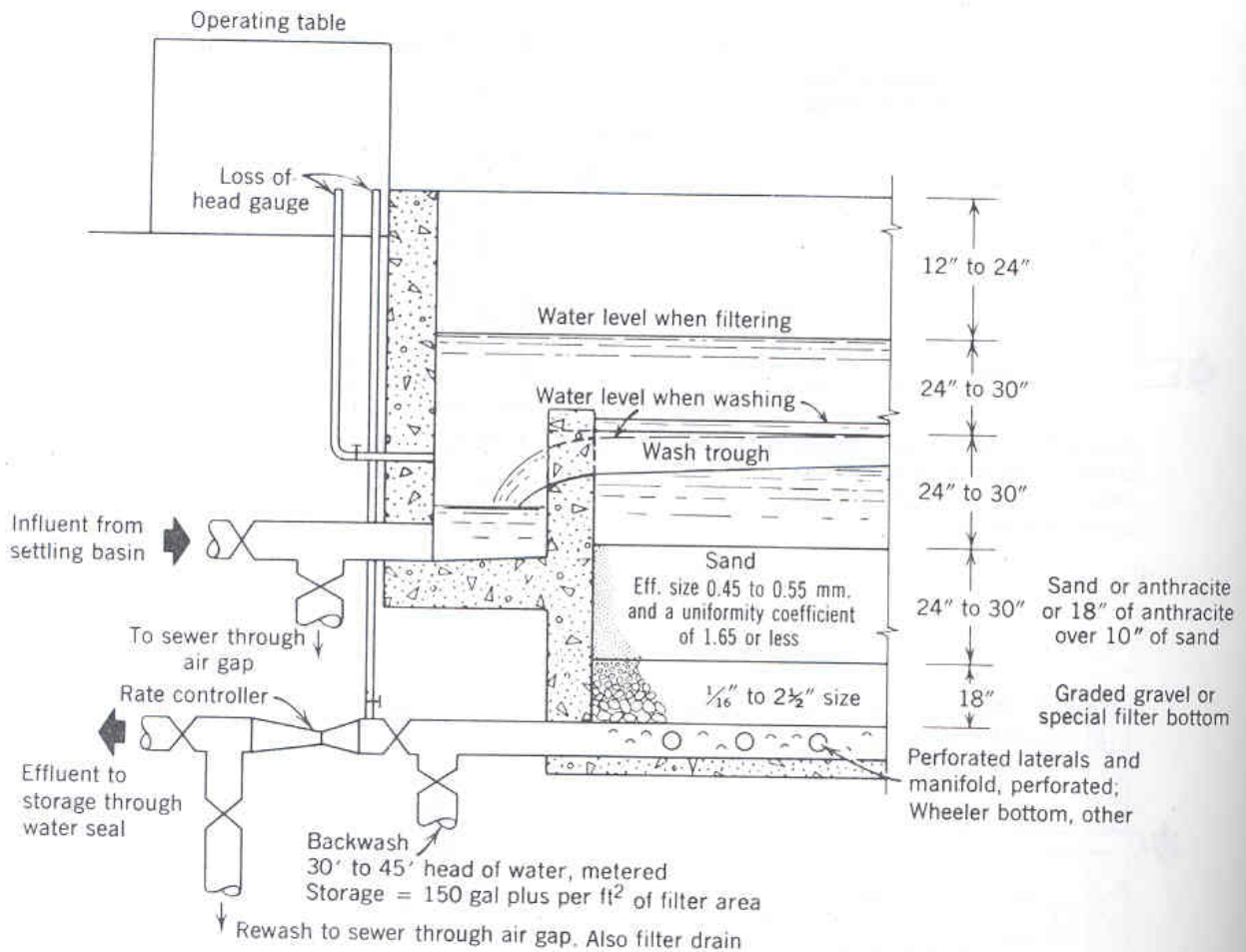
Operating table

Loss of head gauge

12" to 24"

Water level when filtering

24" to 30"

Water level when washing

Wash trough

24" to 30"

Influent from settling basin

Sand
Eff. size 0.45 to 0.55 mm.
and a uniformity coefficient
of 1.65 or less

24" to 30"

Sand or anthracite
or 18" of anthracite
over 10" of sand

To sewer through air gap

Rate controller

$\frac{1}{16}$" to 2$\frac{1}{2}$" size

18"

Graded gravel or
special filter bottom

Effluent to storage through water seal

Perforated laterals and
manifold, perforated;
Wheeler bottom, other

Backwash
30' to 45' head of water, metered
Storage = 150 gal plus per ft² of filter area

Rewash to sewer through air gap. Also filter drain

Figure 3-19 Essential parts of a rapid sand filter. The minimum total depth is $8\frac{1}{2}$ ft, 12 ft preferred.

$$\text{Rate of filtration} = \frac{7.48}{\text{minutes for water in filter to fall 1 ft}};$$

fill filter with water, shut off influent, open drain

Backwash time = 10 to 15 min minimum, until water entering trough is clear

Normal wash-water usage = 2 to 2.5% or less of water filtered

Sand expansion = 40 to 50% = 33.6 to 36 in. for 24-in. sand bed
= 25 to 35% for dual media, anthracite and sand

$$\text{Rate of backwash} = \frac{7.48}{\text{minutes for water in filter to rise 1 ft}};$$

lower water level to sand, slowly open backwash valve,
20 to 25 gpm/ft² minimum (32 to 40 in. rise/min)

Orifice area = 0.25 to 0.30% of filter area

Lateral area = 2 × orifice area
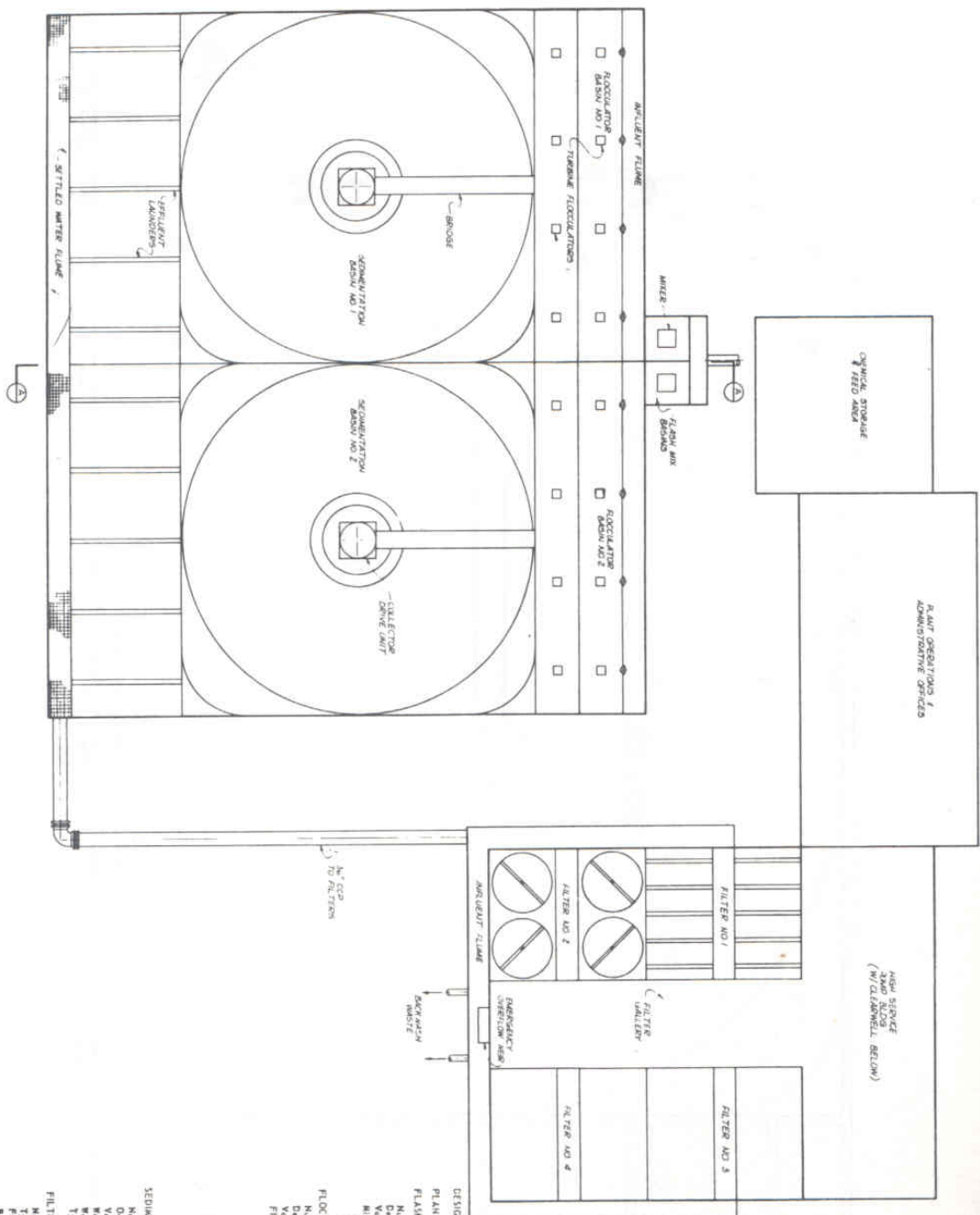
Manifold area = 1.5 to 2 × total area of laterals

Figure 220. Facility layout for 10-mgd water treatment plant.