Figure 5-2 – Alignment of Field Laterals with Contours

Drain Spacing, Depth and Grading

Concept Design shall follow the method set out in "Computing Drain Spacings" (The International Institute for Land Reclamation and Improvement (ILRI), 1976, Bulletin 15). The work describes methods of computing drain spacings for a range of ground conditions. Average pipe spacing for soils of different textures are presented in below table:

Soil Texture	Hydraulic Conductivity		Spacing
	Class	(m/day)	(m)
Clay	Very slow	0.03	9 – 15
Clay loam	Slow	0.03 – 0.12	12 – 21
Average loam	Moderately slow	0.12 – 0.49	18 - 30
Fine sandy loam	Moderate	0.49 – 1.52	30 – 37
Sandy loam	Moderately rapid	1.52 – 3.05	30 – 60
Peat and muck	Rapid	3.05 – 6.10	30 – 90
Irrigated soils	Variable	Variable	45 - 200

Table 5-5 – Soil Properties and Pipe Spacing

Drainage pipes are recommended to be placed at depths varying between 1.8 and 2.7 meters below soil surface with a desirable starting depth at 2 m below soil surface. Only in rare instances, a depth of more than 2.7m below soil surface is justifiable.

For economy and efficiency, grades for field drains must be maintained between 0.1 percent (1 m per 1,000 m) and 0.3 percent (3 m per 1,000 m). The minimum acceptable flow velocity is 0.75 m/s as a lower flow velocity will cause silt and sand to settle and eventually lead to blockage of the drain pipes.

Determining Discharge from Subsurface Drains

With reference to Figure 5-3 below, the steady state discharge of spaced drains can be computed using the following formulas:

drains placed above the impermeable layer	$Q = CA\frac{2\pi KH(d + H/2)}{S^2}$
drains placed on the impermeable layer	$Q = CA\frac{4KH^2}{S^2}$
Where *A* is the drained area and *C* is given by	$C = \frac{1}{0.00054\sqrt{A} + 0.7795}$

Where:

Q = the total discharge (Length³/Time (L^3/T))

K = the hydraulic conductivity weighted over the affected soil profile in (L/T)

d = the height above impermeable surface (L)

H = the initial height of water above the centreline of the drains (L)

S = spacing between consecutive drains (L)

Calculated discharge using any of the two formulas above can be checked using the product of the drainage coefficient and the area served by the respective field drain: