Problem #4 - Main 1

Solution Calculations

Sta. 11+75 to 5+75 0.7% grade DC = $^{3}/_{8}$ inch

Begin with 5 inch CPT - Maximum Capacity (from slide rule) = 16 Ac

Laterals are 950 ft. long with 50' spacing.
Contribution by each lateral= 1000' to include area drained by main.

$\frac{1000' \times 50'}{43{,}560}$ = 1.15 Ac. Per lateral

Number of laterals to fill tile: $\frac{16}{1.15}$ = 13.9 laterals Use 13 laterals

Actual drainage at 13 tiles = **15 acres**, 1 acre unused main capacity

Sta. 5+75 to 2+25 0.7% grade

Try 6 inch CPT - Maximum Capacity = 26 Ac

Capacity remaining in tile = 26-15 (from sta. 11+75 to 5+75) = 11 Ac

Number of laterals to fill tile: $\frac{11}{1.15}$ = 9.6 laterals Use 9 laterals

However, only 7 laterals at 50' spacing can tie into the main between sta. 5+75 to 2+25 (350'/50'=7)
Actual Drainage at 7 tiles = **8.05 Ac**, leaving 3 acres of unused main capacity.

Sta. 2+25 to the Outlet 0.1% grade

Due to farmstead, lateral lenghts are reduced to 750' at 50' spacing.
Contribution by each lateral= 800' to include area drained by main.

4 Laterals can fit in the space between sta. 2+25 and the outlet.
Total Acres contributed by these laterals =

$\frac{800' \times 50'}{43{,}560}$ = 0.92 Ac. Per lateral

4 x 0.92 acres = **3.68 acres**.

Total main capacity required at outlet = 15+8.05+3.68 = **26.73 Acres**
From slide rule, 27 acres at 0.1% grade using 3/8 dranage coefficient=
Use 10 inch CPT - Capacity = 34 acres