

Irrigation Ditch Lining Design, using Table B

Example:

Design the most economical section for a lined ditch for the following:

$$Q = 25 \text{ c.f.s.}$$

$$S (\text{slope}) = .2\%$$

Surface finish to be such that Manning's coefficient of roughness will be .014.

Using Table B, follow down the column under "Slope = .002". The first section that will handle 25 c.f.s. is a ditch with a bottom width (b) of 1.0 ft., when the flow depth (d) is 2.0 ft. Such a ditch with a freeboard of 0.5 ft. will carry 26.6 c.f.s.

Continuing down the "Slope = .002" column in the table, it is seen that a ditch with a bottom width of 1.5 ft. and a depth of 1.8 ft. will also carry the required Q. This ditch, with a required freeboard of 0.4 ft., will carry 26.2 c.f.s.

By computing the concrete quantity required for each of the above sections, it will be found that the ditch with a bottom width of 1.5 ft. requires slightly less concrete.

Velocity Check

The resulting velocity, using the 1.5 ft. bottom ditch, will be "Q" in c.f.s. divided by the "Flow Area" in sq. ft. (see Column 3 in Table B). Thus -- 26.2 divided by 5.94 = 4.4 ft. per sec. This velocity is satisfactory.

Choice of Section

Assuming that construction equipment is available for both ditch sections, the latter section (b = 1.5') is more desirable and would be used.

Correction for Rough Concrete Finish

If it is known that the resulting concrete finish will be less smooth and probably necessitate the use of a roughness coefficient of .016, then design for a Q of 25 x 1.14 (see under "Notes", Table B, Page 2) which is 28.5 c.f.s. Using this revised Q and Table B, select the most desirable section in the same manner as above.