684.1--Furrow Irrigation

Section 684.11

(a) Description

Furrow irrigation is a method of applying water to the soil to meet crop needs by introducing a specific water flow rate to shallow evenly spaced channels (furrows or corrugations). These small channels convey the water down or across the slope of the field to the vicinity of plants growing in the furrows or on the beds between the furrows. This method differs from border irrigation in that only a portion of the ground surface is covered with water. Water enters the soil by both vertical and horizontal infiltration. The furrow stream is applied until the desired application depth and lateral penetration is obtained. The time that water must be applied in the furrows is dependent upon the volume of water required to fill the soil profile to the desired depth, the intake rate of the soil, and the spacing of the furrows. Land grading to provide uniform slopes is essential to permit uniform water application and efficient irrigation.

There are two main types of irrigation using small channels as a method of water application. These types are separated according to the kinds of crops and type of furrows used in distribution of the irrigation water. The two types are commonly referred to as furrow irrigation and corrugation irrigation. Furrow irrigation is primarily used to irrigate tilled crops planted in rows. Normally there is one furrow between crop rows except for bedded crops where two rows are planted on each bed. In these cases, the furrows are along each pair of rows. The size and shape of the furrows vary with the crop grown, the equipment used, and the spacing between crop rows. Furrow irrigation also includes applying water to small grain or similar crops drilled on flat-top furrow beds.

Corrugation irrigation is primarily used to irrigate non-cultivated, close-growing crops using small, closely spaced channels down the steepest slope of the field. Corrugations are also commonly used to guide irrigation streams on bordered land. In this case, the design is based on the border method instead of the corrugation method. Corrugations are frequently formed after the crop has been seeded. In case of a perennial crop, they are reshaped as needed to maintain the desired channel cross-section.

Water application principles are the same for both the furrow and corrugation types with furrow spacings, size, shape, and retardance characteristics the primary differences. Corrugation stream sizes are small in comparison to furrow streams, and the lengths of run are relatively short because of the smaller size of furrow generally used and the resistance to flow caused by the growing crop. The first type will be discussed in this chapter as furrows, and the second type as corrugations in accordance with their respective differences as discussed above. Any small-water channel is defined as a furrow. In discussing these channels as they apply to both the furrow and corrugation method, the term "furrow" will include corrugation channels as well as channels for furrow irrigation systems.

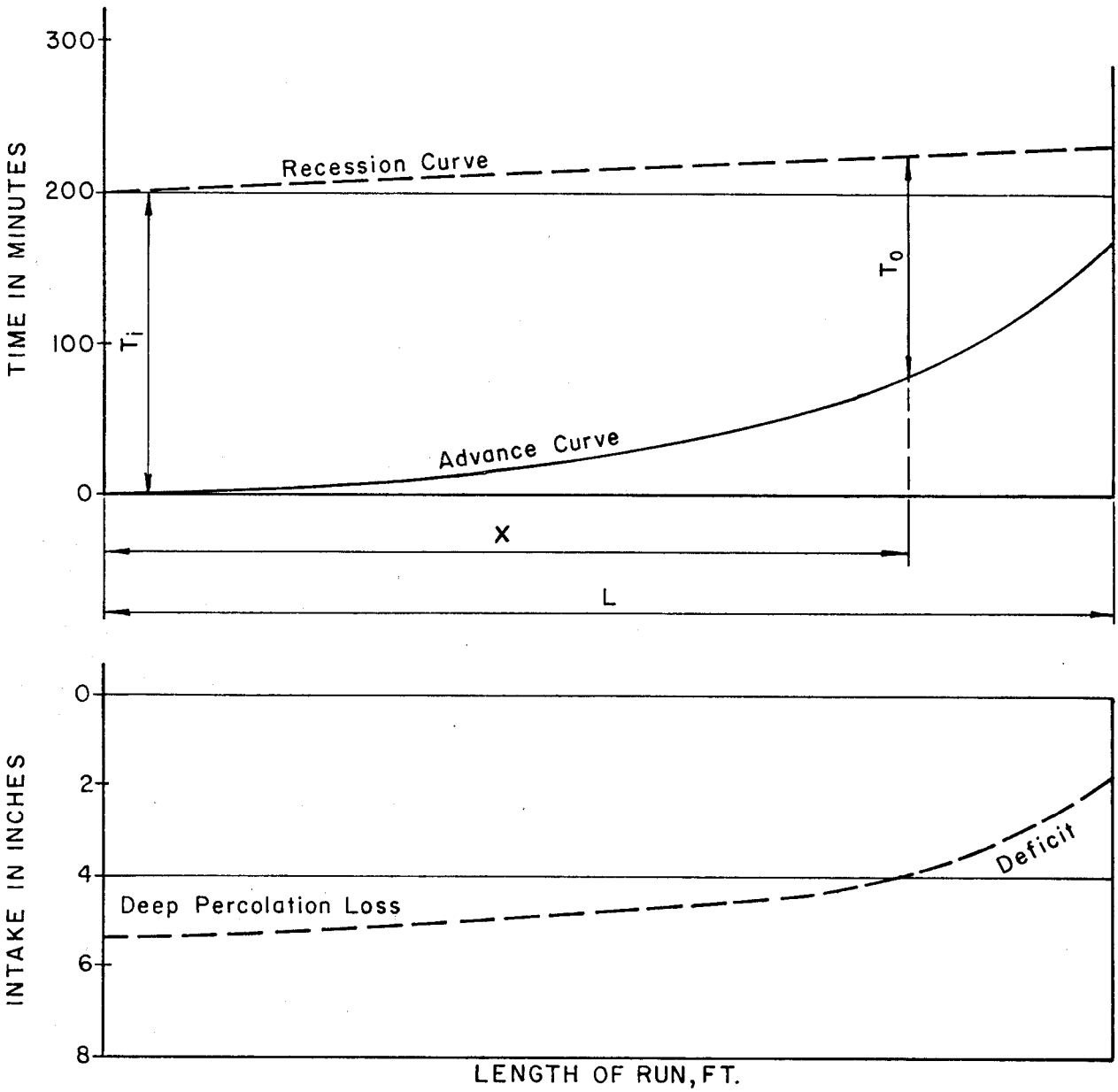

Figure 684—I

APPLICATION TIME, ADVANCE,
RECESSION VS INTAKE RELATIONSHIP

Opportunity Time, T_o , at the head end of the field becomes T_i
(T_i is the time water is being introduced at the head end of the furrow).

An intake amount is associated with a given opportunity time,
T_o , at any distance X along the furrow.

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