

DRAINAGE - ROADSIDE DEVELOPMENT

By

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In general the engineer tends to solve the problem of drainage by concentrating surface water within structures, while the landscape architect attempts to spread water out and retard its flow both before it reaches highway drainage structures and after it leaves them.

Laws Regarding Runoff

Certain laws regarding the effect of land slope upon runoff are enumerated by Mr. Q. C. Ayers in his work "Soil Erosion and Its Control."

1. If land slope (defined as the total drop divided by the total length of slope) is increased four times, the velocity of surface water is doubled.

2. If velocity is doubled, the erosive or cutting capacity of surface water is increased about 4 times.

3. If velocity is doubled, the quantity of material which can be carried by water is increased 32 times.

4. If velocity is doubled, the size of soil or rock particles which can be moved by surface water is increased 64 times.

5. Flowing water tends to carry silt in suspension until velocity and depth begin to decrease. At this point silt is deposited. In other words, if we decrease the velocity of runoff on the roadside, silt can be held or deposited there instead of in catch basins or culverts.

Drainage is not merely a question of providing proper drainage structures. In fact our old conception of drainage structures complicated rather than simplified the problem, since decreasing the velocity of water after it has descended highway slopes causes the accumulation of silt in ditches, culverts and catch basins. We must begin to solve the highway drainage problem by retarding water and holding silt on highway slopes before it reaches ditches and culverts.

Retarding Surface Water

The flow of surface water may be retarded before drainage structures are reached, in the following ways:

1. Surface water can be spread out and its depth and velocity reduced by flattening and rounding highway slopes.

2. Water can be confined and partially controlled at the top of highway slopes by the use of berm ditches which will collect surface water, or by deeper drainage ditches which cut through subsurface seepage layers of soil and stop subsurface water before it reaches the highway slope face.

3. Grass, vines, or low woody plants can be established on highway slopes to protect bare surfaces, reduce the velocity of surface water, and thus prevent it from picking up silt as it flows toward drainage structures.

4. Ditch checks and check dams may be used to retard surface water after it has reached artificial or natural channels.

Highway Design Fundamental

Proper drainage of the highway is to a large extent a measure of proper design, which requires that the highway be considered a unit from right-of-way line to right-of-way line. Roadside, roadway and roadbed are only subdivisions of the highway unit. Because an important part of the highway drainage problem originates and ends on what we call the roadside, roadside development and highway drainage are essentially part of the same fundamental problem of highway design.