GREENBELT PROGRAM

SOME GEOLOGIC HAZARDS ALONG THE MOUNTAIN FRONT AND FOOTHILLS OF WEST BOULDER

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I. Landslide Deposits

Many of the steep slopes along the mountain front and foothills of west Boulder are mantled with ancient landslide deposits. The location of these features is shown in Figure 1. Most of the landslide deposits record slope failures from a time, thousands of years ago, when the climate was more moist than it is today. Under the present-day, natural environmental conditions, these deposits are stable. However, man can change these environmental conditions by excavation, construction and use of the area. Such use may initiate slope instability and further landsliding. These changes include the following:

(1) Removal of supporting material from the downhill part of an ancient landslide mass by cuts for road or house construction.

(2) Addition of weight to the uphill part of a landslide mass by construction.

(3) An increase in the subsoil water as would result from additions from septic systems and garden and lawn watering.

(4) Any steepening of slopes that are already near critical for failure.

Construction and development in areas of ancient landslide deposits is subject to several additional expenses that are not required in areas of stable subsoils. These include:

(1) A detailed geological and soil engineering study, including subsurface investigation by a closely spaced network of boreholes.

(2) Stabilization of the landslide mass by artificial redistribution of material as directed by a soils engineer.

(3) Special foundation design to minimize damage to structures caused by differential sliding of subsoils.

(4) Special drainage and septic system design as directed by a soil engineer to minimize moisture input into deposits of marginal slope stability.

(5) The nature of landslide materials carries a legal obligation for "support or 45^{o} repose in excavations" as in the resolution concerning Rules and Regulations Governing Excavation Work, Section 1, Paragraph 1-87 adopted by the Industrial Commission of Colorado on August 23, 1966.

II Aquifers

The Dakota Sandstone crops out along the foothills west of Boulder (See Figure 1) as the easternmost major hogback or ridge. It extends for miles north and south of Boulder. The Dakota east of the outcrop is reported to give moderate water yields to wells (2½-5 gpm on the average, but in places as high as 40 gpm). Some wells are free flowing or artesian, even from moderately deep ones (600 ft.). The water quality from the wells is fair, with the water usually hard (200-600 gpm dissolved solids). Permeability is generally high near the outcrop and because of the fractured nature of the aquifer, pollution of water supplies down dip from the outcrop by septic systems and other wastes is a hazard. Furthermore, construction on the outcrop would increase surface runoff thereby reducing the infiltration recharge of the aquifer. Hence, subdivisions on its outcrop would reduce the potential of future use of the Dakota Sandstone as an aquifer.

The Lyons Sandstone is the best aquifer in the area, though for the most part, it remains unused. It crops out west of the Dakota hogback along the flanks of the mountain front (See Figure 1). The Lyons gives moderate to high yields of good quality water that is moderately hard. The water coming from Eldorado Springs is from the Lyons Sandstone and is reported to yield 100 gpm. When wells are drilled to the Lyons ~~cost of~~ close to the outcrops, they should be artesian or at least the water from the Lyons should rise high in the well. The Lyons potentially is a good source of water for domestic, public livestock and certain industrial uses and hence, as in the case of the Dakota, the recharge areas along the outcrop should be protected from excess runoff caused by construction and from contamination by wastes.

References

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