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Slope Stability Problems in Urban Areas

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So you made it - you bought a home nestling against the crest of a high bank; it is close enough to nature and has a view into romantic sunsets. . . Then one morning you wake up, finding your garage, back porch and swimming pool down the drain with the threat of your house overhanging a deep scar left behind on an even steeper bank! This is becoming enough of a worry to planners, geotechnical engineers and municipal authorities in Canada's rapidly expanding cities that the Canadian Geotechnical Society decided to explore the present geological, technical and legal challenges posed by instability of slopes in urban areas. To this end it sponsored a well conceived and planned conference in Toronto (April 21 to 22, 1980), whose organization was mainly in the hands of Del Fredlund (Department of Civil Engineering, University of Saskatchewan) and John Seychuk (Golder Associates, Toronto).

Almost all of Canada's land surface bears the imprint of glaciation, deglaciation, isostatic uplift and subsequent erosion. The result are shorelines defined by steep banks of unconsolidated materials, river valleys carved into unstable bedrock, and mountain sides covered with thin colluvial veneers or thick lacustrine silts. Many of these settings are now subject to intense urban pressures: the precarious colluvial slopes along the West Coast; the riverbanks of Edmonton, Calgary, Saskatoon, and Winnipeg; the sensitive clay slopes of the St. Lawrence lowlands; and the shoreline of the Great Lakes. During two days of technical meetings and an excellent panel discussion, urban landslides were analysed not only as technical but also as legal headaches. Healthy re-appraisals of geotechnical practice ranged from self-flagellation (well known to geologists!) to confident breast beating (also familiar). Apprehension arising from recent involvement with the 'legal boys' was expressed frequently and the possibilities of increased liability insurance were explored.

The geotechnical problem was identified in papers dealing with Calgary, Saskatoon, Vancouver, Winnipeg, Toronto, and Ottawa. The challenge boils down to the fact that homes with 'good views' are more than ever before in great demand and that 'top-of-bank' developments often proceed without adequate geological and geotechnical input. Subsequent deterioration of slopes, foundation failures, and sudden landslides, classified as 'Acts of God' may be triggered by such seemingly innocent activities as irrigation, paving, and the building of swimming pools. All of which may lead to court: liability cases directed against engineers have increased by an order of magnitude in the last decade. Some municipal and provincial governments have developed guidelines regarding the minimum set-back distances for houses along the top of the banks and specified the permissive slope angles, or requested extensive geotechnical input. Others have done little or nothing.

One approach clearly tries to tackle the problem at its root by stringent planning measures but often they come too late and remedial measures may be necessary, and the question as to who should pay for it all in general has to be resolved by the 'legal boys'. The panel discussion focused on liability (featuring echoes from the medical profession), on the pressing need to inform future home owners of potential geological hazards, and a challenge to the geological profession to establish more precise rates of anticipated slope deterioration from the geological and historical records available.

The organizers of the conference were successful in producing a fine proceedings volume in a remarkably short time span and the submitted papers are being processed for publication in the Canadian Geotechnical Journal. It is certainly good to see that the Canadian geotechnical fraternity has set out to broaden its outlook, and hopefully it will be awarded by a better public appreciation of its unique task in dealing with the complexities of mother earth!

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