Beside the normal variety of leda clay, there are others which pass into quicksand.

Ottawa: The present physical features are of varied origin and are the result of erosion and deposition by various agencies. During a long period of time, previous to pleistocene or glacial times, the region was above sea level, as is shown by the absence of marine tertiary deposits and by the development of stream valleys partly filled with pleistocene deposits. During this time the major features of the bed rock topography were formed by process of weathering and stream erosion. Erosion of



Conditions which Exist at Niagara Falls

Niagara Falls maintains its vertical crest due to the nature of the rock over which it flows. The water flows over the head capping of limestone and undermines the soft shales below, giving rise to the "Cave of the Winds." When the limestone is undermined far enough, it breaks off, forming a vertical crest as the process is repeated.

the solid rock is shown by the appearance of the side wall of the small valley leading up from the Ottawa River at Sussex Street in the city of Ottawa, but the character of the sides of the valley in places also shows that the valley existed before the advance of the ice sheet and was only slightly modified by ice erosion. The partial filling of many of the rock valleys by glacial deposits shows also that the valleys were largely formed in pre-glacial times.

The deposits occupying the surface of a large part of the Ottawa area are superficial deposits, which differ from the bed rock or solid rock underlying them in that they are largely unconsolidated and vastly younger in age. They belong to the latest of the geological periods, the Quaternary, which is sub-divided into pleistocene and recent. During pleistocene or glacial times the ice advanced southward across the Ottawa and St. Lawrence valleys into New York State. When the ice melted it left the surface covered with glacial drift. Near the close of the pleistocene epoch this area was depressed relatively to sea-level so that, as the glacier retired, the sea water entered by way of the Gulf of St. Lawrence and formed what is known as the Champlain Sea. The waters of this sea covered the land in some places in the Ottawa Valley to a depth of several hundred feet. In these waters large quantities of sand, silt, and clay were deposited. More recent uplift of the land has driven the sea out of this region and has set the streams at work eroding the glacial and marine deposits.

Boulder Clay—Small surface distribution but covers an extensive area beneath the marine sediments.

Leda Clay—The maximum extent of the sea in the Ottawa area is shown by the distribution of the marine deposits. The highest shore line near Kingsmere has an altitude of 690 feet above sea level.

The clays have a maximum thickness in places to nearly 200 feet and are best developed in the stream valleys and lowest parts of the area. The central portion of the city of Ottawa is also underlain by marine clay occupying a basin in which the clay has a maximum thickness of nearly 100 feet. The basin-shaped area extends southward along Bank Street from Albert Street to the Glebe, westward to Bronson Avenue and northeastward to the Rideau River, including a large portion of Ottawa east. The Victoria Museum was built upon a bed of leda clay. Sandy Hill is underlain by marine clay, showing that the clays were originally more extensive but have been removed by stream erosion.

Should Preserve Records

Owing to the importance to builders of knowing the kind and nature of the subsoil, it is desirable that all engineers preserve records of this nature in connection with works under their supervision. In connection with the numerous excavations attendant upon building construction, sewer and gas main laying, water system installation, etc., the municipal engineer frequently sees exposed strata of the upper geological horizon. He can easily take an accurate measurement of the elevation and position of, for example, a deposit of clay, a layer of limestone, or the line between subsoil and made ground and record same in his note book. If this information was laid down on a suitable map in distinctive colors it would prove to be of great value as a basis for future work.

Geology and Power Development

On account of the great difference between high-water flow and minimum flow of rivers in Canada it is necessary, in many cases, to provide storage in order to get the best out of a development. In connection with these storage projects geology is of great importance.

Loetschberg Tunnel

Even since the opening of the Simplon tunnel connecting Switzerland with Italy, the necessity of opening a route of access to it from the north and northeast of Europe has been apparent. Several routes were proposed for getting through the Bernese Overland. The route



finally chosen was that of passing under the Loetschberg Mountains by means of a tunnel some nine miles in length. According to the geological predictions, where the north end of the main tunnel is 590 feet below the floor of the