

electron temperature and electron concentration. In the spectroscopy group, the structures of atoms and molecules are investigated by means of their microwave, visible and ultra-violet spectra, and considerable work has been done on optical masers.

The X-ray diffraction laboratory undertakes fundamental work in molecular and crystal structure and identification problems for government laboratories. Two of the major projects concern narcotics and vanadium minerals. X-ray diffraction methods are extremely valuable for identification purposes as they are non-destructive and require only very small amounts of material.

Building Research.—The provision of a comprehensive research service for the construction industry of Canada is the primary concern of this Division. The research program therefore covers all aspects of building design, building materials and components, fire research and studies in soil, snow and ice mechanics. Regional stations engaged in research and information are maintained in Halifax, Saskatoon, Vancouver and Norman Wells. The Division serves as the technical research wing of the Central Mortgage and Housing Corporation.

Examples of Division projects are the behaviour of concrete aggregates and lightweight concretes; the materials and techniques of masonry construction and plastering; atmospheric corrosion of metals; paint and acoustics research; and examination of the performance of walls, windows, chimneys and domestic heating systems. Other studies involve humidity in buildings, air-conditioning design data, snow and wind loads on structures, the properties of various soil types including permafrost and muskeg, and the effects on buildings of ground vibrations caused by earthquakes. A unique fire research laboratory provides facilities for all types of fire resistance, fire prevention and fire fighting tests.

As the Division concentrates on building problems peculiar to Canada, much of the work concerns the performance of buildings and building materials in cold weather. In this connection, double-glazed windows and lightweight metal and glass curtain walls, used increasingly in modern buildings, have been examined. Special studies have been made to improve winter building techniques and there is a section devoted to problems of building in the Far North.

The efforts of the Division have included educational work in a number of directions in order to alert the design professions and manufacturers to design-features that should be avoided. Similar liaison exists with federal and provincial public works departments and some important field studies have been made of some new provincial buildings.

Many results of the Division's research are expressed in the National Building Code, an advisory document of building standards now used by municipalities accounting for about three quarters of the total urban population of Canada. The Division also provides the secretariat and considerable technical assistance to the Associate Committee that produces the Code on behalf of the Council.

Mechanical Engineering.—This Division works mainly in the fields of mechanics, hydrodynamics (hydraulic engineering and naval architecture) and thermodynamics. Extensive testing and specification work is undertaken for a variety of industries and for government departments. Much of the work consists of continuing projects related to land, sea and air transportation.

The mechanics activities include mathematical analysis and computation, the development of instruments and servomechanisms, and research on mechanical devices such as gears. One group, working in the field of bio-medical engineering in collaboration with surgeons, has devised a mechanical aid for the treatment of patients with curvature of the spine; a blood cooler used experimentally with animals promises to extend for an hour or more the length of time a surgeon can conduct a brain operation without blood flow through the brain.

In hydraulics, a number of investigations and models have been made for improving Canadian harbours. The successful development of the Jarlan perforated breakwater and