

and Development Department that has made significant contributions to transportation technology. Other companies have also made contributions in this field and some useful research projects have been carried out by government and universities....

#### NORTHEAST CORRIDOR PROJECT

In Canada we also have the benefit of what has been called "spill-over" from scientific and engineering research in the United States. We are watching with a great deal of interest, for instance, the so-called Northeast Corridor Project to explore the potential of fixed-path, high-speed ground transportation in that heavily-populated and highly-industrialized area. Engineers and scientists are talking in very practical terms of running trains at 150 to 160 miles an hour along the Washington-New-York-Boston route. In somewhat more visionary, but by no means wildly impractical, terms they are also thinking about eventually running trains underground at speeds up to 500 miles an hour, and using the vacuum-tube principle for motive power.

Research projects of this nature have important implications for Canada. But in this area, as in others, there are grave disadvantages in over-dependence on others. For one thing, Canadian need for technical advance is so urgent that we cannot tolerate the time lag that exists between a development in another country and its application in Canada. For another, we need research and development aimed at meeting specifically Canadian needs and conditions, including recognition of the social, political and regional impact of scientific and technical developments....

#### TELECOMMUNICATIONS ADVANCES

I am quite fascinated by the implication of some technological developments. Take the field of telecommunications as an example. In this field our own CN-CP organization is making remarkable advances. Only last September our experts began work preliminary to the creation of a single Canadian Forces communication system which will employ the most modern technology including the possible use of satellites orbiting the earth. The choice of the CN-CP organization for this job is a tribute to the technical competence of the organization and an indication of confidence that we in Canada are abreast of the very latest developments in this field. I can well believe this because our own telecommunications experts keep telling me about such developments as "broad-band switching", which is due to come into service next year. This is a high-speed data exchange service that will allow subscribers to transmit data at speeds ranging up to 33,000 words per minute. At this speed the bible could be transmitted in 23 minutes and the whole Encyclopedia Britannica in about seven hours. Equally important is the fact that pictures can be transmitted as well as words, so that complete blocks of data, including blueprints and illustrations, can be sent back and forth across the country literally in seconds. The implications of this, and even more startling forecasts of advances seen for the near future, are, as I have said, enormous. One implication

is that businessmen and scientists and technicians may be able to communicate with each other so quickly and completely that there will be little need for them to travel any more. You will be able to hold a conference, perhaps even a whole convention, without anybody ever leaving his home or office....

#### PIPELINE COMPETITION

Another matter of great interest to Canadians is solids pipelines research. CN's Research and Development Department has been looking into this because it is obviously of great importance to the future of our business. Are solids pipelines going to take away some railway business or can they be used to augment railway service and thus increase business? Is the unit or integral train the "answer" to the pipeline and, if so, to what extent? We are getting some of the answers and other researchers are also in the field in Canada. But there are obvious limitations to what one company, or one group with special interests can do in this field and the need for broad objective studies is great....

#### LABOUR RELATIONS

...Technological advance must be accelerated if we are to meet new and growing requirements for the movement of people and goods. But new equipment often requires new skills and retraining or relocation of manpower. It is by no means inevitable that technological advance means an overall reduction in manpower requirements. But we must have research into what new jobs are developing and how we should tailor the retraining and relocation projects that will certainly be required. In the interests of an efficient national transportation system, collective bargaining in the transportation industry must promote efficiency as well as help solve specific problems in labour management relations. Such matters as job assignments, work rules and employment practices must be dealt with in a manner that will recognize the human problems produced by technological change and, at the same time, encourage increased productivity in the transportation industry.

#### SUMMARY

In summary then - to understand the increasingly complex transportation problems of today and tomorrow, to identify the relationships of social, economic, administrative and technical factors involved, to translate scientific knowledge into transportation engineering practice, to weigh the merits of alternative systems and to formulate new improved and consistent policies - we in Canada need information that can only come from a good programme of transportation research.

There is urgency in this matter. An efficient, low-cost transportation system is essential to the prosperity and progress of Canada. I repeat that I do not regard our present transportation as basically inefficient. It works pretty well by the standards of other countries and we do get things done; we get the wheat to Russia one way or another and we are doing some things that bring people here from other countries to observe and to learn.