

unit for years. Some of the best minds in Japan have been concentrating on improving their transit systems. If you take all research people in the United States who have been working for all our railroads, plus our railroad associations, plus universities and so on, you come up with about 200 professionals.

In other words, our effort in the United States is something like between a third and a quarter of the effort that the Japanese are putting into this same kind of activity.

One of the first things we do when we want to find out about improvements in transportation is to go to other countries and see what they have done because they have been putting a lot more imagination and intelligence to bear on the problem.

It is a neglected area in this country. I think in terms of feasibility, there is no question but what attractive, competitive mass transit can be built. It certainly is not at all impossible. It is easily achieved with comparatively small effort, for example, in comparison with aerospace problems.

Mrs. DWYER. Is the Japanese railroad—is that private enterprise?

Dr. ROMUALDI. It is Government operated.

Mrs. DWYER. The Japanese road system—what about their road system?

Dr. STELSON. It is far less adequate than ours. So consequently they have had even greater pressure to get their mass transit working right. Because their highways cannot handle the passenger loads that our highways can.

Mrs. DWYER. Are you of the opinion that many of our railroads, particularly in the East, would like to get rid of their commuter transit services and just do freight?

Dr. STELSON. That is my impression; yes.

Mrs. DWYER. Thank you very much.

Mr. BARRETT. Doctor, in talking about the rapid transit from Japan to Yokohama, I was on those trains and they are, in many ways, comparable to an airplane. But the foundations are very costly. While I was on them, I was wondering if we are pursuing the proper concept of overland transportation, or should we be pursuing another feature, underground transportation? What would be your comment on this?

Dr. STELSON. My comment—and I would like to emphasize that I have spent no great time studying this problem—this is just an impression from a general background of knowledge, but my impression is that underground transportation systems probably do not promise a good ultimate solution. The reason for this is as follows: In an urban area for example, in most city areas, the construction costs of a subway is of the order of \$20 to \$30 million a mile. This same mass transit system can be built in open cut if we don't consider the damage to the structures there; for about \$2 to \$3 million a mile.

In other words, the expense of construction is about one-tenth as much. So you pay one-tenth less—and for the same amount of money you can get 10 times as much mileage in your system. That's a big economic difference, a factor of 10.

Consequently, when you consider the three possibilities, on-grade or elevated, or subways, there are certainly going to be—in the final