

solutions in all cities—there are certainly going to be some of each of these three, because of the change in the terrain and the peculiar characteristics of each individual system. But the economics will always be pushing to bring it up out of the ground, to put it on-grade, or put it in elevated structures. This will be the direction in which, I think, it will move.

Mr. BARRETT. Thank you.

Mr. Moorhead?

Mr. MOORHEAD. Just following along the chairman's question about below or above, or on-grade. Do you envision an on-grade system, in competition directly with the automobile or an exclusive right-of-way?

Dr. STELSON. There will be no good mass rapid transit system without exclusive right-of-way. Exclusive right-of-way is one of the absolute essentials for a good mass transit system.

Mr. MOORHEAD. That is what distinguishes rapid transit from mass transit generally, does it not?

Dr. ROMUALDI. That is right. May I comment on that point?

It is amazing, the very few prejudices that are held by so many people that are exerting a tremendous leverage on the direction in which we go. For example, the prejudice against elevated structures, which is a carryover from pictures of the old New York El, simply does not have to be. If it is done properly, an elevated system can be made an attractive supplement to the city environment. It can be done with the proper architectural treatment and proper engineering treatment. This little barrier is quite a formidable one, though. In the end, the demonstration projects are going to be essential to break this. Once it is done, it will be a much easier path to follow.

Mr. MOORHEAD. Dr. Romualdi, very few of us on this committee are scientists. I think we would benefit from a general amplification of some of the things that you have been describing here. For example, "systems engineering," optimization of decisionmaking, thinking of the city as a whole system, and also I think we can benefit from an explanation of how computers would be used in this process of systems engineering, optimization of cities, and so forth.

Dr. ROMUALDI. Dr. Stelson is a bit more familiar with the systems engineering approach. Perhaps he can make a comment on that.

Dr. STELSON. In the redevelopment of an urban area, transportation is one of the vital subsystems of the redevelopment. Normally, there has been too much separation. Partly this is a mental block and partly it is a matter of timing and financing.

When a section of the city is rebuilt, transportation lines should enter wherever there is a logical plan. Usually the street patterns are designed. They frequently change that. But an integration of transportation with redevelopment of most urban areas is lagging at the present time. It is probably because transportation is in such a backward condition today.

For example, take a demonstration program like Sky-Bus in Pittsburgh. If your back is turned to that vehicle when it is approaching, you frequently don't realize that it is coming until it is right on you. You feel the wind from it.

Now, that kind of vehicle can go right through a building and not be at all objectionable to the occupants of that building; yet most