

PART 3

INTERVIEWS WITH PARTICIPANTS

By ANN HAMLIN, Missouri State Highway Department

LESTER A. HERR, Federal Highway Administration

Interview with Lester A. Herr, Chief, Bridge Division for the Federal Highway Administration. (This interview took place September 25, while Congress was still considering the Surface Transportation Act of 1978 to include bridge legislation. The additional money and legislation Herr briefly mentions here referred to that bill. Herr's statements regarding those funds are pertinent to whenever the money comes available.)

Q. What is your biggest concern right now?

My biggest concern is hearing we have so many bridges to replace and not really the organization or the funding. We spent about \$2 billion yearly for the last several years on bridges alone on just the Federal Aid System. These \$2 billion build anywhere from 2000 to 3000 bridges of various types and so forth. We are supposed to get some additional money because we are not building enough. A lot of those two or three thousand bridges can be accounted for by the Interstate System, because the Interstate System is sort of a new system.

So, what we're starting now is bridge replacement program to replace old bridges. The farther East you get, the older the bridges are. Bridges were worn out in Pennsylvania, let's say, before California became a state. Missouri is somewhere in between. In 1925, Pennsylvania had some bridges 50 years old and some of these are still in use. The Eads Bridge in St. Louis is one of these older bridges.

Now, the trucks are getting bigger and bigger. Every day more and more railroads are being abandoned. And as they abandon railroads, industry products have to be taken to market on highways. Often, the bridge or a part of the highway is not constructed for heavy truck traffic.

So, our biggest problem right now is to know how many bridges we have and their condition. Many of the counties don't know if they have 300 bridges or 500 bridges. And it is interesting to note -- we have run into the problem of "who owns a bridge?"... this happens in some of the western states. Over the years, nobody was concerned as long as they could maintain traffic over the bridge, but now comes the time when you have to replace it or repair it, and somebody has to come up with some money. Then comes the question "Who owns it?", and the answer is unclear in some instances.

Q. What do you see in the next 10-15 years ahead?

Right now, we estimate that to do the job with today's

dollar, it would cost us \$25 billion to put the bridges in the shape we'd like to see them. Now if you divide that by the number of years, if we spent a billion dollars a year it would still take 25 years. And we're not spending a billion dollars a year extra on these bridges now. That's why Congress is trying to get a bill through to get an extra \$2 billion annually, because they want to clean up the situation in say 10 or 15 years.

So, what I see in the future is that we are going to have a bridge program for at least the next 20 years.

Q. If Congress should vote the money and the President signs the bill, how would the money be apportioned?

If we get the money, we have to allocate the funds to the states on the basis of need, the way the law says. We don't allot funds according to the number of people a state has, or the length of highway, or the number of bridges. The program would be set up to give the money according to how bad the bridges are. So really, if a state had all good bridges built just yesterday (theoretically), it would not get any of this money at all.

Q. How difficult is it to determine that amount of need?

We first have to know how many bridges a state has, their size, width, so forth, and then evaluate them. That takes some technical expertise to say that the deck is bad, that a pier is bad, or determine what else the bridge really needs. So, we have to get some kind of evaluation so we can compare the needs of that particular state with other states.

So, if a state had few bad bridges, they wouldn't get much money. And really, we would look upon that as being excellent. The state, however, might not look at it that way, since they would not be getting any money. But the whole principle is to get all deficient bridges in good shape.

This is why we need to know how many bridges we have, and what condition they are in, and that information we don't have at the present time, particularly on bridges located on highways that are not on the Federal aid system.

The bill, as introduced into the House and passed out of committee, would provide \$2 billion a year for a special bridge replacement program. The funds would be not only for replacement but, additionally for rehabilitation. Up to this time, states

or local jurisdictions were expected to take responsibility for rehabilitation.

Q. Does the fact that bridge failures bring more dramatic consequences perhaps draw excessive attention to the bridge problem?

Although this last year we got a lot of attention to potholes, a failure in the roadway is not as catastrophic as some people getting dumped into a river. Plus the fact, that a bridge, per foot of roadway, is pretty expensive. If a county would get \$50,000 a year, this would build maybe one bridge. But it would also build perhaps 10 miles of roadway. So planners most often build the 10 miles. That is why bridges, because of lack of money, have been allowed to deteriorate to the point of no return... it has to be pretty serious before people will collect money to deal with it.

Looking back a bit...when the Interstate System was started back in the early 60's...there was a big push. There were traffic jams much worse than there are today. We even had traffic jams in the 1930's. When I was in high school coming back from Atlantic City, it took us four hours to get across the bridge at Philadelphia. They had two-lane traffic and it was a mess. When I went to Washington in 1935, from Baltimore to Washington, a two-lane road again, you couldn't move. So we had traffic jams a long time ago. Then they came up with the idea of the Trust Fund. People were just tired of fooling around with the traffic problem. So again, it's just a matter of how serious it's going to be before we get some money.

I think the bridge community of the highway departments and the consultants are an excellent bunch of people, and everyone of them is conscientious about getting our bridge situation improved.

JOHN W. FISHER, Lehigh University

Dr. John W. Fisher is Associate Director of the Fritz Engineering Laboratory at Lehigh University, Bethlehem, Pennsylvania. He is widely regarded as a top consultant in the area of bridge fractures and failures and is called to all parts of the nation as failures occur. He was involved in the AASHTO Test Road in Ottawa in the late 50's. At the St. Louis Bridge Engineering Conference he chaired the session on Long-Span Bridges. Here, Fisher expresses his concern for anticipated problems of earlier bridge structures, and also voices concern over the use of the transportation and research dollar.

Q. What areas of concern does your research involve?

Generally, I've been involved in the investigation of many failures and developing design criteria to prevent fatigue cracking. When a cracking problem develops I often become involved in it in some way or another as a consultant. In my own state, Pennsylvania, we have one of the higher populations of old bridges in the country, because it's a relatively old state, going back to the first colonies, although the bridges aren't all that old.

Nonetheless, in the East there is a much higher volume of traffic. So many of these problems associated with serviceability manifest themselves there, before they do elsewhere in the country. As a result we have had a lot of problems in the state. We've studied some of the state's bridges and future related problems. The Transportation Department has

supported us in this ongoing research. We have also carried out a number of NCHRP projects in the area of fatigue.

With so many rivers -- the Monongahela, the Allegheny, Ohio, and Delaware -- Pennsylvania has a lot of long bridges similar to those over the Mississippi in Missouri.

Most long span bridges are steel bridges, and my work is in steel structures.

Q. What are you anticipating in the next 10 years in your field?

I think there will be more problems, and that's because we have only realized in the past 10 years that there was a potential for a really serious problem. I think this is because, in general, when welding was introduced into bridges in the late 40's and early 50's and the severity of certain details that were used was not recognized. Therefore, we have a lot of older bridges with fatigue sensitive details. Unacceptable details exist on these older structures, and therefore, we are going to have problems associated with them as they age and see more service. But there are an awful lot of older bridges -- we did a lot of construction of bridges during this earlier period of time. That's our problem now.

I think some of the thrust of the work in the future will have to deal with how to retrofit these types of bridges. How you repair without replacing the structures -- because economics dictate this kind of solution. I'm less concerned about new bridges because I think we have enough knowledge now that we can design new bridges to avoid these problems.

The other problem is with designer's using details without recognizing their severity. Often this is because there is insufficient experimental work.

Q. With the failures you anticipate from these earlier constructions, will research people be able to keep up with the increased needs for both better design on new structures, as well as ways of solving arising bridge failure problems?

I think there are a lot of potential failure problems and whether or not we are able to keep up depends on whether or not funding will be available.

It's the economics that matter here. I believe there is too small a percentage of research money going to other work. I feel that possibly too much of the transportation and research dollar may be going for administration or soft type research vs. hard type research. Whether that is a reality in fact, I'm not so sure I could prove, but it's just a feeling I have.

GERALD D. LOVE, Federal Highway Administration

Dr. Gerald Love is Associate Administrator for Research and Development, Federal Highway Administration. Dr. Love discusses his concern for bridge rehabilitation, new developments in research, his concerns and anticipations for the future.

Q. Right now there is a growing emphasis on bridge rehabilitation, rather than bridge replacement alone. How does this new emphasis affect you people in the field of research?

I wouldn't consider it a new emphasis. We've always been concerned with this problem. In fact, the thing that has brought it into the fore at the present time is the fact that we do have a very serious problem as far as the condition of our bridges throughout the country. We must recognize that additional funds have to be made available not only to replace some of the structures, but also to rehabilitate those that can be saved.

Q. Do you see a lot of new types of replacements, new methods of rehabilitation coming? Are we going to go about this work at a different pace?

Well, I certainly think there will be new developments. We will go about it in a different pace in the sense that one of the most serious problems we must recognize is that we have a highway system in need of maintenance. The majority of the miles of the highway system are already constructed. So, the problem in the next decade basically, will be one of upgrading and really rehabilitating the existing system. So the emphasis of the immediate future certainly will be more toward rehabilitation and upgrading, rather than construction of new facilities, which has been the thrust for the past 20 years with the Interstate System.

Q. What is your greatest concern right now?

The greatest concern to the highway industry is the very serious condition of many of the bridges throughout the country. And it's not only the older bridges where you find structural deficiencies in the superstructures. We also have a very serious bridge deck deterioration problem in some of the structures constructed as part of the Interstate System. So, the bridge deck problem is perhaps one of the most serious problems facing us.

Q. What new developments in scientific work do you see coming up?

I think our research efforts have come up with some new innovations for providing additional construction techniques for bridge structures. Perhaps you've heard of the term "epoxy coating" coated reinforcing steel. That is one of the outputs of our research program which protects the reinforcement steel from the action of deicing agents. We have worked with the states on a project using "wax beads" in the bridge decks.

Q. How exactly does this system work?

The problem associated with bridge deck deterioration is the deicing agents coming in contact with the reinforcing steel, causing corrosion, which in turn tends to cause the concrete to crack and fail. This causes accelerated deterioration in concrete bridge decks. So, we need a means of preventing the deicing agents from penetrating through the concrete to reach the reinforcement steel. So we mix small wax beads with the concrete in the top two inches of the bridge deck, and then melt the wax beads by the application of heat after the concrete has cured. The wax then fills the small pores, thereby creating a seal where the deicing agents can't get in contact with the reinforcement steel.

This technique appears to have a good potential. It is a little more expensive, but it would prolong the life of a bridge. It's difficult to say just how long, but we would anticipate that it would give a bridge deck a comparable life to the rest of the structure.

Q. Dr. Love, you've been Associate Administrator for Research and Development for a little over four years. What is the most exciting aspect you find in this job?

I think the most interesting thing is that we are working with new ideas and new concepts and we intend to come up with better solutions to some of the problems basic to highway industry for many, many years. That, to me, is the most challenging and most interesting part.

Q. Dr. Love, what do you see the the next 10, 15, 20 years ahead?

I think basically the emphasis will definitely be on rehabilitating and maintaining the system, and in some cases upgrading. But there certainly will not be any significant new construction.

Q. Do you think the biggest problem will be a problem of funding or of time?

We are concerned that we will not be able to maintain an adequate funding level. In terms of the overall priorities in transportation, we have to fund the highway program at an acceptable level. It is generally true, I believe, that most states are capable of funding their highway program. I am sure that this would be true in Missouri. You could use some more money, perhaps, but we could use a little more money in our programs too.

Q. Do you see any problem when we get into upgrading the existing system? Can we "gear up" to this if funding should quickly become available?

I think we have a cadre of capable engineers and a construction force around the country that can effectively manage the program that is now proposed. I don't really see any problem.

In fact, we're much better off today than we were when the Interstate first started because we do have a more experienced cadre of engineers than we did 20 years ago. Really, there should not be any shortage of qualified highway engineers in the foreseeable future.

GEORGE H. ANDREWS, Sverdrup and Parcel Associates, Inc.

George H. Andrews is a man who says the best part of his day is "getting up!" He was top administrator for the Washington State Highway Department, from which he retired with 35 years' service in 1975. He then joined Sverdrup & Parcel Associates, Inc. Andrews is also a past president of AASHTO.

Andrews lends an unusual combination of expertise in both the public and business sector to a conference such as the Bridge Engineering Conference in St. Louis. Here he reflects on the differences he encountered in the transition to the business sector after some 35 years in government. In 1974 Andrews was named one of the Top Ten Public Works Officials in the U.S. He presently is Vice President of Transportation and a partner of Sverdrup & Parcel.

Q. How great is the transition you made in moving from the position of top administrator of the Washington Highway Department to your position with Sverdrup & Parcel Associates, consulting firm?

It is a great transition going from almost daily public involvement, meetings, talks, conferences, to the business setup, where you have to worry about how your staff is doing, whether you are able to produce the work, or for that matter where the next job is coming from. It's more a competitive situation. It has been quite a transition.

But to my advantage, I had the experience of having worked with a number of consultants in our Department and knew what they were doing, how they were doing it. And then I moved to the other side of seeing that it got done. My work now is mainly in the internal administration of the business, business contacts with clients, etc., no public meetings, as before. In a way I kind of miss that.

A great satisfaction from working with people in public life happens when you can hear what they are saying and have some ability to respond and do something about their problems. It's a great satisfaction to be able to do that.

Combining experience in public life with the private sector: Having been a professional engineer in the (Washington) Highway Department gave me a background in general engineering problems, particularly highways and bridges. It's helped me in knowing what some of the design problems are that we now have under contract as a consultant. Having had the advantage of several administration positions in the Highway Department gave me a feeling for business and engineering practices that are common to both private business and public life. One big difference is that I now don't feel the pressure of the administration of a Department as big as the Missouri Highway Department or the Washington Highway Department -- they're about the same size. Pressures are there in this job too -- but they are different. I don't miss that part of public life!

Q. What brought your attention to this conference?

This is a great conference. It is a timely meeting, as right now there is a lot of interest in bridges. The condition of our bridges throughout the country has got to be a concern to everyone. By and large, so many of them were built right after the turn of the century and so many of them are wearing out.... There is a lot of serious interest in these problems because attendance here is bigger than had been expected...I think every state in the Union must be represented. It is good for the bridge engineering fraternity to get together and share some views. There is constant change in this business, and all of us have to stay on top of it.

ROBERT C. CASSANO, California Department of Transportation

The following interview was with Robert C. Cassano, who with Richard J. LeBeau of the California Department of Transportation, co-authored the "Best Paper" of the Conference on "Correlating Bridge Design Practice with Overload Permit Policy." Their paper identified the need for design and permit people to combine their efforts at the time a structure is being planned, and they specified how this was implemented in the California DOT recently.)

Q. Were you and co-author Richard J. LeBeau expecting the "Best Paper" award at the time you submitted your writing?

Oh, not. I was very amazed. In fact, after listening to the various papers being presented at this Confer-

ence, I'm still more amazed. Ours is kind of a "not-very-spectacular" topic, and I was very surprised that it was selected for an award.

Q. Where did you conceive the idea presented in your paper?

The paper related what we in California are doing, i.e., how we switched from the usual AASHTO specifications to the present California practice. We also give the rationale for why we think it's desirable to change national practice. It isn't an idea we thought of just for this conference. It's something we saw a need for a long time ago. I can't claim the concept as my own. It kind of grew out of our staff as a team effort.

Q. How do your specifications change, generally?

Basically, with what we were doing in the past there seemed to be two groups of people: People who designed bridges using a set of specifications, and then a second group of people in the maintenance field who wrote the permits for bridges, deciding what kinds of loads to put on them and inspected them. The second group operated independently of the designers. The permit people were using different criteria for deciding how to load the bridges than the designers had used to design them. In general, there is a communication gap between maintenance and design engineers.

We've got to get the two groups together, so that the designer takes into account the same stress levels and same loadings that maintenance used for the completed bridge. This seems quite fundamental, and it's kind of amazing that it's viewed as a new idea. It seems logical that you would design a bridge for the load you expect it to carry -- but still that's not the common practice.

The purpose of our paper is to get the two functional groups together so that they use the same specifications right from the start.

Q. Have you implemented this idea in California?

Yes, we decided the way we were doing business was almost absurd, so about four or five years ago we began talking about what we should do about it. We've been using our new criteria routinely for the last couple of years in California.

Q. What reactions do you anticipate to this idea?

Many AASHTO members in the western United States already think it makes sense. But there is considerable effort involved in switching to new procedures. You have to retrain designers and rewrite computer programs. There is a certain amount of investment in time to make the switch over. That's one of the reasons why our procedure may not be widely adopted. You have to be highly motivated to conclude that the required effort is worthwhile.

Another reason why we will have some trouble getting it adopted is that California's system might not have nationwide appeal. We are cognizant of the fact that permits for overloads and levels of overloads vary drastically from state to state. This lack of uniformity is a serious factor.

BRUNO THUERLIMANN, Swiss Federal Institute of Technology

Dr. Bruno Thuerlimann is presently on a sabbatical from the Swiss Federal Institute of Technology, Zurich, Switzerland, where he is a professor of Structural Engineering. An internationally known consultant, Dr. Thuerlimann is president of the International Association for Bridge and Structural Engineering, and performs consultant work on the North American continent, Europe, and the Middle East. He left the St. Louis Conference to begin a five week series of lectures on elasticity of reinforced concrete at the University of Texas. Dr. Thuerlimann received much of his education at Lehigh University, Bethlehem, Pennsylvania.

Q. Dr. Thuerlimann, your consultancy exposes you to bridge failure problems on three continents. What, right now, is your greatest concern for these structures?

One of the biggest problems is maintenance. Here, and also in Switzerland, there is a tremendous system of highways and bridges, and we see a much faster deterioration of our structures than we had expected. I think maintenance will be one of the very big problems.

Personally, I'm not involved in maintenance, but I do see this as a big problem. I think in design we should become mindful of this problem and attempt to design maintenance-free bridges.

We have to have monies appropriated to keep up a good system. Switzerland, compared to the United States, is a much smaller country. We have similar political systems: a state highway system and a federal highway system. I think our problems are quite similar to one another, just on a smaller scale.