

development.

Starting in 1921 with this as an objective, several outstanding engineers, either involved or interested in highway bridges, believed we needed standard specifications for our bridges -- not only in steel, but in timber and concrete. Various specification bulletins were published during the twenties, but the truly first AASHTO bridge specification appeared in 1931. This has been constantly changed, revised, and added to until we have the recently published 1977 edition. The increased size represents much hard work over the years by many including the members and their staffs, industry, academia, and consultants. It truly has been a cooperative effort.

We today are still active with 19 agenda items ready for balloting this year. Of particular importance is a proposal for a fracture control plan for steel bridge design and construction. We hope this plan will greatly improve our quality control and quality assurance programs, especially for welded fracture critical members. We have also completed metricating our specifications for soft conversion, a first step to the eventual hard conversion.

We have several items pending for future agendas and discussions. An important one is a problem that has been around for a long time -- and one that perplexed the organizers of the Bridge Committee -- that of design loading. At first, just after World War I, it was military loading, steam rollers and logging donkeys -- now it is the ever increasing size and frequency of truck loading. What are adequate design loadings and geometrics for a bridge today -- and tomorrow? What will eventually be the "ideal" size of a truck and how will increased loads and numbers affect the thousands of bridges we have already built? The solution will not be easy.

Another immediate problem facing the committee is that of hard conversion to metrication. The impact on the designer is probably of the least concern since most of us had a taste of metric units in college physics and we lived through that. But we must remember the craftsmen and industry. The crafts and the workers involved are not as receptive to training, and industry is worried about the economics of the change. This task will not be easy, but the committee is committed to go forward in this effort before the printing of the next edition of the specification in 1981.

Although the future's not our's to see we must prepare for the future. It is comforting to know that the committee is well structured to keep its finger on the pulse of change.

COUNTY BRIDGE PROBLEMS AND NEEDS

Howard E. Schwark, Kankakee County, Illinois

Since the tragic collapse of the Silver Bridge over the Ohio River near Point Pleasant, West Virginia, on December 17, 1967, the public has been reminded through the news media, trade publications, congressional reports and surveys made by many highway related agencies, to name a few, that America faces a serious problem with its highway bridges. To better understand county bridge problems and needs perhaps we should begin our discussion before the Silver Bridge collapse, even though this tragedy was largely responsible for the extensive bridge inspection program which so clearly pointed out the seriousness of structurally deficient or functionally obsolete bridges that were on the federal aid system.

Howard E. Schwark



Most of the structurally deficient or functionally obsolete bridges on the county road systems were constructed in the first few decades of this century. A few may bear plates dating back to the later part of the last century. Considering that these structures, in the main, were designed for horse and wagon loads and their widths were limited to one lane of traffic it hardly seems possible with today's traffic that any of them are still standing. It is further difficult to understand this phenomena when we consider the evolutionary changes which have taken place in the number, size and weight of vehicles traveling over these bridges. I can recall several years back when our threshing crew would disconnect the threshing machine from the steam engine, plank the bridge floor with runners for load distribution, cross the bridge first with the steam engine, then pull the threshing machine across with a heavy log chain. Today loads much heavier than either of those machines cross the same bridge at high speeds building up an impact factor resulting, in some instances, in a higher stress than the combined load of engine and thresher. In my opinion these seemingly indestructible structures designed so well by our early bridge engineers fostered the apathy which has existed in the minds of the public that these bridges would last forever and, as a result, we are faced with today's national bridge crisis.

Instead of local agencies funding a realistic bridge replacement program when the character and type of traffic changed from horse and buggy to mechanized vehicles that continued to grow in numbers and size, most highway agencies spent their highway dollars on building a road system and replaced only those bridges that were absolutely necessary. The rest were kept in service with occasional maintenance being the only attention they received. The reason for this, I feel, can be attributed to several factors. One factor was that counties could build a lot of road for the price of a bridge spanning only a few feet, and the public was demanding from all highway agencies better roads which resulted in local agencies giving priority to roads rather than bridges from the monies available for highway purposes. Another factor was psychological. As long as a bridge was still standing the average driver assumed it was safe to cross irrespective of the load he was taking across and as a result the public never became excited about the need to finance a bridge replacement program. Everybody went over the bridge; seldom did anyone go underneath to see what was holding it up. If they had, we may have replaced more bridges than we have to date. Another factor was that by and large counties did not have professional services available to them for rating bridge capacities. About the only guidelines many counties had for bridge replacement were outright failures and an obvious need to replace due to heavy loads and high

volumes of traffic. As a result the bridge crisis did not materialize into national proportions until the rating of structures on the federal aid system was mandated by the federal highway administration, a fallout from the Silver Bridge tragedy, and it was estimated that replacement costs for deficient bridges on the Federal system alone would cost approximately \$12.5 billion. The number of bridges on the off-system in need of replacement has been estimated to be 5 times more than the number of bridges on the on-system. A complete report of the off-system bridges is not available because the rating of these structures nationwide is incomplete.

Why should counties be concerned about this bridge problem now when for many years they were able to get by with a comparatively modest bridge program and the remainder of these old bridges are still standing and most are still carrying traffic? They haven't been hit by vehicles in spite of their narrow widths. They haven't been collapsed by overloads as they seemingly should be so why get excited at this time. I believe it is because we are now faced with the truth. We know factually the conditions that exist on a national basis that we have known to exist in each of our jurisdictions for some time. We also know that more and more school busses of increasing size and capacity are using the rural roads today than ever before. A failure of a bridge with a loaded school bus on it would be a national tragedy. We are also faced with more and more railroads being abandoned with heavy trucks taking their place which are appearing in ever increasing numbers on our rural highways. The bottom line, however, is that we know these bridges must be replaced to meet today's traffic needs and that counties do not have the funds to get the job done.

Perhaps to better illustrate the point made on counties' concerns over funding problems I would like to use as an example our experience in Kankakee County, Illinois. In 1961 we conducted a survey of all bridges requiring replacement on the local system of highways. A total of 381 were located and inspected which included three river bridges and 111 under twenty feet in length. At that time we had a very modest bridge replacement program using Federal Aid secondary funds or motor fuel tax funds for bridge construction work. In 1963 we started a tax levy of five cents per \$100 assessed valuation levied on real and personal property for a county bridge matching fund. Each of the seventeen townships could also levy a like amount to match county funds on a fifty-fifty basis for joint bridge construction in its township. Several did not levy at first but by 1969 all were eligible for matching funds. However, in 1965 we began an ongoing program of bridge replacement at which time we estimated our bridge needs to be \$8,000,000 county wide. In 1971, after spending \$1,600,000 on the bridge replacement program, a revised estimate of our needs was \$8,300,000. Today, 1978, after spending \$5,733,250 constructing 85 bridges over 20 feet in length and replacing 80 other structures with pipe, pipe arches, box culverts, etc., we estimate our needs in 1978 dollars to be \$5,300,000 to construct 100 remaining structures, a somewhat disappointing progress report. The continued increase in costs of labor, wages, and material has resulted in an approximate 55% increase in our construction costs over the past 13 years with the largest increase taking place within the last 6 years. We have used every available source of funding including Federal Aid Secondary, Federal Bridge Replacement, Revenue Sharing, Joint Bridge, Motor Fuel Tax, County Highway, Road and Bridge, Safer Off System, and the State Local Bridge Fund

and still find ourselves further behind in our bridge replacement program than we would like to be. I am sure that some counties have progressed better than we have in their bridge replacement program, and others may not have done as well. A county with a high assessed valuation and one which began early in the bridge replacement program is not quite as badly off as smaller counties or less affluent counties who do not have the advantages of a high-assessed valuation and sufficient staff. Judging from the results of surveys conducted by the National Association of Counties (NACO) there is still a large number of bridges needing replacing nationwide. I feel those counties with these deficient bridges share some of the same problems Kankakee County has--with insufficient available funds to meet the replacement costs leading the list.

Up until now our county has used relatively few federal dollars in our bridge program other than a bridge replacement project presently underway involving the replacing of a river bridge at a cost of a little over a million dollars. I can see this changing rather rapidly, especially in light of the concern Congress is expressing over the local bridge crisis across the nation. We will more likely be using a share of our local bridge funds for matching federal dollars depending upon the matching ratio set forth in the proposed new highway bill. Congress and highway related associations have placed a great deal of emphasis upon the size of the federal appropriation for on-system and off-system bridge replacement. Little has been reported on how capable the local agencies will be in matching these funds especially if the funding reaches the billion dollar mark. Many counties in Illinois, I have been told, will find it difficult, if not in some cases impossible, to match these funds if they do become available. I believe that many counties throughout the nation will not have sufficient matching funds if the matching ratio is set at a given figure and consideration is not given to using a sliding ratio based upon a county's ability to raise the matching funds.

Matching federal dollars is only the beginning of the problems facing counties in an accelerated federal bridge replacement program. The Congress and FHWA have been busy for over twenty years building the interstate highway. Due to the nature of this immense project and the fact that it was built almost entirely on new location, laws were passed and policies developed which in no way fit local highways. Yet counties must, when using federal funds, comply with these laws and policies. To replace a bridge that has been in the same location for over 50 years and address its impact on the environment is rather redundant. To be required to obtain a permit for construction to replace a bridge from the Army Corps of Engineers when on the same stream a landowner is dredging the streambed, straightening nature's meanders and destroying the integrity of the watershed, all of which is being done without a permit because agriculture is exempted from the law, is not in the best interest of the country. This is certainly an example of how a discriminatory law can result in unnecessary public expense and, because of exemptions, does not do the job for which it was intended.

Other items such as archaeological finds, historic structures, endangered species all take time and are costly items to administer. In almost all cases counties are going to construct bridges replacing bridges which have been in the same place for many, many years. If we as counties are going to have a successful federal bridge replacement program I feel that Congress must acknowledge the fact that our bridge replacement program is far different from that

of the interstate highway program; at the same time they should acknowledge that the counties and their respective states have proven their ability to get a job done. Out of the 3.1 million miles of rural roads in this country approximately 2.3 million miles are under the control of local agencies. That figure represents a lot of responsibility.

If an accelerated program does become a fact I feel that the obligating of allocated funds the federal way will also be a problem. First of all, prepared plans for a project are necessary before work can be placed under contract. Relatively few counties will have sufficient plans "on the shelf" to be ready for a large program. Most counties needed their construction dollars for the few bridges they have been building, and their county boards were reluctant to invest in plans based on an insecure hope for more money for bridge construction. Because of this there more than likely will be a time lag which will hard press counties to obligate their allocated funds within the time allotted. By the time a county has designed plans for the structure and processed it through the red tape factories, considerable calendar time will have lapsed. I believe this problem must be addressed on a national basis. The term "obligated" should be redefined or the period for obligating funds should be extended to allow counties to get their programs underway. A large number of counties nationwide do not have the staff to cope with the paper work involved in using federal funds. Often times we overlook this because we have assumed that counties are no different from the state and federal government who add or transfer staff when the need arises. I can assure you that there is a difference.

I feel counties need substantial financial assistance in coping with their bridge problems. Along with that need is a need for Congress to recognize that the counties on a nationwide basis are very dissimilar in many respects, such as topography, traffic requirements, climate, type of traffic, economy of the area, whether they are industrial, agricultural, residential or wide open spaces. Each characteristic requires certain considerations to be made during the design of a structure. For instance, in an agricultural area with super-wide farming equipment the guardrail treatment should be different from the guardrail treatment in a congested residential area. A bridge in rough topography should be considered differently in width and approach grade from one located in the flat plains where its length may be extended many more feet to provide the necessary waterway opening. Many variables exist in as diverse a land as ours. The point I wish to make is that we are no longer talking about a program to which we can apply uniform standards nationwide when we discuss rural local bridges. We are instead in need of addressing each bridge as an independent structure to fit specific requirements if we are to obtain the most value from the construction dollar. It is, therefore, essential that full consideration be given to allowing sufficient latitude in standards if we are going to invest the taxpayers money wisely and, most of all, eliminate these old structures as quickly as possible before another tragedy occurs. Let us not impede safety by making one bridge super safe and allowing others to collapse because we did not have the time or money to replace them.

To briefly summarize, the county bridge problem is critical nationwide and the needs are in excess of the present available funds which counties can generate for bridge replacement purposes. It has become a habit in so many instances for local governments to turn to the federal government for help when their needs exceed their available funding sources. The county off-system bridges seem to be no exception. I support the use of federal funds

with reservations. After more than twenty-five years as a county superintendent of highways, I have observed the growing dependency of counties for federal dollars to get the job done. I have also seen the cost of projects increase when using federal dollars to get the job done. I have also seen the cost of projects increase when using federal dollars due to certain requirements which are applied across the board just because federal dollars were used. Red tape, environmental concerns, A-95 Review, Uniform Act on Acquiring Right-of-Way to name a few, all take time, and time is money!

The same taxpayer who sent his dollar to Washington also paid his local and state taxes. His interest in the bridge program is to be able to cross a bridge safely and he doesn't care which level of government is paying for it because he has paid his taxes. My point is: Why should there be a difference in how his dollar is spent? Why can't state and local governments continue the work they have done together for so many years? Why should Congress attempt to set apart federal funds as something holier than local and state funds with an ever-increasing loss in purchase power due to unnecessary regulations spawned chiefly by a National System of Highways which bears no resemblance whatsoever to local highway systems?

The tenor today, as expressed through California "Proposition 13", is that local governments will have a difficult time in raising local revenues to meet their needs. Let us not betray the conscientious taxpayer who is watching his tax dollar locally by wasting his federal dollar nationally. The ultimate answer to these concerns, I feel, is for Congress to appropriate directly to the states sufficient revenues over a period of time from the Trust Fund to meet the needs of the bridge crisis in their respective state and allow each state to proceed as they do now when they administer their local and state road funds. I think we owe this to the taxpayer, and I feel he in turn trusts us in county government to be able to do the job with his safety and welfare in mind.

TWO SIDES TO A CONSULTANT

George Andrews, Sverdrup & Parcel Associates, Inc.

The purpose of this bridge engineering conference is to facilitate an interchange of information on all aspects of design, construction, rehabilitation and maintenance of vehicular bridges with specific emphasis on problems and solutions of interest to bridge engineers and administrators of highway, railroad, and transit agencies.

I assume, therefore, that most of you in attendance are highway, railroad, and transit agency administrators or bridge engineers. Why then should I presume that you may be interested in whether or not a consultant has two sides, three sides, or for that matter, any sides?

From the introductory remarks by our Chairman, you have been advised that my previous engineering background has been as a state bridge engineer and highway administrator. Through these former positions, I have had an opportunity to develop scopes of work, prepare contracts, interview, hire, and supervise the work of many consulting engineers from the side of an employer. In my present position, I am involved with RFP's, scopes of work, interviews, and job performance from the side of a consultant.