

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.

George Andrews



In recent years, more and more public agencies are beginning to balance their workload between staff and consultant to avoid the difficult tasks of reductions in force that may develop due to uncontrollable program delays caused by funding shortfalls or by court, environmental, or other involvements. Perhaps the sharing of some of my experiences with you will aid in this transition.

As we all know, consultants can - or at least claim to be able to - solve all problems, perform all kinds of services and, in general, remove any need to ever worry again. I am sure I don't have to caution you to take these claims with a grain of salt. But consultants can, in fact, perform a valuable service for transportation agencies of any size. This will generally be in one of two roles - either to supplement the staff you have in order to attain maximum manpower efficiency or to provide a special skill and experience that you may not have within your own organization. In either case, you should have an adequate, experienced, and professional staff to know what you need, what you want, and what you are getting.

In my former position, I was advised on several occasions by consultants that it was fundamentally wrong and against the basic precepts of free enterprise for a state agency to do any of its own design. I didn't believe it then and, more than ever, I don't believe it now. There have simply been enough shenanigans pulled over the years by a few so-called professional consultants, that I firmly believe the public is best served when the larger agencies have at the least a cadre of experienced, professional engineers to administer and perform their engineering functions. In other words, "it takes one to know one."

There are several aspects of our business which you should know about and take into consideration in your future employment of consultants. In making these comments, I am going to assume that most of you as bridge engineers and administrators represent agencies where consultants are selected on the basis of need and through a system which permits open solicitation, interviews, examination, and, finally, selection free of political pressures. To the rest of you, I extend my sympathy and my hope for a speedy change in direction.

To begin with, let us first consider the scope of work. This document should be carefully and thoroughly prepared to insure that all invited consultants are actually proposing on the same job. The size, nature, time, location of office, and degree of detail and follow-up services are all vitally important to each project and the accompanying fee that will be involved. Most of you will have a professional staff with sufficient knowledge of the proposed project to develop a scope of work. For those who do not feel they can do the job in-house, consultants are available to assist, but I do

not suggest that as a general practice the consultant who develops the scope of work then again be selected for performance. Often this is the way to go, but the practice has some inherent and obvious problems and should be carefully considered.

Next is the proposal. On a large job, a properly prepared proposal costs the consultant a lot of money, which adds to his overhead. In a few cases of which I am aware, some agencies on very large jobs have made an allowance for proposal preparation to carefully selected consultants. I do not believe this procedure is needed on most bridge or other transportation-oriented projects. I do suggest, however, that the practice employed by some agencies of pre-screening the qualifications of those consultants who have responded to an expression of interest and inviting full proposals from only a select few of those felt to be best qualified is good and I recommend it for your consideration. The preparation of proposals can cost anywhere from a few thousand to literally hundreds of thousands of dollars, adding ultimately to increased costs through increased overhead. The willy-nilly solicitation of proposals without intermediate screening is not only expensive but is unprofessional and can lead to inferior, ambiguous and ill-defined descriptions of how the work is to be performed.

Adequate proposals are essential to insure a complete and mutual understanding of the work to be done. As I indicated, however, good proposals cost money and add to overhead. Overhead then is the next item which deserves attention. Contrary to salary-related costs which reflect social security payments, annual and sick leave credits, retirement plans, and the like, overhead is a direct reflection of the consultant's modus operandi and to some extent, the type of consulting service he performs. Soils engineers, management consultants, and special services consultants, in general, for example, have a higher overhead than do consulting firms providing services employing a large number of draftsmen or subprofessionals that can be switched readily from one job to another as the needed work effort varies. The number of administrative personnel, the amount of marketing and new business effort, the style and location of office, and even the ownership of a company plane, all affect a firm's overhead. Likewise, the basic efficiency of the consultant's productive effort is critical to overhead and should be recognized.

Another important item of overhead which has grown significantly in recent years is the cost of liability insurance. All of you are no doubt painfully aware of the cost of loss of sovereign immunity and the rapid increase in public suits. As your agent, claims for liability due to errors, omissions, and negligence are passed on to the consultants. To the extent the consultant is at fault, the payment of such claims should logically add to his overhead. But, awards for damages are frequently made by sympathetic juries or judges against big corporations and state or federal government agencies completely out of proportion to good common sense and often the consultant is caught in the middle. The common practice of insurance companies is to write their losses off against the entire industry and, therefore, consultants who have been prudent and careful in the performance of their assignment are also affected by the increased rates. As an example, I recently attended a meeting of several of the larger consulting firms to discuss the rapid escalation in costs of errors and omissions insurance. In reviewing the loss ratio of the firms represented, I found that not a single firm at the meeting had paid claims through deductibles or insurance in excess of about 15% of the amount of their premiums. Yet, such

insurance is necessary, the payment of premiums is a must, and the cost becomes a part of overhead for all of us.

In employing consultants, your staff should know all about overhead, the reason for it, and what it contains. You should be prepared in your negotiations to question every item contained in overhead and agree to only those items and amounts which are pertinent. At the same time, you should be prepared to pay for all appropriate overhead. The practice now being followed by a few agencies of applying an arbitrary ceiling on overhead is unwise and unfair. Overhead varies as to the type of service and the size and nature of the consultant. Be prepared to pay what it's worth - but no more.

The fee for services performed is the next important item to consider when employing a consultant. All of you are aware of the various types of fee arrangements being used and the reasons for the evolution from percent of construction cost to cost plus fixed fee or lump sum contracts. I will not go into the types of fees. I would, however, like to spend a few minutes on the subject of competitive bidding, a practice which is now required by a few states and some major agencies, and then add a few words about the fixed fee portion of the cost plus approach.

Competitive bidding for consulting services is getting more attention all the time. Participating recently in a panel discussion on priced proposals, I was asked if, as an ex-highway administrator, I felt there were ever any circumstances under which competitive bidding for professional services would be an advantage to the client. My answer, to the shock of the other consultants present, was a qualified "Yes." But let me hasten to clarify. From my personal experience, there are some consulting services which lend themselves to being clearly enough defined as to scope that a high-quality end product at the least cost will result through the bidding process, provided the agency or owner is totally free to solicit bids only from those firms who are known to be professionally competent. Such a practice must be restricted to those projects where the scope is not only capable of being clearly defined, but also where invitations to bid can be limited to a small number selected from a list of qualified firms with a proven performance record. You will be quick to recognize that these qualifications will restrict the application to only a few types of projects and certainly will not work when mandated by law, regulations, or influenced by outside pressures or political motives.

Even though you may be aware of the problems which will result from the indiscriminate or widespread practice of taking competitive price proposals for professional services, I don't want to miss this opportunity to highlight them once more, particularly in view of the attention being given to this subject at the present time.

When price is the principal, or worse yet, the only criterion, quality of work and amount of detail obtained will suffer. Many, if not most, engineering jobs are incapable of finite definition in advance of development. Lowest price will surely result in an inferior and inept produce with a minimum amount of detail. Detail on a bridge job, for example, can be done by the consultant designer when included in his fee or by the fabricators. But if left to the fabricators, additional cost will follow when the work is checked by the owner.

For competitive bidding, prequalification of competent engineering consultants is an absolute necessity. However, I am sure you recognize that, at best, prequalification is difficult, because of the problem of quantifying experience and performance

except by judgment. Competitive bidding will result in having to accept bids from inferior and inexperienced consultants.

Even though bidding in the early rounds may lead to accepting bids from the less experienced and more poorly qualified firms, in the long run bidding gives an undue advantage to large consultants, since small consultants have no extensive past experience upon which to draw in a bidding situation. In addition, large consultants can afford to take a few losers which would drive the smaller firm out of business.

The cost of construction and maintenance will increase substantially over the life of a project for which design is cheapened by bidding. Design is a very difficult item to define. Unless specified, multiple studies on a low bid would not be made to arrive at a good economic decision. If multiple studies are required, the depth would be minimal, making them virtually worthless. There would also be a strong tendency to use previous designs and standards, even though they may not be cost effective and efficient. Even in original designs, approximate methods and simplified details would be favored. Cutting engineering costs could dramatically increase construction costs.

It has been alleged that bidding is necessary to make consultant procurement competitive. Negotiated consultant procurement is competitive, if you are willing and able to make the required reviews and investigations to insure the best quality of work for the least applicable cost and then go on to the next consultant if you are not satisfied with the negotiated results from the first.

At present, under negotiated agreements, the consultant tries his best to satisfy the client because he knows his future work depends on it. Legal actions or claims seldom occur on negotiated contracts, whereas they could become a way of life on bid contracts when the consultant knows that he only has to be low again to get the next contract.

For these reasons, among others, bidding will not necessarily stop political abuses. It will only shift any undue political influence from the selection process to contract administration. A bidder with political ties can bid low with advance assurance that he will be taken care of on contract adjustments.

To repeat, there are a few times when competitive bidding under carefully controlled and selected conditions could be an advantage to the owner. In all other cases, negotiated contracts using the principles of the Brooks Act are by far the best. Even using the negotiation approach, however, and applying the cost plus a net fixed fee means of payment, clients have placed some arbitrary limitations on the fixed fee portion which deserve mention.

Net fixed fee as defined in FHWA Policy and Procedure Memorandum 40-6 is "a dollar amount established by negotiation (and not by application of percentage factor to estimated costs) to cover the consultant's profit, miscellaneous expenses, and other factors that may be considered under the applicable regulations and that are not paid for otherwise."

I have no argument with this definition, but if it is good enough for the PPM, why isn't it good enough for FHWA and some of the states? About the first thing that FHWA did after drafting the PPM was to issue to their field offices a set of curves to be used as a guide in determining the acceptability of fixed fees. The curves have become the maximums and limited to profit - regardless of all the good words in the PPM definition.

There are several items inherent to conducting a consulting business, not the least of which is the

cost of borrowing money to finance the work until progress and retained percentage payments are made, which are not allowed under the heading of overhead. These will vary with the consultant and the project. It is the obvious intent of the PPM to include these costs along with profit as a part of net fixed fee. My point here is that the client should pay no more than is proper, but at the same time he should recognize the costs of doing business as a consultant and pay accordingly.

I have already mentioned the excessive use of standards as a natural fallout of the bidding for contract process. From my experience on both sides of the table, the proliferation and indiscriminant use of standards by both in-house professional staff and consultants can be a cop-out leading to mediocrity. Standards have a definite role in engineering design to establish parameters for minimums and uniformity. But, I am sure we have all seen the results of blind application of standards to engineering solutions which have produced unsightly, inefficient, and costly end products.

The refusal of designers and FHWA reviewers to accept reasonable deviations of shoulder standards on low-volume rural roads and bridges recently led AASHTO to adopt new standards which, in turn, were rejected because of threatening safety problems. The result is a foolish application of standards which in no way can be considered cost effective or assure any significant improvement in safety.

In my home state of Washington, we have an example in the wide open eastern section of the state where the use of acceptable but minimum standards for horizontal curves at an interchange produced an unsightly result which had to be later hidden by landscaping. There was plenty of room to ease the curves and do the job right.

I understand it took seven years to obtain approval for the counterflow bus lane on the Lincoln Tunnel where "standards" were reduced to eleven-foot lanes, no shoulders, a New Jersey barrier on one side, and opposing traffic on the other. Plenty of reason to be concerned about the wisdom of the engineering judgment proposed, but the end result is a safety record better than the Shirley Highway in Virginia where all standards are by the book.

One last point that I wish to make and recommend for consideration when hiring a consultant: Be sure your scope of work requires the engineer to make and be responsible for an independent check of his work to provide a quality design -- then be sure he does it and be prepared to pay him for his efforts. It is costly and time consuming for the client to also make a detailed check of a consultant's work. The consultant must be made responsible for his work and held to it. Spot reviews by the client to be sure that scope is satisfied, progress is timely, and product is as desired are in order -- a detailed review is not.

In summary, I believe there is a proper and useful role for competent professional consultants in the development of programs for both government and private agencies. They can efficiently supplement your own engineering staff, they can bring new and different ideas and solutions to problems, and, when properly administered, can do so in an economical, efficient, and satisfactory manner. I do not believe, however, that you can count on it's always happening quite that easily and instead you must recognize that it takes good management on the part of both the client and the consultant to consistently achieve quality results.