THE RELATIONSHIP OF HIGHWAY BUILDING TO SOCIETY

N. W. Daugherty, Dean
College of Engineering, University of Tennessee

Prologue

As one flies from Knoxville to Lexington he can trace the whole history of highway building which lies below him. From the earth road to the modern highway is a long gap of sweat, ingenuity, research and judgment. Before we talk about the topic of the evening let us try to catch the spirit of the road itself.

"Dear old road, no wonder, surely
That I love thee like a friend!
And I grieve to think how surely
All thy loveliness will end.
For thy simple charm is passing,
And the turmoil of the street
Soon will mar thy sylvan silence
With the tramp of careless feet."

Jennings Carmichael

All of us remember the path through the meadow to the wooded highway with its shade, its wild flowers and its odors of the forest. We still have a few such highways but they are passing. In their stead is the bustle of the town, the hordes of vehicles and their speed-drunk drivers hastening on a simple errand which is not demanding. Now and then we hear the ambulance or the police car sounding the siren as they speed along. The dirt road, the parkway and the super-highway all make our problem and in solving it we render untold service to our several communities.

"I love the roads;
The goddesses that dwell
Far along invisible
Are my favorite gods."

You and I provide the travel ways to give pleasure and recreation to a nation on wheels; to a nation which has more vehicles than all the rest of the world; to a nation which has thrown petty jealousies to the winds and has learned that we are
brothers all because we know each other so well. Our land is bound together with bands of steel and cemented by a common aim and a common purpose.

Daniel Boone blazed the first trail from my state to yours and since that day the hunter, the covered wagon and the automobile have beaten a path between our doors. Our neighbor state passed the first highway legislation of the Colonies when in 1632 the General Assembly of Virginia decreed:

Highways shall be laid out in such convenient places as are requisite according as the Governor and Counsell or the Commissioners for the monthlie courts shall appoynt, or according as the parishoners in every parish shall agree.

Virginians and Carolinians came down into the Valley of East Tennessee and then spilled over the mountains into Kentucky where they carried this old Virginia law from which they builted the legal structure which now governs our highway construction.

Not always have we considered the wishes of the parishoners. One time I went out with the right-of-way agent for Tennessee who was trying to get legal ownership to the land the locating engineer had selected for a new highway. One old lady said she had never seen such a bunch of engineers. They couldn’t make up their minds. They had surveyed in front of her house at least a half dozen times.

An elderly gentleman said that the engineers seemed either to run the new road between the house and the barn or they would take the foundation from under the porch. I suspect that engineers in this room have followed a straight line through a farmer’s house and then moved the house, instead of placing it “where every parishoner shall agree.”

Now I come to my text:

“If a community is stagnant, the condition of the roads will indicate that fact; if they have no roads they are savages.”

A. T. Bryne

Many years ago I heard Guy M. Walker develop his thesis: “Transportation is a Measure of Civilization” and as the years go by I become more and more convinced that this is true. To his idea I would add the transmission of messages as well as the transportation of persons and goods and I would have a measure
of all types of human thought and activity. It is not the civilization but a measure of it. The craft of highway builders has had a very important part in producing the civilization of today. They have a long line of ancestry which extends back to the shadows of the Pyramids and which has contributed its share to the industry and thought of each generation. It is of the builder rather than the road that I wish to speak this evening; he is the presiding genius of all the roads that have even been constructed.

Many of you know of my interest in Professional Recognition; tonight I wish to enlist and further your interest in this most important engineering activity. Who is professional? Of the many characteristics let me mention three:

a. The service motive
b. The relation of confidence, and
c. Unity of action.

A profession has certain characteristics which set it apart from the crowd and the non-professionals. Again let me name three:

a. It must take pride in ancestry and have hope for posterity,
b. It is an intellectual activity, and
c. It must have a group consciousness.

We will deal with the qualities of the profession first and then say a few words about individuals. Our highway tradition extends far back of the Mayflower to the canals of Babylon, the Pyramids of Egypt, and the Roads of Rome.

The historian Herodotus describes the construction of the Great Pyramid, how it took 100,000 men working twenty years to complete the construction, and then he says:

It took ten years of oppression of the people to make a causeway for the conveyance of stones . . . a work not much inferior, in my judgment, to the Pyramid itself. This causeway is five furlongs (3,000 feet) in length, ten fathoms (60 feet) wide and in height, at the highest parts eight fathoms (48 feet). It is built of polished stones and is covered with carvings of animals.

Long before these events there was road building. Rarely does so great a work spring full grown from the brain of man. It was the result of many centuries of trial and error, toil, sweat
and ingenuity before an egotistical monarch decided he must have a monumental tomb. It turned out that the monument constructed was not to the king but to the men who designed and constructed the Pyramid and the causeway. They blazed a trail for the long line of highway engineers who have builded roads and trails since that day. Their qualifications were imagination to see and a will to do; their science, as we know it today, was negligible. Their materials were as vast as ours, though not as easily prepared and they had at hand thousands of man-hours of effort but practically no machinery at all. Imagination and a will to do are our major assets today.

Let us take another look at the historical beginnings of our craft. "All roads lead to Rome" was literally true at the beginning of the Christian era. More than 68,000 miles of Roman roads bound the Empire together and made it possible for a legion of soldiers to travel to the ends of the earth to put down rebellion. With slave labor they built roads that remain as monuments of their skill today. And over them moved the traffic of a great industrial empire, which could only last as long as the spirit of the builders remained alive. When they quit building and began to enjoy the luxuries which came from easy transport and little work they were doomed to fall before their enemies.

When their law was overthrown and their roads were allowed to go into bad repair there spread over Europe a darkness, equalled only where there are no roads at all.

If the light that is in thee be darkness, then how great is that darkness.

To illustrate the condition of the roads Samuel Smiles quotes the following from the tutor of Dante who traveled from London to Oxford about the end of the Thirteenth Century:

Our journey from London to Oxford was, with some difficulty and danger, made in two days; for the roads were bad, and we had to climb hills of hazardous ascent, and which to descend are equally perilous. We passed through many woods, considered here as dangerous places, as they were infested with robbers, which indeed is the case with most of the roads in England. This is a circumstance connived at by the neighboring barons, on consideration of sharing in the booty, and of these robbers serving as their protectors on all occasions.

Chaucer’s Canterbury Tales had their origin on the road to that city when groups had to travel for their protection. No
individual or small number of individuals would undertake an extensive journey without good protection. The conditions in England were typical of what was to be found throughout Europe, and they continued until the middle of the Eighteenth Century. When a nation has means of transportation and then allows them to go into decay that nation will slip back into provincialism and finally into stagnation.

It is not necessary for me to tell you about the Posidon strides we have taken in highway building to convince you that we have had a worthy past and that we can take pride in ancestry. In my lifetime there has been more improvement in transportation than in all the centuries before. Yes, I did my courting in the horse and buggy days—it was safe enough for me to be here to tell you about it tonight. You are not interested in the courting except as it fits into the changes which were on the way. The bicycle had stimulated road building along the Atlantic Seaboard and the automobile was in the offing. I remember seeing the first automobile that came to Knoxville; I read about the first flight of the Wright brothers at Kitty Hawk; all of us remember the first streamliner on the railways. In the lifetime of those present, transportation has gone from the horse and buggy and the wagon to the airplane, the limousine and the streamliner. Abraham rode his camel out of Ur of the Chaldees, Caesar rode his chariot in triumph to Rome, Washington rode in his coach and six to his first inaugural; there had been practically no change in motive power and only minor changes in the vehicle for many thousands of years. Then science burst upon the world in a series of revolutionary changes which swept us out of the past into an age of instantaneous messages, of supersonic speeds and assembly line production.

The impact is so stunning that we are tempted to think that the frontiers have been occupied and that the mature economy is at hand or that technocracy has run away with us. You remember that during the Thirties we were talking about putting the brakes on science to let our sociology and government catch up. Fortunately we did not try. Instead we continued our science making possible the winning of the war and at the same time we developed a research technique which is one of our most valuable assets.
Should we compare the highway engineering problem after this last war with the same problem after World War I we would come to the conclusion that highway research was our greatest advancement during the interval. Then we used the method of trial and error; now we attack a problem through research and a vast fund of excellent experience. Then we had a few real highway engineers; today we have many but are losing some of them to other than public agencies.

In 1933 I heard Dean Marston say that he was entering college in 1893 and he was advised not to take civil engineering because the railroads were completed. He did enter the field and during his lifetime the automobile was invented and highway building was developed. Would a young man do well to stay out of civil engineering today because the highways have been constructed? If he did, he would miss professional activity in a new age which will probably eclipse all that has gone before.

The war showed us the value of our research technique. It will open new worlds to conquer and make new frontiers in all our states. We will invent new vehicles which will require new roads and the cycle will begin all over again. New road machinery has changed our designs; new materials have changed our construction methods; and new techniques will make for efficiency and economy. We must find a way to apply science to our methods of finance and supervision as we have applied it to construction and maintenance. I have said enough to show that we can take pride in ancestry and we can have hope for posterity. Now let me inquire a little further into this thing I am calling professionalism.

The words professional and professionalism have many meanings depending upon who is using them and their attitude toward the object they are trying to describe. Most dictionaries do not give us much help. When applied to the athlete it has meaning ranging from the wrestler to the golfer and a doubtful meaning when applied to a college football player. I, as a college professor, trying to build up respect for myself and my fellow workers, describe a profession as:

An activity requiring special knowledge and skill in which work is mental rather than physical and which requires the exercise of discretion and judgment rather than the following of routines and fixed rules.

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But this is not enough. There are certain essential attitudes and relations which are not included in the definition. We can hardly imagine one person, or even a few individuals, creating a profession of their own. It requires group activity building from year to year on the accomplishments of those who have gone before. Its members shout from the housetop their new discoveries that all may use them. They set up a forum of exchange of information and publish their findings as soon as they are made. During the last fifty years there has been created a literature of highway design, construction and research. No longer do we need to go by trial and error but we can build on the records of the past. Each new generation of engineers adds to this common store of highway knowledge.

Pride in ancestry and hope for posterity is not enough. Practitioners must be dedicated to a cause in order that they may be members of a profession. Former President Wickenden, Case Institute of Technology, has said that a professional is one who believes in the doctrine of the second mile; he is one who renders the over and above service; his measure is heaped full and running over. He does more than is required in the bond; he does all that is necessary to get a job well done. This is quite different from the prospective employee who was being interviewed by the personnel officer. "Are you a clock watcher," asked the young officer. "Hell, no, I'm a whistle listener," was the reply. When I asked a young graduate how long he stayed on the job, he replied, "As long as is necessary to get the job done."

Dr. Vannevar Bush has suggested that all professionals are direct descendants of the old medicine man who held his place in the tribe because of his service to the people. The chief might inherit his place or he might acquire it by a strong arm, but not the medicine man; his office was dedicated to the service of the tribe and as soon as he failed to render service he was no longer the medicine man. Certainly throughout all the professions there is the relation of confidence and the service motive and the service must be on some essential social need. That highway engineers will fulfill the service requirement no one will deny.

The relation of confidence to the minister, the doctor or the lawyer is easily understood because it is an individual personal relation, but for the engineer it may be quite general. You go to
the doctor with a pain in the side. He takes a blood count, thumps the side and says, "What are we waiting on, this man needs an appendectomy." And an appendectomy he gets; he does not have to form a judgment in the matter. He takes the diagnosis in confidence, the operation on faith and then accepts the pills without question. If later the doctor is called into court and asked to testify to the patient's hurt he may ask to be excused because of the relation of confidence. All this is easily understood.

So also is the relation of the parishoner to the pastor. What he tells in secret and in confidence will be respected even by the courts. Healing the body and saving the soul have their peculiar kinds of professional attitudes but they do not pre-empt the whole range of confidential relations. The work of the lawyer is a little less personal and that of the engineer ranges toward the totally impersonal.

Some years ago I heard an eminent engineer say that engineering could never qualify as a profession because it lacked the relation of confidence so conspicuous in the ministry, the law and in medicine. We have mentioned the personal relation of the doctor and his patient and the minister and his parishioner which does not prevail in engineering, but that does not mean that the relation of confidence is lacking. Every time you build a bridge, lay out a curve or construct a pavement you protect the road user or expose him to needless hazard. Your relation of confidence is more general but it is there just the same. The lives of all who travel are placed in your hands and you are duty bound to give them every protection you know even though you know much of the danger is due to their own carelessness. As highway engineers we are duty bound to protect the vehicle operator against his own carelessness and willfulness.

I said that individual responsibility characterizes a professional. At times we try to shove the action over on the group but it will not rest there; it must come back and rests on the shoulders of some individual. The great engineering disasters like the Quebec Bridge, the Tacoma Narrows Bridge, the St. Frances Dam and the Johnstown Flood have a way of pointing a finger at some individual or a small group of individuals.

There is a growing tendency in industry and government to
classify engineers as skilled artisans and to limit their activities and responsibilities to those described in a classification. The only limit to promotion and responsibility should be ability to do with requisite knowledge and skill. Artificial classifications do help the accountant or the personnel officer but have no place in professional activities. I know that it is easier to promote as groups, to give automatic raises, etc., instead of merit raises on individual achievement.

One chief engineer told me that it was much easier to deal with a committee for the engineers than to try to handle them as individuals. Regimentation, group bargainings and rigid classifications tend to destroy individual initiative and thus injure the professional attitude. Employees of the public are especially subject to the classification mania; they should be alerted to the tendency and they should resist being treated as groups and men with numbers.

Now let me come back to my text. Our own Washington Irving got the spirit of the road when he wrote:

A stage coach carries animation always with it, and puts the world in motion as it whirls along.

What would he say if he saw an automobile? Stage coach days were romantic days; the pioneer was taming the wilderness; he was making possible the days we enjoy. And the pony express! What days! The historian of the next century will write about our days, possibly as the beginning of a new age, probably as the second century of the Industrial Revolution. His readers will envy us and our new gadgets and our response to the new things as they came into being. He will tell about the game of leap-frog played by the vehicles and the road, each responding to every improvement in the other.

Finally he will come to 1945 and the dropping of the atomic bomb. He will describe the fear that was in many of us, how we wanted to turn the clock back, destroy our atomic fission plants and forget this dangerous discovery. Then he will catalogue the doings of those who were not afraid, those who knew the clock could not be turned back but who began to find ways of using this new source of energy and power. From his vantage point he will be able to place a value on the work of individuals; the at-
titude of states and the intelligence of nations in adjusting themselves to this new achievement.

Now we see through the glass darkly; then he will see us as we were. Engineers, scientists and real statesmen will find the answer to this new and terrible force. It will bring new problems to us as highway engineers; it may revolutionize our best thinking.

"A stage coach carries animation."

What would Irving say if he were here in 1949, surrounded by motor vehicles, and living in an age which has developed a way to get vast supplies of energy from small amounts of matter? Certainly he would say: "The road is a symbol of animation." It is a symbol of the age in which we live; it is an index to progress and the science of our day.

The public cannot by any stretch of the imagination be conceived to have more than a remote conception of the economic loss that results from improper design or construction. This loss is unquestionably enormous, but it is made up of millions of small items that are concealed in those every-day expenses of vehicle operation or road maintenance that are taken as a matter of course. The only barrier to the indefinite continuation of the economic waste is the predilection of the engineer to improve his work constantly out of sheer love of doing things as nearly correctly as his working relations will permit.

Thomas R. Agg

This paragraph gives an eulogy to the highway engineer as he toils on the job trying to improve, to do a better job and he is always at it.

"As long as necessary to get the job done" is his reply.

You are the product of this generation. Your construction methods are very different from those used in the first century, and far different from those used twenty years ago. Your responsibilities have increased, you have achieved a success hardly dreamed of in 1916. Today you hold the keys to the safety of a nation on wheels, and you deserve the good will of all people. I would have you feel proud of your profession so that you may give answer as did the Apostle Paul when asked who he was and where he lived:

I am a citizen of Tarsus of Celicia, which is no mean city.
I am a member of the profession of highway engineers, which is no mean profession.

Epilogue

And they went out to spread the gospel of highway building as men of greater skill and better understanding. They made their state a great state because of the ease of travel and because of the safety of their construction. The people of the state began to understand their problem, their devotion to their tasks and to give them a place of esteem which their long services warranted. After a while the people looked upon the roads as monuments to many nameless engineers who had striven to do well; the roads were a record of their achievement. A few of the engineers they named in their books and occasionally the people of a community erected a monument to the honor of one who served them locally. All in all the engineers had achieved recognition and they had NO MEAN PLACE IN THE COMMUNITY.