A Conversation: with Ellis Williams

Ellis Williams was the Asphalt Institute Field Engineer for Kentucky, Ohio and West Virginia

Asphalt: How did you get interested in asphalt?

Ellis Williams: Well, my first experience with asphalt goes back to when I was seven years old. I had just moved to Greenville, Kentucky. The highway boys were putting down two courses of waterbound macadam with two inches of Kentucky rock asphalt on top on the road near our house. It was the first time I had ever seen a steamroller in operation. That job was what is now U.S. 62 and most of the equipment on it was horse-drawn.

I went to Western Kentucky University for a couple of years. I picked up physics and chemistry and plane surveying and a little more math, and I was headed for the University of Kentucky in the fall of 1939. I worked at a job with Kentucky Utilities in Lexington for about a year. Then my brother, who was a civil engineer working for Alcoa building dams called and said they were going to open a soils lab and asked me if I could handle that at $125 a month.

The resident engineer put me in training for a few weeks of 16- to 18-hour days and I learned pretty fast. So I worked in that lab until about 1939 and then worked in a lab testing rock for a dam below Mt. Airy Gorge. Then I joined the Army and spent about four years in Europe during World War II. The most impressive thing I saw over there were the Roman roads. They have been around for a long time. When I got back to the University of Kentucky, the state’s Division of Research found out I had a background in materials. Kentucky was doing its first pavement evaluation to develop its own thickness design system.

They were looking for someone to do a whole lot of soil testing. They hired me to head the evaluation program and gave me two or three students. I went to school and worked the testing program at the same time.

Asphalt: Where did the research job take you?

Williams: We had a lot of good studies going then that involved the aging of asphalt. What we were trying to do was determine whether we could simplify the aging status of asphalt by putting it on the roof and comparing it with what was happening on the road.

We had a testing track in the lab, too. The problem was you had to run that thing for weeks and weeks before you got any results.

Asphalt: Were you trying to measure rutting?

Williams: Yes, the main thing I wanted to know about then was asphalt’s resistance to shear. We didn’t have a good shear test for asphalt. Some of the lab compaction equipment was costing $25,000 and I knew the asphalt contractors weren’t going to buy that at the time, and I didn’t think the state could afford it for all its districts. Budgets were pretty tight.

Asphalt: Tell me about some of your field experiences.

Williams: One of my first assignments was a sandstone project in eastern Kentucky. We took samples from the project—about 14 miles in three counties. We worked all winter running all sorts of mixes on the sandstone, some hard, some soft and some in between. As a result of that project, we probably used 2.5 million tons of asphalt on Kentucky projects. I wrote a paper for the Association of Asphalt Paving Technologists (AAPT) on the sandstone project and presented it in Houston. It was there I met John Goshorn, who was District Engineer with Division 5 of the Asphalt Institute. He offered me a job with the Institute and I took it.

John Goshorn was one of the Institute’s best field engineers. He was one of the most intelligent men I have ever met. He worked in materials for years in Ohio before coming to the Institute. He had a degree in chemistry and a degree in chemical engineering. Then, because he was working with civil engineers, he got a degree in civil engineering. He ran into some legal questions where he thought the lawyers were wrong, so he went back and got himself a law degree. I learned a lot working with him, both about asphalt and about people.

Asphalt: What did you do as an Institute Field Engineer?

Williams: One of the first things I did was to cut the asphalt content of mixes by roughly 1.5 percent in one state on every ton they put out. They had been designing all their mixes for maximum durability. And in mixes that should have had 5.5 to 6 percent asphalt, they were putting in 7.5 percent. The asphalt was literally walking across the road onto the sidewalk and into the grass. At the time, the cut I recommended.
didn’t go over very big with our members. But I pointed out to them that we had a choice. We could either teach the state to make decent mixes or we could expect white pavements forever.

I trained people in the Highway Departments of my states to run the Marshall test and interpret the results. I took the gradation on some of the bad shoving jobs and showed the people how to run the test. I stood right with them and helped them for days on end, literally. There was a lot of concrete going down at the time but I began showing the states how they could save money with asphalt.

Also, I began collecting the bid data on some of the alternate bid jobs that went concrete because of politics. I had the bid data on some of these projects so I started a cost study. It was the only one of its sort that I had ever seen. I used that as a base and then I took all of the projects that had been let in one of my states and analyzed the cost — the effective quantity and its direct relationship to quality. It was one of the best and most useful studies that I ever did. Then I did the same thing in another one of my states. Many of “the powers that be” did not like those studies because they were so definitive. But the highway engineers did like them, and some of them were considerably influenced by them. Asphalt got its foot in the door through those studies.

**Asphalt:**
*How did the studies influence the highway people in those states?*

**Williams:**
We didn’t score big on anything right away. But we kept improving the roads and they saw it, and the highway people got serious about asphalt. West Virginia hired a training outfit and set up an asphalt training program and called me in to help with it. I took the outline that the consultant had been using and altered it to fit West Virginia’s needs. It was the best program for certified technicians in the country. People came from Maryland, Virginia, North Carolina and Kentucky. Many of them had been to technician training in their own states and they were amazed at what we did. This was in 1964. That’s when our first school began. It was before anybody had anything on certification.

**Asphalt:**
*Why is field testing important?*

**Williams:**
In many respects we had 90 to 95 percent of the knowledge we have now 40 years ago. In Kentucky, if a design was done the way it was supposed to be done, we used volumetrics. And we used the Marshall for verification checkpoints to see if everything was going right. Volumetrics were the basis for design in Kentucky as far as research was concerned.

The thing is, when you relate too much to the lab rather than the field, you’re going to get in trouble. You’ve got to set up everything that you are going to do so that the man building the pavement knows whether he is right or wrong. The only way I know how to do that is by a lot of testing and that means gradation and mixture properties testing. You need gradation control and strength parameters to make sure the mix is where it should be.

**Asphalt:**
*What about test strips?*

**Williams:**
To know how to build a road, you have to build a test strip. We did test strips on the West Virginia Turnpike and that project turned out well. The mixes that we put on the West Virginia Turnpike are darn good. As you know, the turnpike was originally built with 10 inches of Portland Cement Concrete (PCC), and after about 12 years it started getting so rough that we had to do something. I had retired from the Institute but I was a consultant for the turnpike at the time. The PCC was 14 years old when we started the rehabilitation project. We rubblized the concrete with a RMI resonant pavement breaker, then overlaid it with asphalt.

**Asphalt:**
*Was that in 1988 or ’89 that you did the first rubblization?*

**Williams:**
Yes, 1989. And if you can see a rut in that first project, you’ve got a better eye than I have. Today there is no rutting.

**Asphalt:**
*Do you like the perpetual pavement idea?*

**Williams:**
Well, asphalt pavements just do not wear out. But as far as perpetual pavements are concerned, we are not getting them sold as well as we should, but we are making progress and that part I like. The best argument for perpetual pavements is that you
never have to take them up and put new ones down. You just take some of the top of the pavement off and leave the bottom in place indefinitely. So the age of a perpetual asphalt pavement might run 15 or 16 years on top but 60 to 65 years or more at the bottom. I don't know if that is perpetual or not. But to me it is because you never have to come out and pick it up and throw it away. It's there permanently.

**Asphalt:**

*Why have some of our pavements failed?*

**Williams:**

I didn't find building good asphalt pavements particularly difficult. But when I started working in asphalt we didn't have the loads we have now. Coal trucks didn't carry 250,000 pounds then.

I did a lot of mine roads in eastern Kentucky over the years and a lot of them were tipple roads. I wouldn't design one unless the owners gave me the real numbers. I designed roads for 200,000 pounds or more and they are holding up for a lot of years. We have never had a pavement in the coal-haul region of Kentucky that has not exceeded its design life by a multiple of 4, 5 or 6.

Perpetual pavements—that's what I was designing. If you do it that way, you never lose your bottom structure and you have a perpetual pavement. I guess I've been doing that for at least 40 years.

**Asphalt:**

*What do you consider the greatest accomplishment in your asphalt career?*

**Williams:**

Well, I can't pinpoint any one single accomplishment, but I can give you a category and that's teaching. You can't improve the product if you don't improve the product if you don't impart what little knowledge you have to whoever is actually doing the work. And that is where I think I got my greatest pleasure. I always had long-term projects going. Most of them involved instruction of one sort or another. Development of better techniques. Development of better structural designs, development of better mix designs and better materials.

When I was with the Asphalt Institute, my job was to promote the use of asphalt. And more importantly, it was to promote it in a way that would improve the use of the product. I tried to build my reputation, and the Asphalt Institute's, on excellence.

**Asphalt:**

*What is the greatest challenge that asphalt faces?*

**Williams:**

I have one word for you. Quality! It's a state of mind as much as anything. Everybody wants quality if they can get it. The main thing we need right now more than anything else, more than even political support, is to perfect the techniques for building good pavements. And we need training on how to build roads right. Part of that training is the design. And that means designing for the particular project. If you've got $10 million to do the job, and you can't afford to spend $3,000 or $4,000 to design the mix properly, you're in the wrong business.