

## TRANSCRIPT

**SCRC Series:** North Carolina State University Oral Histories – MC 00449

**Field Notes:** David Johnston

**Interviewee:** DAVID JOHNSTON

**Interviewer:** Virginia Ferris

**Interview Date:** Tuesday, January 27, 2015

**Location:** Raleigh, North Carolina

**Length:** Approximately 68 minutes

This interview was conducted at D.H. Hill Library of North Carolina State University, in Raleigh, North Carolina. Born in 1944, David Johnston grew up on a farm in Greensboro, North Carolina. His father, a cabinet maker, attended NC State in 1915 before serving in World War I. Dr. Johnston attended NC State for his B.S. (1966), M.S. (1968) and Ph.D. (1972) in Civil Engineering. He worked in construction design and consulting in New York and Connecticut for several years before returning to NC State to join the faculty of the Civil Engineering Department (later Civil, Construction, and Environmental Engineering) in 1977. He served as Associate Head and Director of Graduate Programs for the department from 1997-2007. Dr. Johnston's research has focused on construction engineering and management, and structural engineering and design. He established the Construction Engineering Laboratory for the Construction Engineering and Management program in 2007. Dr. Johnston was named Edward I. Weisiger Distinguished Professor in Construction Engineering and Management in 2008. He retired in 2010 and maintains involvement in the department and in professional organizations including the National Council of Examiners for Engineering and Surveying and the American Concrete Institute.

In the interview Dr. Johnston discusses: his family background; his years as a student at NC State; the climate on campus during the Vietnam War; his work in industry and consulting; the influence of Dr. Paul Zia; his experiences in teaching at NC State; research for the Department of Transportation on bridge management systems; the history of the Department of Civil, Construction, and Environmental Engineering and changes in the department during his time there; the development of sanitary engineering and environmental engineering and growing awareness of the environment in the field of civil engineering; expansion of research and graduate programs in the department; the development of Centennial Campus; and the impact and legacy of extension at NC State.

### START OF INTERVIEW

[00:00:00]

Virginia Ferris: Okay, so I'm Virginia Ferris, here with Dr. David Johnston on January 27, 2015, in D. H. Hill Library. Dr. Johnston, we'd like to find out a little bit

about your background before you came to NC State, so could you tell us when and where you were born and a little bit about your childhood?

David Johnston: Yes. I was born in 1944 in Greensboro, North Carolina. In terms of my early childhood I think one of the most significant factors was that my father died when I was about two and a half. He had actually attended NC State in the period 1915 to 1917, before entering World War I, and then had returned. He had not completed the four years after he came back, unfortunately. But he had a wonderful career, married my mother, who was from a big eastern North Carolina farm family. She was primarily the one who raised me along with an older brother and an older sister, so I grew up in Greensboro.

VF: Can I ask what was your father's name and what he did?

DJ: His name is Henry Wood Johnston, Sr. My older brother, who also attended NC State in architecture, is Henry Wood Johnston, Jr. My father was partly a cabinet maker. He did the interiors of libraries, a lot of cabinet work, for example, at the old Greensboro Public Library that I got to visit on occasion and see what he had done. So he was a craftsman and I think I followed a little bit in his tracks in that regard.

When I was growing up I attended the Curry School which was on the campus of what was then the Women's College in Greensboro, now UNC at Greensboro. It was a teacher demonstration school so in addition to our regular teachers we had students who were studying to be teachers at the Women's College as teachers also. So in some ways you could say I received all of my degrees, including my high school diploma, [Laughs] from the University of North Carolina system, which is I guess a little bit unusual. But [00:03:01]

during that process at that school there was a very strong industrial arts program, an excellent faculty member on the staff at the Curry School who in many ways was a mentor, a little bit of a substitute father when I was in the period of junior high and senior high. He taught me to respect, I think, hard work, to respect craftsmanship, so I developed this appreciation of building things. While I was making fine furniture in that process – and the program there also won a lot of awards nationally – it was creating an interest on my part in building things, and that I think, plus my father's time at NC State, the fact that my brother was studying at NC State, caused me to take a great interest in NC State. Plus I had, I think, capabilities in math and the sciences that caused me to look hard at engineering as that possible career field for myself.

VF: So when you came to NC State as an undergraduate did you know that you wanted to study civil engineering specifically?

DJ: I thought I did in high school, but while I was in high school I would sometimes talk to someone about my thinking, and although they had nothing to do perhaps with engineering, had no experience in the area I was interested in myself, they would sometimes say things like, "Well, that's a good field, but you know nuclear engineering is really the thing of the future." Now this was 1961, '62. So I was starting to struggle: was I making the right decision or not?

I had an old NC State catalog from the 1950s and at that time the mathematics department was called Engineering Mathematics and it was located in what was then called the School of Engineering. So I started to think, well, maybe I should do something like temporarily major in math and take the time to figure out what I want to

do, and as I talked about that someone said, “Well, if you’re interested in mathematics you really ought to look at statistics because it’s an up-and-coming field.” So, there I was, [00:06:00]

struggling again, so I actually started out at NC State entered as a major in experimental statistics, having no idea what I was doing, and I spent my freshman year trying to figure out what I wanted to do.

I went to the career center where they would give you tests and things like that to try to figure out what you were good at, and I visited the civil engineering department because I wanted to meet people. I think some of the best advice I got came from two sources. One was a counselor at that career center. I’ll call it a career center; I’m not sure that was the name at the time. She said, “You know, I looked at your first semester grades, I’ve listened to you talk, I can give you all kinds of tests, but they would mainly tell you if you were capable of pursuing those fields. It seems to me you’re a capable person. What you need to figure out is what you really want to do. That’s the most important, and you will make it a success.” So that was one key piece of advice.

The next piece of advice came at the very first week of my sophomore year. I had signed up to be an orientation advisor for freshmen. It gave you some early access to signing up for courses if you did that volunteer activity. So I was doing that and it was over in Reynolds Coliseum and the chancellor was speaking. He said, “Look, you’re going to have opinions from your classmates, your dorm mates, etc, about what you should major in. You need to figure out that for yourself. They don’t know any more than you do about the various fields. Find out; make your own decision.” So almost

immediately I changed majors to civil engineering and I never looked back, and it was the right decision for me.

VF: Were there particular professors—?

[Interruption for technical issue; transcript resumes at 08:48]

VF: Were there any particular professors or influences that guided you as a student, any mentors that you found here?

DJ: Yes. I was interested in majoring in what was then called civil engineering—  
[00:09:05]

construction option. I had always had an interest in construction, I also had an interest in structural design, and I think, in the process of my undergraduate courses, I particularly—. I had a course with Dr. Paul Zia and he was an outstanding teacher. It was a concrete design course. While there were many faculty that I had it was clear that he was really on top of everything that was new, everything that was changing, everything that was going to be happening in the near future, because of his involvement in professional activities. So, I particularly appreciated his influence and in fact he served as my advisor for my master's and PhD studies as I continued on in structural engineering, because there was not a construction engineering graduate program at that time. There was an undergraduate program but not a graduate program.

VF: So did you begin your master's degree immediately out of undergraduate?

DJ: I did. I had worked some summers to gain some experience, but I went right into the master's program, completed my master's in two years, and then continued on in the PhD program. I had some struggle about whether I wanted to stay at NC State after my master's or go to another university for a change of experience, but I found that it had

an excellent facility at the time, excellent faculty, and about that time I also met another student, a young lady in economics who eventually would become my wife, and that probably influenced me to stick around and do my PhD here.

VF: That was an interesting time, in the '60s into the early '70s, that you were a student here. Can you tell us a little bit about what the feeling, the climate, was like on campus?

DJ: Well, when I arrived in the fall of 1962 it was a relatively small campus compared to now. I would guess that perhaps there were seven, eight thousand students. But it was rapidly growing, a lot of construction underway. Mann Hall, in fact, had just [00:12:03]

been completed and occupied at the end of 1963. So it was a fairly calm, normal campus for a number of my undergraduate years. But the war in Vietnam was having its effect. Of course everyone signed up for the draft at that time, and many individuals were being drafted or entering the service right after they graduated. While the war had a lot of popular support initially, as it went on there was less support in the country for the war. People were, in some cases, upset about how it was being run or whether we were getting clear facts about what was happening. So there started to be unrest on the campuses, protests about the war, and this continued through the '60s and into the early '70s.

I was a graduate student when a lot of this was surfacing, 1966, '67, '68, '69, and when a good friend of mine from high school was killed in Vietnam I really struggled myself: was I doing the right thing? Because I was in graduate school I had a deferment, and the only way I could reconcile that was to ask myself: why was I in graduate school? Was I there to avoid the draft or was I there because of my desire for graduate study?

Finally the reconcile came with realizing I was there for the purposes of graduate study and my country was making the decision to defer me from entering the service. My mother had always told me: always get all the education you can, while you can. The system will tell you when you can't go any further. So, I continued on to complete a PhD. I did my research for the PhD in '68, '69, beginning of 1970, completed all the testing, all [00:15:07]

the data analysis, then decided to take a job and write it up during that first year while I was in that job.

VF: What was the job that you took?

DJ: I intentionally made the decision to search somewhere else. I had grown up in North Carolina, I had gone to school in North Carolina for all my degrees, and I felt that it would be desirable for me to live someplace else, see what it's like. I liked North Carolina but obviously people like many places that they live. So I remember searching around Washington, DC, firms there, because I thought: great city, lots to do, museums, things like that. But I had attended, with Paul Zia, a convention of the American Concrete Institute – which was an area that I was doing my graduate work in – in New York City, and there I met an individual who had a firm in Connecticut that did a combination of structural design and construction consulting, and that was a perfect fit for me because I always had one foot in kind of both arenas during my studies.

I later went up and interviewed with him and made the decision to go to work for his firm. It was located in Stamford, Connecticut, a firm named Shupack Associates, and I was there for about three and a half years. There were some changes occurring in the firm. A couple of the major people in the firm were deciding to leave and form their own

firm, one of which I had worked closely under. He asked me if I would join with them as a junior partner and I made the decision to do it. I felt that what they were going to be doing was going to be slightly different from what the first firm was doing and I thought it would broaden my experience again. So I did that and was with that firm for about three and a half years, so I was in Connecticut for about a total of seven years.

[00:18:00]

At the same time I began to struggle with: do I want to try teaching and research at some point? I finally decided that if you make that kind of career shift, while you are doing the same kinds of things in terms of the primary emphasis – structural engineering, construction engineering – it takes a while to develop a different type of career. An academic career is different from a consulting and industry career. So I finally decided to do it before it would become too late, although I had been extremely successful in my work in industry. We decided that since both of our parents were getting old, they were both in North Carolina, both my wife and I were born when our mothers were in their early forties, so we decided we wanted to be closer. We had started a family and we said, well; maybe we should do this. I had had a call from Paul Zia, who said, “We’re searching for someone in construction engineering who has that link to structural engineering also. Would you be interested?” and one thing led to another. The experiences I had designing buildings, bridges, doing special analysis for nuclear power plants, and doing a lot of construction engineering on all of those as well, was something I felt that I could bring into the classroom and bring into my research.

So I think the experience was extremely good for me. The financial opportunities in industry during those years allowed us to make that decision with some confidence. We knew that we could always return to it if this didn't work out, but this worked out, so.

VF: Can you tell us what it was like to return to NC State and to be on the other side as a professor now, what it was like teaching your first classes when you returned?

DJ: I think the first thing that struck me was how young the freshmen looked. I [00:21:01]

wasn't that old, I was perhaps thirty-three or something like that, but it really struck me: wow. But it was a reasonably smooth transition. Particularly I think my early years in the classroom I don't think that I would have been considered a very good teacher. I think I communicated the knowledge that they needed but I was never a very exciting lecturer. Some people have that talent; it wasn't there for me. It became better with time. But I remember at the end of my first semester I got the teaching evaluations for that first semester, and I literally went home and cried. So it was not an easy transition in that regard but I was determined, and I fairly soon accepted that it was me and not the students opinions that were wrong, and I simply worked on it. I was very pleased some years later to receive a university outstanding teaching award, so these things take time but eventually you can get there if you work at it.

VF: What sort of research were you doing at that time, as you continued in your career as a professor?

DJ: Actually the first small research project I had was one that came from a new institute that had been formed. It was the Institute for Transportation Research and Education that had been formed about 1978 and Bill Babcock, one of our faculty, had

helped create that institute. He had originally been a professor in the department in the '50s and then he had gone to the state highway department, now the state Department of Transportation, and had become the state highway administrator, which is the highest staff position, highest non-political, you know, appointment, even though it served at the pleasure of the governor. But he had done a great deal to modernize the highway department during the late '50s and through the '60s and then he returned to NC State in [00:24:03]

the late '60s. He had worked on setting up this institute and he had a small amount of money and said, "I can give you a one-month project. Have you got an idea?" So I came up with an idea; that idea provided me then a connection with the Department of Transportation; got a paper out of that idea and followed it with some others later from that research.

I then had a project studying epoxy coated reinforcing bars for a combination of the state Department of Transportation and the Federal Highway Administration, and that was a fairly successful project. It created some waves out there because of the things that we discovered in the process of that research that eventually influenced building code requirements.

Then I started doing research in bridge management systems. North Carolina, like all the states, had begun collecting a large amount of inspection data on its bridges for the first time and the head of the bridge maintenance unit, a gentleman named Jimmy Lee, who had also been a graduate of NC State, he wanted someone to see what could be learned from that data. It happened that again my background was a good mix because I understood construction, I understood structures, this was bridges; I was interested in also

certain management aspects of the construction process, so this worked well because it's managing essentially a set of bridges and how you make decisions on them.

So I had quite a string of projects with the North Carolina Department of Transportation and the Federal Highway Administration on what are called bridge management systems. For example, North Carolina has about fifteen thousand bridges and the question is always: with a limited amount of funds to do maintenance, repair, rehabilitation, improvement, or replacement, how do you decide what to do with that limited amount of funds so that you do it in the most effective way? It turns out that that ends up being a large optimization program where your constraints are budgets and [00:27:04]

you've got all these things you can possibly do. So I worked on developing these optimization systems for bridge management and that had significant national impact. It was certainly the most advanced system at that time, in the late '80s, and while others have added to that research from other places over the years I think the key contributions that we were able to make in the research in those formative years where, you know, it's wide open, they are still hallmarks of the systems that are in place and in use today; that is, they fall back on a lot of those early developments that we did.

VF: Can you tell us, building on that, what is it that you found most exciting or inspiring about that work that you were able to do?

DJ: Well, the size of the problem, and the fact that it could influence so many important decisions. Ultimately the infrastructure, whether it's highways, bridges, water supply systems, whatever it might be, is owned by the public, and so that ultimate owner is the one that we're trying to optimize things for. If you don't spend the necessary funds,

and spend them correctly, to widen bridges for the appropriate amount of traffic that is going to be there, there are more bridge collisions. They tend to be much more disastrous for the drivers and occupants, higher loss of life, more severe injuries, and even if it's a minor accident on a bridge, a collision with something or sideswiping something, those accidents, while they cause individuals great loss, they're also shared because of the insurance structure. So everybody's rates go up a little bit when there are a lot of accidents, or they go up a lot when there are a lot of accidents, actually.

[00:30:01]

So in improving these systems and taking all of this into account you're trying to actually save the public money in the long run by keeping your infrastructure system in good shape and responsive to the public's needs, and that's a thing that many people struggle with because they don't want to pay more taxes. They don't want to have higher cost of gasoline. But it's like the old saying, "Pay me now or pay me later." You have to invest adequately to have a system that performs well, and you could say the same thing about many things, our education system, our infrastructure, our environment; it goes right down the line.

VF: Can you tell us about some of the changes that happened in the civil engineering department that eventually became Civil, Construction, and Environmental Engineering over the course of the years that you were a professor here?

DJ: Yes. Well, when I started there were two degree programs in the department at the undergraduate level, the civil engineering degree and the civil engineering-construction option degree. The civil engineering degree of course goes back to 1895, but by the early '20s the department had started to form specialty options. The first ones were

general civil engineering, civil engineering-highway engineering option, and civil engineering-architectural engineering option. By 1927 the architectural engineering program moved out of the department and the department added a civil engineering-construction engineering option to the degree, and all these things were listed in the catalog at that time. Later they added, in the '30s, a civil engineering-sanitary engineering option.

So there have always been these options out there, but during World War II they didn't have enough students so they collapsed back to just the civil engineering degree; couldn't offer much in the way of specialties so they offered a little bit of everything. But then after World War II we had the boom in construction, and so there was first a BS in [00:33:07]

construction that was offered by the department and then, at the request of industry, in order for it to be an engineering degree it was changed in 1954 to a BS in civil engineering, construction option, and then it was accredited in 1958. The civil engineering degree had been accredited in 1936, about four years after they started accrediting engineering degrees in the US, so it was among the first to be accredited, and the construction engineering was the very first construction specialty degree to be accredited in the US. So when I entered there were those two options at the undergraduate level.

The sanitary engineering specialty, by the 1970s, was being referred to as environmental engineering as a specialty. It wasn't a separate degree initially. I don't remember the exact date. It may have been in the 1990s that the environmental engineering was formally established, but it recognizes that role of the whole of civil

engineering in first sanitary engineering and then the wider scope of its impact on our whole environment. I think initially the concerns of the early 1900s would have been water supply and water treatment, and the reason they were concerned about water treatment was, as you used water, whether it's home use or industrial use, you're polluting it. It ends up going back in the rivers, if you're a city, but there's someone downstream who needs to use that water so it needs to be treated and cleaned up before it gets back in the river. I don't think, in those early years, that there was as much emphasis on its effect on the environment itself, on wildlife and right down the road, on fish, but that gradually became important. I think the book *Silent Spring*, from the '50s, early '60s, [00:36:01]

whenever it was – I remember the name Rachel Carson, but I'm not sure that's right.

VF: Mm hmm.

DJ: It is? Okay. I'm encouraged. I think that started–. I remember as an undergraduate that was embedded in our education; that we needed to understand what was going on in our environment. So, the environmental program was gaining in importance through many years, and for a long time our department had deferred to Chapel Hill in the area of sanitary engineering and environmental engineering. Oh, and this goes back a long way.

In the 1930s during the Depression there was a decision made that the universities could not afford to have duplicate programs, so Chapel Hill had a small engineering program – some civil engineering, some mechanical engineering; there were some people over there also in the area of sanitary engineering as a specialty – and North Carolina State had a business program. The decision in the 1930s was to move all the engineering

that was at Chapel Hill and consolidate it with the engineering program at NC State that was larger and to move the business program that was at NC State, which was smaller than the one at Chapel Hill, to move it over there, and so there were a number of these types of shifts that were occurring.

One very prominent faculty member at Chapel Hill in that area of sanitary engineering – or water chemistry, something like that – refused to move, so the compromise was that that one program would stay at Chapel Hill. So it was the only program in engineering at Chapel Hill and it was a graduate level program rather than an undergraduate level program. As a result of its strength the Department of Civil Engineering at NC State, while it had the specialty of sanitary engineering, it had a little bit of a deference to the Chapel Hill program, so it had not been built up strongly. But it became apparent during the 1980s that the whole area of environmental engineering was growing so rapidly, there were strong research opportunities available for funding from [00:39:01]

agencies, and the decision was made in the department to expand the environmental engineering area to the extent it could be justified by the students that would come in and the funding that could be obtained. So that was one of the shifts that was occurring.

Now of course I was in the area primarily of construction engineering with some structural engineering combined with it, and the attitude of contractors sometimes surprises people because they sense that contractors are the ones who are always going into a plot of land, cutting down all the trees, building houses, building roadways, etc. To some extent there's an image of "pillage and pave." But contractors, like everyone else, want to be proud of what they do, and that includes building something that is visually

wonderful and has the least environmental impact. You also have to remember that when a contractor builds something, they are building something that an architect or another kind of engineer has designed, so they haven't made all those decisions about how the land is going to be changed and how roadways are going to be shaped, etc; they are simply carrying out the work, but they want to be proud of what they do also, and that includes being environmentally sensitive to the extent that is reasonable. So that's going to build into the mentality of the whole department, whether it's environmental engineers or construction engineers, structural engineers, transportation engineers; we know that we have to be sensitive to the environment, much more today than you had to be a hundred years ago.

So, those are part of the changes, and there were changes in terms of the facility. Mann Hall has been renovated partially several times to make things fit. We've been in and out of adjacent buildings with space. We were fortunate to be able to build the Constructed Facilities Laboratory building over on the Centennial Campus. We're looking forward to moving over there when the funding can happen. But I think the other [00:42:02]

change that was happening from the 1960s when I entered – and it started much earlier – was the expansion of the graduate program and the expansion of research within the department. It's not intended to be detrimental to the undergraduate program; indeed I think it adds a lot to it because if your faculty are involved in research, if your faculty are interacting with industry and with government agencies and with their profession, they are more likely to be on top of what is not only current but what is coming down the road,

and our students need to know that at the undergraduate level as well as the graduate level.

So if I look back, again thinking of the history of the department in part, if you looked at it in the 1920s, 1930s, there was a little bit of research but not much. They had some laboratories, primarily for teaching, and they would do research when they had the opportunity. Most of the faculty through the '30s, and even into the '40s, as at most universities their terminal degree had often been a master's degree. There were very few PhDs on the faculty. That changed more significantly after World War II and I think one of the very significant faculty who had an impact on the department at that point and in that regard was Ralph Fadum. Ralph Fadum had completed his PhD at Harvard in soil mechanics. I think it was the only engineering program they had at Harvard at that time, and even it was closed later, but he studied under an outstanding geotechnical engineer.

So he came to NC State with a doctoral degree and I think one of his objectives was to gradually expand –and the university's objective and the college's objective – was to gradually expand the research more to get to the point that NC State could offer doctoral degrees in engineering. Chapel Hill had fought that idea for a long period of time. It wanted Chapel Hill to be the only doctoral-granting institution among the state-

[00:45:02]

supported institutions, so NC State was working on that issue through the 1950s. It was not until about 1960 or '61 that the first doctoral degree in civil engineering was awarded at NC State but the faculty that were being hired, when they could find it, were individuals who had achieved a PhD somewhere. So it was, even during the '50s and

'60s, a mixture of individuals with master's degrees and a lot of experience, either as faculty or in industries, and some PhD faculty coming in.

So now we get to the early '60s – no, the late '50s – and there was Sputnik, the Russian satellite, which really caused turmoil in the US because it meant that Russia, or the Soviet Union, was getting ahead of the US technically, and this was a great period of worrying about nuclear war, not that it's gone away but it was really a major issue during that time. So there was a lot of reflection on: what are we doing to develop a sufficient number of people with technical and scientific skills to drive the programs, like the race to the moon and that sort of thing? So the federal government decided to fund much more research in these areas, and that was able to build in civil engineering on top of the research that was already picking up and becoming more strong as a result of the interstate highway program that started in the late 1950s. So the combination of things really drove the expansion of the graduate program and research.

The department had a new facility with better laboratories, it was well-positioned to begin to build, and I think has done a wonderful job over the last decades since that time to grow not only the undergraduate program but the graduate program. The number of graduate students I think is in the three hundreds now; whereas when I was a graduate student, while I really don't know, there may have been forty of us in the '60s, so it's

[00:48:00]

nine-fold or something like that since that time. So, those are some of the major changes that have been occurring.

VF: Can you talk a little bit about what the department's perspective was towards Centennial Campus in the early days when the campus was still kind of an idea and how you got to the point of the facilities that you now have?

DJ: Yes. When Governor Hunt turned over that block of land to NC State University, the College – and at that time it may have still been the School of Engineering, but what is now the College of Engineering – began thinking about its problems on the main campus, because we had not had a new building for twenty years. Everything was very tight. All the programs were growing and we didn't see that there was going to be space on the main campus for the College of Engineering to grow as it needed to. So the college was looking to the Centennial Campus almost from the beginning, and one of the issues became: how do you get the legislature to fund construction of new buildings?

The College of Textiles was the first to build, or to move over there, and at that point in time we still had a very strong textiles industry in the state. They had great political influence and so the funding from the legislature followed, and of course that helped the campus because then you could move other things into Nelson Hall, which they vacated. The College of Engineering wanted to create that kind of movement toward building facilities for the College of Engineering over there. In order to do it the dean at the time, Larry Monteith, saw that he needed to have that support from industry and one of the most spread industries throughout the state is construction and civil engineering, civil engineering design, whatever it is, environmental engineering. We do it everywhere in the state. It's just not a major industry here and there; it is all over the place. So it has

the attention of politicians if you can mobilize those segments of the industry to help present the message that we need to do this. This was also at the point that there was a big [00:51:05]

boom in computing starting so there was an idea to build a clean room facility for engineering on the Centennial Campus, particularly for electrical engineering and computer engineering, but they also saw that they needed more political muscle to make that happen.

So the idea of providing a facility for construction, for structures, for various areas of our department over there, became part of that funding package so that they could get support from a broad sector of engineering for it, and so it happened. It was decided to put it in a separate building from what was then called the Engineering Graduate Research Center – I think it's now the Monteith Building – because they like things to be very quiet in their clean rooms, no shaking, [Laughs] and we in the Constructed Facilities Laboratory like to break things and shake things. Paul Zia was head of the department at that time and he mobilized the industry. He had this vision of a facility that would offload the laboratories in Mann Hall, give us more elbow room, and they were able to eventually get it funded. It actually took quite a while. There was some design and then everything was put on hold, and then it was redesigned and funded finally, so it was not until late 1996, I believe, that we occupied the Constructed Facilities Laboratory.

So that was the start of the engineering move, except there were some other buildings that engineering also built with loan money essentially, funded out of projects, but eventually classroom buildings started to be built and other laboratory facilities, and

whole departments started to move, and we almost got to the point in 2007 that we had gone through the process of selecting the design team for our new building, and then unfortunately the economy went downhill. They had to withdraw the design funding and so the design was not completed and we're still waiting for the next step, but we hope that's soon. It will happen; we know it will; it's a matter of when, and that will benefit [00:54:04]

other departments that can move into our vacated space.

VF: So can you tell us, what is your current involvement with the department?

DJ: Well I'm retired. I retired at the end of 2010; that's a little over four years now. During my years in the department I was designated the Edward I. Weisiger Distinguished Professor in Construction Engineering and Management, and I was greatly honored by that. So I retired, I partially retain that title in emeritus status, which it's wonderful to have the title and the recognition. Now I really do volunteer activities for the department. I like to help where, you know, my advice might be needed or my help on just cleaning out a room of historical items might be needed, just making those decisions. So those are my primary types of activities.

I still maintain activity with several professional groups, with the National Council of Examiners for Engineering and Surveying, which is the group that develops the exams for professional engineering licensure. I chair one of the subcommittees that develops the civil engineering PE exam. In the American Concrete Institute I'm still involved in some committees, I've reduced the number, but particularly those related to construction and design of formwork for concrete. I completed last fall a book revision

for the American Concrete Institute on formwork for concrete and it was published in October, and I'm very proud of that effort and enjoyed it very much.

So, I try to maintain those professional links because I enjoy them. Most of them are volunteer activities, and the same for most of the things I do around the department. I just enjoy being involved. At the same time I've made it clear that I don't want to be giving my opinions. I had opportunity to give my opinions for thirty-three years as a faculty member. I want the faculty who are there now to make decisions. But if they have [00:57:07]

questions, something I can give information about, I love to do that, but it has to be their decision. It's in their hands now, just like my predecessors eventually put it in my hands to try to do the right thing. So, I feel that's important for a retired faculty member: help but don't try to run the show.

VF: You have a really unique perspective with your family legacy at NC State and then your career from undergraduate through faculty emeritus. What do you think makes NC State unique and what makes civil engineering at NC State unique?

DJ: I think it's the strong relationship that the university has always had with the people of North Carolina, and the people include people in terms of their homes, their lives, their work, the industries that they work in, the government agencies; there's always been a strong involvement. Extension, whether it's a formal extension program, or simply extension by involvement in issues that are important to the state, and important to the nation, I will add, and increasingly things that are important to the world as NC State has grown in its activities and its prominence. But I think that has made NC

State perhaps an engine to help the state's growth, to help the state transition from an economy that at one time was primarily based upon agriculture.

My mother had a lot of brothers and sisters and I spent some time on farms in eastern North Carolina during the summers when I was growing up, with my aunts and uncles. It was a fairly strong economy but it was changing. Agriculture is still important in the state but there are so many other things that have been important in providing jobs for the people of North Carolina. So in all kinds of scientific and technological areas the [01:00:08]

state has grown, and I believe that North Carolina State University has been most prominent in helping make those things happen, and when doing that you have to understand not just the technical areas but you have to also understand those areas like the importance of the environment, the issue of trying to optimize a system to make it the most effective at the least cost for the public also. So all of those things are just like coursing through our veins, in our blood, I guess. They're just part of us, if you're at NC State.

VF: So, based on your involvement in the department now and what you've seen happening, where do you think the department is headed in the next generation? What do you see happening on the horizon?

DJ: Well, I'll go back to that time in the late '50s and early '60s when I was struggling with what I wanted to do as a career and, as I said, some people said, "Well, civil engineering, it's been around a long time but there are all these new fields." I think civil engineering and its specialty areas will always be there. We always need housing. We always need places to work. We always need clean water. We always need that

infrastructure that allows us to do so much, efficiently. So these things will vary in prominence, whether it's environmental engineering, or construction engineering, or structural engineering, or transportation, geotechnical engineering; all these fields will shift around a little bit with time. But they will always be there because they affect the public so much, and even today we see a strong emphasis in Congress, in the legislature, about the infrastructure and its state. Work needs to be done there. So that's again going to influence construction engineering, and structural engineering, and geotechnical engineering, and transportation engineering, and it's going to involve environmental engineering.

[01:03:00]

So, they will evolve in terms of the new knowledge. I can't predict that new knowledge. It's out there in the minds of faculty and graduate students that are working on research and clawing their way into the future. So I'm not going to be a predictor of exactly how it will evolve; I know it will evolve and it will evolve in a positive way, always with objectives of serving the public.

VF: Well I think we covered a lot of the ground that I was hoping to cover and you've been so generous. Are there any other points that you'd like to talk about in regards to your experience or your knowledge of the department?

DJ: Well, first of all, I loved being a student at NC State. I think it helped me grow a lot because I grew up in, well, a very knowledgeable family but had limited circumstances during those years, and NC State was an eye-opener to me. There were people here that in many ways served as mentors for me while I was in my undergraduate years and graduate years and helped expand my mind. I took a lot of courses, sometimes

challenging courses. I had a colleague once who said, in response to some student complaints about, “Well, why do we have to take this course, or that course? It’s a highly mathematical course,” or something like that, “and I don’t see that I’m going to be using exactly that material.” His response was, “It’s important to take those challenging courses because a mind once expanded never returns to its former size.”

I think NC State expanded my mind. It gave me the knowledge, when I was working in industry, to accomplish some things. I interacted with a lot of engineers [01:06:01]

during that time that I was in industry who had degrees from many universities, some that would at that time be thought of as the most prominent universities in engineering, with advanced degrees, including PhDs, and I never felt that my education at NC State let me down. I felt that I had the capabilities and the knowledge to achieve whatever I wanted to achieve. I just had to work at it.

So that’s what NC State did for me, and I think NC State is good at doing that for its students and I think particularly in engineering. We constantly are throwing problems at students and the students sometimes think, oh, it’s the equations they’re learning, and that sort of thing. More than anything else what they’re learning is how to solve problems, how to identify what you know, what you don’t know, and how to find a way to get to a solution, and that’s what a lot of construction companies tell me about our graduates. They need people who are constantly facing a new problem every day. It’s not always a problem that can be solved by an equation, but you have to figure out what you know, what you don’t know, and you’ve either got to find a way to get at that solution or find somebody who can help you get to that solution. You can’t freeze. You can’t just

stop and neglect the problem. Engineering graduates, because they've had to work so many problems, it might be a completely different problem but they've had to work so many problems they're very good at facing up to the problem and getting to a workable solution so that things can move forward. So, we need to be challenged in our education, and as faculty we need to be challenging the students, and some will grab at the opportunity and those are the ones that will really make a contribution in the long run.

VF: That's wonderful. Well, Dr. Johnston, thank you so much for taking this time to speak with us today. We really appreciate it.

DJ: I really enjoyed having the opportunity. Thank you so much.

[01:08:58]

END OF INTERVIEW

Transcriber: Deborah Mitchum

Date: February 11, 2015