PROFILES OF SWE PIONEERS

ORAL HISTORY PROJECT

Alva Matthews Solomon Interview

May 14, 2003

New Canaan, Connecticut

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Alva Matthews Solomon

Alva Matthews Solomon attended Middlebury and Barnard colleges before receiving a bachelor's degree in soil mechanics in 1957, a master's degree in structures in 1959, and a Ph.D. in engineering mechanics from Columbia University in 1965. She taught civil engineering at Columbia University as a graduate student, becoming their first woman engineering instructor. After earning her doctorate Solomon continued to lecture at Columbia, Swarthmore College, and the University of Rochester, where she became an associate professor in the mechanical and aerospace sciences. She worked as a research engineer and consultant for Rochester Applied Science Associates and Paul Weidlinger Consulting Engineering, during which she carried out fundamental research on the mechanical behavior of materials and wave propagation in solids, extending nuclear weapons' effects on structures. Solomon held a number of offices in the Society of Women Engineers and received the SWE Achievement Award in 1971. She was also a member of the American Society of Mechanical Engineers and the New York State Society of Professional Engineers, and served on the board of directors of the Engineers Joint Council.

In her 2003 Profiles of SWE Pioneers Oral History Project interview, Solomon discussed her undergraduate and graduate studies; her early work in industry, primarily performing original research; her career teaching undergraduate and graduate courses in engineering; her career pursuits outside of engineering; and her involvement in SWE, including during the first International Conference of Women Engineers and Scientists.

- July 2016

INTERVIEW WITH ALVA MATTHEWS SOLOMON, MAY 14, 2003

LAUREN KATA: This is an interview with Dr. Alva Matthews Solomon in New Canaan, Connecticut. The interviewer is Lauren Kata for the Society of Women Engineers Oral History Project. I would like to thank you for participating.

ALVA MATTHEWS SOLOMON: You're most welcome.

LK: Can we start by establishing your date of birth?

AMS: Uh-huh. August 29th, 1933.

LK: And would you please describe your family background?

AMS: I'm an only child. My father founded his own construction company, very dynamic man, was an engineer, went and took some engineering courses at Cornell, got his professional license to practice, and then founded his own company. My mother was a stay-at-home mom with interest, really, in the arts.

LK: And what was it like growing up? Did you grow up here in Connecticut?

AMS: No. I grew up mostly on Long Island. When I was quite young they moved to Great Neck, Long Island. I grew up there. I went to Great Neck High School. It was a good high school. I did lots of things, you know, tennis, some sports, and I -- very active. I'm trying to think. You know, I've forgotten a lot of that part of my life. But it was a very nice way to grow up. Great Neck was a lovely town.

LK: And so with your father being an engineer and your mother's interest in the arts, did those two areas influence you?

AMS: Very much so. I guess when I was about thirteen, I thought, you know, I might like to study engineering, because I liked math, I did fairly well at it. I loved the physics course in high school. And I have a precious letter that my father wrote to me when he wasn't well. And he wrote to me from Florida. And in the letter he out lined the meaning of the moment of the inertia. And he said I was to go to the physics teacher and see if he knew what moment of inertia was. (laughs)

LK: Did you do it?

AMS: Well, yeah, I handled that a little diplomatically. (laughs) But, no, I adored my father. And it never -- being an only child, I just thought maybe engineering was a possibility. It never occurred to me that it wasn't. And then my mother's interest in the arts has come into play much later in my second or third career, which seems to be evolving at the moment.

LK: Did you want to talk a little bit about that?

AMS: If you want to wait until the end, and we'll do it chronologically?

LK: Okay. So you knew at an early age that you wanted to be an engineer.

AMS: Yes.

LK: And what was the process of thinking about college and thinking about where you would go to school? What was that process like?

AMS: I wanted a coed school, and I wanted a school that had

an engineering connection. And at that time, MIT [Massachusetts Institute of Technology] and Middlebury [College] had a three-two program. You would spend three years at Middlebury and two at MIT. You would graduate with a bachelor of science in engineering and a bachelor of arts. And so I applied to Middlebury, also applied to Swarthmore [College], because they had an engineering curriculum. And also applied, of all things -- I'm not sure why -- to Mount Holyoke [College], which was an all girls school, but I believe at that time they had a strong math department. And then I envisioned going on to an engineering department beyond that. But when the acceptances came in, I had a choice of the three, and I chose Middlebury for the three-two.

And then my father died right after I graduated from high school. I went away, and the first year at college, being an only child, was lonely. My mother needed support, and so I decided to transfer. So I applied to Barnard [College], which had an association -- in those days the engineering school at Columbia [University] was a two-year program, junior and senior years. So I went one year, sophomore year, to Barnard, and then junior and senior years across the street to the Columbia Engineering School.

LK: Wow. And was the fact that your father was a civil engineer, was that an influence?

AMS: It probably did influence me. He was in construction. Now, even today that's a bit of a stretch for women, although there are lots of women I know who are in construction. But I

think somehow in the back of my mind, you know, before he died, I thought, well, you know, maybe it could be a family firm or something. But of course, that didn't work out.

So I wound up, again, being interested in math, going more toward the applied mathematics. So that going for college my bachelor's degree was in structures. I'm sorry. My bachelor's was in soil mechanics. My masters was in structures. And then my doctorate was in engineering mechanics, which was really the applied mathematics interdepartmental research oriented engineering, and still is to this day.

LK: And did that come naturally, or were there other courses that you enjoyed when you were in school?

AMS: It evolved naturally, because I always wanted summer jobs, and the professors at school were all mostly associated in particular with one firm, the Weidlinger organization, downtown New York. He was a world famous structural engineer. And my Professor Salvadori, from whom I took a number of structures courses and math courses, was a partner in the firm. Mel Baron, who wound up being my boss for many years, was research director of that firm, and he was my professor for a number of courses. So I got summer jobs with them.

And then Hans Bleich, who was my doctoral advisor, was also a consultant for them. So it all kind of wrapped together very nicely. And from the summer jobs, then I went to a full-time employee with them.

LK: What was it like doing fieldwork in the summer while you were a student?

AMS: May I take a glass of -- a drink of water?

LK: Absolutely.

AMS: I had one summer job, which was very interesting. I did a month on the Delaware Water Gap Project, whether they were either building -- I think they were building a new tunnel to bring the water down to New York City. But I couldn't go out to the tunnel because of superstition in those days that a woman near a tunnel would cause a collapse. So I was in the field office in a little place called East Branch, New York. I stayed in a littler -- littler -- (laughs) smaller town called Roscoe, and handled quantities of concrete and such that were handled. It was a bookkeeping job, essentially, that were done in the field. But that really was kind of fun. It was very lonely, was very lonely.

LK: Being the only woman, is that what you mean?

AMS: Yeah, yeah. Another year I did spend one summer, the first summer after my father died, I did drafting at his construction firm in New York. And that was interesting, because I had never done drafting, so I got some experience there. I'm trying to think what other summer jobs. I worked as a secretary, and that was most accepted, you know, in the engineering department at Columbia. Lots of secretarial jobs open for women in those days, lots. (laughs)

LK: But you knew that you wanted to become -- work as an

engineer.

AMS: Yeah. It just seemed -- the flow seemed really very natural. When I was at Middlebury that freshmen year, I remember I talked to the head of the physics department, because he was in charge of the three-two program that I hoped to enter. And it was the first discouraging thing I had ever heard. And he said, "Why on earth do you want to do that, because you will never, ever get a job?" So I was so shocked. I was really speechless, didn't know what to say. Left. Didn't realize how famous he was until I read about him, even recently.

I guess I ignored it. You know, it was a piece of information I didn't like. Somehow I just put it right out of my mind, which I look back on, and I think that's very interesting. Somehow I was more, you know, focused than I even realized at that time.

LK: That's wonderful.

AMS: Yeah.

LK: Do you think that being around engineering technology through your father's firm may have helped you with that confidence?

AMS: Oh, sure, I do think so.

LK: And how did the other people who worked there -- I mean, they were comfortable with having you around?

AMS: The one summer I worked there they seemed to be. They were very supportive. I think it was -- I was fresh out of high

school at that point, so it was a limited amount -- in the exposure I got, it was probably a limited amount of information I was able to absorb, because I didn't yet have the technical background.

LK: In one of the articles I was reading about you in the past it talked about how there was a requirement to attend a surveying camp. Would you talk about that?

AMS: Yes. Oh, what fun. Columbia had a surveying camp in Lakeville, Connecticut. It had only been boys, only men, and they lived in dormitories in this big open area, little forestry, and a little forested and a little bit of open fields. So when I came along they said, "Well, you have to take a surveying course. We don't think you can go to Columbia's surveying camp." So they arranged for me to take the NYU [New York University] course in Van Cortland Park. And halfway through that they said, "Well, we've decided next summer to allow you to go to Columbia's engineering -- surveying camp. So the next summer I went to the surveying camp.

I had to live in a little guesthouse off campus. And I had to walk up to breakfast. And I thought, well, that was all right. The only time it became a problem was when we had to shoot Polaris, you know, take a sighting on the North Star, at 2:00 -- or at a precise time, at night, in the middle of the night. And I had two lab -- what were they called -- lab partners -- crew partners -- whatever. They were both shorter than I was, because

I've always been fairly tall.

But anyway, they came to get me at the little house, and they threw some dirt up at the window to let me know they were there. So I went downstairs. We go out to shoot Polaris, and it's all cloudy. So we have to go the second night. They come, and they throw the dirt up at the window. We go trudging up. And I usually carried the transit, I hate to tell you. But anyway, we trudged up the road. Clouds. So the third night, they throw dirt at the window, trudge up.

The next morning the lady who owned the house said, "Ms. Matthews, I would like to talk to you. There's something about your conduct (laughs) that's bothering me." She did not understand why I was going out into the fields at 2:00 o'clock in the morning with two young men."

LK: Oh, my gosh.

AMS: I tried to explain. I don't know if she believed me. (laughs)

LK: Oh, no.

AMS: That's a funny story.

LK: That's very funny. So you were able to finally--

AMS: I did. And actually, that's where I met my husband. He was up there for an industrial engineering program. The civil engineers, what did we do? I think we did six weeks and the other disciplines did four. But that was when I first met him, in surveying camp.

LK: And what was his name?

AMS: Hap, short for Happy. But his full name was Abby Richard Solomon.

LK: What was it like looking for your first job?

AMS: I kind of avoided that by having the association with the people at school who had the office downtown. They offered me the job.

LK: So the job, again, also came naturally.

AMS: Yes. And I stayed on at Columbia to do my masters. I was working at Weidlinger in the summer, and then I was an assistant in the civil engineering department during the school year while I was studying. And then I stayed on for my doctorate, and by that time I was a full-time employee at Weidlinger. And I wrote my thesis on one of their projects. So it was almost seamless, you know, it just flowed. And I must say, without meaning to, I probably avoided most of the problems of -- you know, the difficulties of finding a job.

LK: Sure. I mean, they're obviously different, industrial work and then teaching. But could you talk about the difference from your perspective in those two types of engineering work, the academic side and the industry?

AMS: Yeah. My, quote, industry side, was research. So it was almost all applied mathematics. I did a little bit of experimental work down at -- oh, goodness, I can't think of the place -- one of the Army installations. So I would travel down

there and oversee any tests that were being done, and then I went back to the office. But being an assistant in the engineering department during my masters years, I did teach in the lab. And then later on, after I had my doctorate, and my husband was with Xerox -- and I think I mentioned he moved to Rochester, and I moved to Rochester, but still commuted down to New York for the job in New York while I was finishing up the doctoral degree. It gets a little complicated here, but that's all right.

LK: Wow.

AMS: But then I took a teaching job at the University of Rochester, but because I was also working, it was as an adjunct. So I was never really at the heart of the academic world.

LK: Where you would have to go through a tenure track or anything like that.

AMS: Exactly. I did not face those problems. And I did not -- for a while I tried to cut the commuting and work for a small engineering firm in Rochester. There I ran into a little bit of the problem where you must bring in contracts, and the pressure to bring in contracts. I sold, but that was very difficult. And actually, for that small period of time, I then went back to the commuting and Weidlinger -- not because of the contract finding, but because of other things. I just missed the people and the work at Weidlinger.

LK: What was it like to be participating in original research? I mean, the research that you were working on at the

time, it seems like it was cutting edge?

AMS: Well, again, it was mostly applied mathematics. And it was fun. It was always, to me, wonderful when something I worked on was published. And that was always a great satisfaction, enormous satisfaction.

LK: Specifically, what you were working on, shock waves--

AMS: Shock waves with applications to nuclear weapons effects. We did a number of -- well, my dissertation was on shock waves progressing through certain types of materials that could be used to model the actions of soils if a bomb went off. And so we used the -- the company used that in underground silo design. And then with a stretch we went to shock waves in water and did a lot of submarine hull modeling, mathematical modeling. And then going a bit further afield, I did work on helicopter blade noise.

And then, again, in Rochester, I was asked to serve on a committee for head injuries, which, again, involved not necessarily long range shock waves, but shock effects on heads and skulls and brains. So I mean, it could fan out -- it really did fan out into other ways. Mostly I worked in the shock waves in soils.

LK: When you were in school studying engineering, did you imagine that engineering could -- you know, in terms of problem solving, be involved in all of these different areas?

AMS: No. Actually, I had no idea. Had no idea. And that progression was solely due to the fact that I was working with the

Weidlinger organization, which did very, very difficult buildings, structural design, but had this research group that worked on government contracts. And so I was always on the government contract side. But I could always see what was going on on the structural side, which was fascinating too.

Now, I never had to go out in the field. But later, women who worked for the Weidlinger Group did stay on the structural side, did go out in the field. And probably by that time it was the '70s and the '80s, you know, when it had become a little more accepted for women to be in the field.

LK: Were you the only woman working at Weidlinger when you started?

AMS: Yes. Yes, I was.

LK: So it was almost a decade before--

AMS: I'm trying to think. Yes, probably, probably. And of course, I was the only woman -- Ruby Langford was the other woman at the Columbia School of Engineering. She was in the industrial engineering department. I certainly was the only woman in the civil engineering department. And I was the only woman at Camp Columbia, the surveying camp. I'm trying to think -- I was the only woman in the engineering department at the University of Rochester where I was teaching.

LK: What does it mean to be the first or the only?

AMS: Coming through school -- in the engineering school, now -- the only downside I think was I really was lonely. It was

difficult to do homework with a man, because it turned into kind of a date situation. And so almost all my work was done alone. And looking back, now -- you know, looking back -- I think I really would have profited from having some comradery, some people to do homework with. Now, I did do some homework, you know, that -- we always had lab groups or something like that, so I wasn't completely devoid of it. But I think in those days it was a lonely thing to be a woman in a man's school, and then a woman in a man's company. But that's really the only downside.

But I was very, very lucky to have found a path where I wasn't going to be finding it very difficult to find a job, or finding it very difficult to keep a job. I was very, very lucky in that respect. And I guess that has to do with the broad thinking of the people who hired me, the people in the Weidlinger Group, and the people in the civil engineering department at Columbia.

LK: Let's switch gears a little bit and talk about how you first heard about the Society of Women Engineers. Do you remember?

AMS: Well, Ruby Langford, who was in the industrial engineering department -- and my husband-to-be, which I didn't know at the time, was also in the industrial engineering department. So she said to me, "You must come to the Society of Women Engineers meeting." And at that time, Ruth Shafer and Bea Hicks were very active in the New York chapter. So those three

people really brought me into the group.

LK: Do you remember what year that was?

AMS: Well, I graduated with my bachelor's degree in '57 and my masters in '59, so it had to be somewhere between, in the late '50s. Maybe it was as early as '57, before I graduated. It might have even gone to '56. I'm just not sure.

LK: And what was it like participating in the early years of SWE?

AMS: Well, there were not too many people at the meetings. (laughs) There were women, other women who were there, who, like Bea Hicks, who had husbands, and my husband, because I was married in '59. But the women who were there with their husbands, the husbands were extraordinarily supportive, extraordinarily supportive. The meetings were centered on education and trying to reach out to women who might be in colleges. I think there was a real effort to find any woman who was in an engineering department at that time. And then gradually they really wanted to focus very much on trying to get women in high school to be interested in math and science. And then there was another emphasis on trying to get women to be recognized within the professional societies.

LK: You belonged to--

AMS: I belonged to the American Society of Civil Engineers [ASCE].

LK: And did the number of women in that organization evolve throughout your career?

AMS: Yeah. I was not conscious of any other women at the time in ASCE. And I hesitate to say there were none, because I wasn't that active in the organization to really know, but I was not aware of any. The one woman engineer that we all knew about was Lillian Gilbreth, you know, with her wonderful book *Cheaper By the Dozen*, which became a movie, and then the subsequent book of *Bells on Their Toes*, both of which were written by her children.

LK: Right, right.

AMS: And we all felt -- huh?

LK: I'm sorry. Did you ever have the opportunity to meet Dr. Gilbreth?

AMS: Yes, I did. It was such a thrill, the first International Conference of Women Engineers and Scientists.

LK: Oh, good. I was hoping you would talk about that.

AMS: Was that 1964?

LK: Uh-huh.

AMS: Oh! I remembered something!

(Laughter)

LK: Okay. She gave the keynote speech. And I was the chairman of hospitality. And it was my job to go pick her up. And I mean, I was just so thrilled. Tall, very tall, very slender, very stately, very with-it. And I don't know, she was either eighty-nine or ninety or something at the time. And it was just fun. And we talked. I drove her over to the hotel, and we just talked in the car. And I asked her, you know, about her

life.

And of course, I had known so much about her, because the one woman engineer who's really been written about was Lillian Gilbreth. And the first writings were all centered, of course, on her children, and the miracle of the way they were brought up. And when her husband died, of course she had to maintain the family with the engineering work she had kind of absorbed by osmosis from him, which is really a marvelous story.

LK: So would you say that she was one of your role models?

AMS: Oh, absolutely. Absolutely. But then so were some of the women in SWE, I mean, like Bea Hicks, Dr. Hicks. And Ruth Shafer was a wonderful role model in her dedication to SWE.

LK: Can you talk about that a little bit more?

AMS: In the sense that both Bea and Ruth were -- and I'm sure I'm leaving out some very important names, here, but they just escape me. But they really saw that SWE had an important role to play in educating women and giving them a place to share thoughts, and maybe even to use for finding -- for networking, which was a big thing for women to even start thinking about. I think women, when they first started out, were very isolated. It was very difficult to network, because there were no other women.

LK: Right.

AMS: So SWE was the first organization I ran into that talked about it for women.

LK: And you felt that that benefited you personally?

AMS: Well, I think it benefited women going into the profession. I was kind of off in a side path, being in research and being with this one group of people. I don't want to say it wasn't important to me, because it was. I mean, it was very nice to know there were other women in the profession, but it wasn't as necessary to me as it might have been for women who wanted to be in larger firms or firms that had more mainstream concerns. I don't know if that's the right word.

LK: Sure. So in other words, you were very comfortable with your job experiences.

AMS: I was. And again, I have to say, I just think I was so fortunate.

LK: Working with progressive-minded--

AMS: Yes, yes.

LK: -- coworkers.

AMS: Yes.

LK: Do you feel that you were a mentor to someone else, either within SWE or outside of SWE in any way?

AMS: I hope so. During the '70s -- well no, during part of the '60s, too, I did quite a bit of visiting chapters, SWE chapters, in different universities. I talked to any number of groups. I did some research on early women engineers. So one of my talks was about the people we could -- I mean, going back to Kate Gleason, back in the--

LK: Oh, sure.

AMS: -- you know, back in Rochester, and Bertha Lamme. And I forget some of the other names.

LK: Some of the 19th Century--

AMS: Emily Roebling, you know, who helped her husband build the Brooklyn Bridge. I did some research on that, too. So in these talks and in these trips I took to the various SWE groups and other groups that were interested, there was an enthusiasm that seemed to come out of the audience. And I thought, you know, this is good. I really enjoyed that particular role. I really did.

And then in one of those books there was an article written by a woman who had been to one of those talks, and she mentioned one of the talks. And I just discovered that, what, a few years ago. That was so gratifying, so gratifying.

LK: So you were saying earlier that it was kind of a complicated schedule that you had.

AMS: (laughs) That was fun. That was fun.

LK: How were you able to balance, you know, time to SWE, time to other organizations, commuting, and just your personal life in general?

AMS: Well, perhaps I didn't devote as much time to other organizations. I did devote some time to SWE. Just to explain, my husband was with Xerox. He worked in Rochester as of 1961 and on. I never finished my doctoral work until 1965, so I was working at the Weidlinger organization and working on my thesis.

And in fact, I think I still did some course work. So for the first two years, I stayed in the apartment in New York, and my husband had an apartment with a couple of bachelors up in Rochester. I would just go up on weekends.

Then I moved up to Rochester, but would fly to New York on Tuesday morning, work at Weidlinger, spend Tuesday night with my mother; Wednesday work at Weidlinger, spend Wednesday night out at my mother's home; Thursday, work at Weidlinger; Thursday night, fly home. I was never gone more than two days out of the week.

LK: Wow.

AMS: But flying was very cheap then. (laughs) And so it really -- you know, it made economic sense, it really did. And I loved the work. And then one semester -- I mean, one semester -- this was really crazy -- I had been teaching on Mondays and Fridays at the University of Rochester. And then I had a friend at Swarthmore, and he said, "Well, would you like to get an undergraduate course," because I had been teaching the graduate courses. And I said, "Sure, that would be fun." So I mixed into this one lecture on Tuesday morning at Swarthmore.

LK: Oh, my goodness.

AMS: So I would fly to Philadelphia, lecture, and then take the train to New York and work in the afternoon, and then work... So it was fine, until one week I wound up in Pittsburgh, and Swarthmore was outside of Philadelphia, but the weather was bad, and we had to land. And my class was in Philadelphia, and I was

in Pittsburgh. So I thought, "You know this is crazy," so I didn't do it again. (laughs) That's youthful enthusiasm.

LK: Wow. That does seem like a class that could have taken its toll.

AMS: Yeah. Well, it did. And I'm not sure why I did it, except it was just something that appeared, and I went, "Oh, that would be fun."

LK: And you enjoyed it?

AMS: I enjoyed it, yeah, yeah.

LK: There's so much to cover.

AMS: I know.

LK: I'm going back and forth through a couple of these topics.

AMS: That's all right, yes.

LK: The International Conference of Women Engineers [ICWES]--

AMS: Oh, that was wonderful, yes.

LK: -- you being involved in the planning of the first conference--

AMS: Yes, yes.

LK: Can you talk about the planning stages of that, and just kind of the atmosphere, the buildup of that, and then the event itself?

AMS: Yes. I think it was quite amazing. And the people involved in planning and connecting with women in other countries

were very, very good at what they were trying to do and which had never been done before, and that was to ferret out women engineers. In 1963, when it started -- '62, I guess, the planning started.

LK: Were you involved in those early discussions?

AMS: Not so much. I did more the planning of the events and the hotels. And one phase was having the visiting people connect with the American engineers. So there was one night where there were dinner parties all over the city. And the people from Japan, and the people from Syria, and the people from England, and all the various countries, we loaded them into taxicabs and had them taken to these private homes for the dinners.

LK: Oh, wow.

AMS: And that was a wonderful, wonderful experience for them. It really was.

LK: Sure.

AMS: I remember the Japanese people couldn't speak English. That's all right, you made contact with the cab driver. You gave him all the information, and you hoped. (laughs) And it worked out just fine. But to me it was amazing that there were women in so many other countries. And I remember the woman from Syria -- I hope I'm right -- maybe it was Iran -- I'm not sure -- she was here with her husband. And I was so amazed that there was a woman from that part of the world who was working as an engineer.

LK: Sure, a very different culture.

AMS: Yeah, very, yeah.

LK: Were there other engineering societies involved in the enthusiasm over the first ICWES, or do you remember that?

AMS: I don't, quite frankly. I'm sorry. Someone who was more on the organizational side, other than the social side would probably be better able to answer that.

LK: Sure. Did you ever visit SWE Headquarters when it was at the United Engineering Center?

AMS: Oh, many times, yes.

LK: Can you talk about the United Engineering Center a little bit? I mean, having been in the New York area at the time it was constructed and used, and now it's no longer there.

AMS: Yeah. Well, for me, I liked having it in New York. And it was a place where you really could go and meet people, no matter when you went there. And Winnie [Winifred] Gifford was the first executive secretary. And she was like a mother hen to us all. She was wonderful.

LK: That's what I heard.

AMS: Yeah, she was just great. And you had a feeling that the organization had really arrived, because here it was in a building with all these larger organizations, engineering organizations, and it had its own office. I mean, to me, it was quite an indicator of how the organization was becoming successful.

LK: Because what had the situation been before that?

AMS: Well, first of all, there was no original headquarters. You know, it was all done out of someone's home. And then to centralize where you could call, and then to have a central place for chapters, you know, that were springing up across the country, that was very good for the organization and for becoming known, which was, of course what they wanted to do, become known.

LK: The Weidlinger Firm, did they know about SWE?

AMS: Yes. Well, they heard about it through me.

LK: Sure. (laughs)

AMS: They did. I don't think any of them -- a couple of them -- yes, I forced them into going to that fashion show. (laughs)

LK. How did you come up with the fashion show?

AMS: Oh, we did it as part of -- as a fundraiser. And there was a designer called Baba. And we talked her into giving -- into designing clothes. And then the women engineers were the models. And it was fun. That was fun. I think Ruby Langford's husband acted as a gendarme. He was dressed as a gendarme, and he helped the ladies up and down. We did it another time, and my mother became a model, too.

LK: Oh, how wonderful.

AMS: You know, it was just -- it became a great relief from only talking about tech -- it became a social focus, too, for women engineers, which was great.

LK: And men engineers, male engineers.

AMS: And men. And the men were very supportive. I know my husband was very supportive, too. They had to be. I think most of the husbands of the early women engineers had to be supportive.

LK: How did your mother feel about you becoming an engineer?

AMS: I don't think she ever did understand what I did--

(Laughter)

AMS: -- because she just never had any technical background or mathematics. So she would be, you know, be very impressed at some of the words we used, but that was really the extent of her interest, yeah.

LK: That's interesting. Do you think it was difficult for other non-engineers in your life to understand what engineers did? I mean, maybe not you personally, but just in a general sense?

AMS: Yeah, I do think so. And I think that's true now. There's a -- if you go with engineer -- if doctors get together, they talk a certain language that is not -- you know, not everybody can understand. I think if engineers -- although now it's so specialized, you've got to get engineers of a certain specialty together before you really hear that jargon that's unique to them.

LK: Sure. What about the fact that SWE was not specialized by discipline? I mean, was there, other than maybe technical presentations, formal presentations -- I mean, was it hard to talk to each other, or--

AMS: No. Because I think it enabled the organization to

focus on educating women or having them become interested in math and science, and having them become interested in any kind of engineering. Because many of the talks at the beginning that I went to, there were women who would talk about one type of engineering, and I would talk about what I had learned in the civil engineering. So I think it was good that they didn't try to fragment into particular – there were just too few. There were just too few women.

LK: Sure. Do you think that was interesting to your audience, getting varied--

AMS: Oh, yes.

LK: -- multiple perspectives of the profession?

AMS: Oh, sure, sure, because the problems the women were facing, of job discrimination or salary discrimination. That was always a problem, and I'll bet still is today. And if there was any problem that I ran into, it was probably salary discrimination. So those problems were common to all of the women in the Society of Women Engineers, I'm quite sure of that. And then they could get together and talk about those problems, as well as the desire to spread out and educate.

LK: While you were working at Weidlinger, did you have a specific project that you would say was your favorite project, or was it just mirroring your career, kind of seamless in how you advanced?

AMS: I'd have to give that some thought--

LK: It's okay.

AMS: -- because the work that I did, again, you see, it was -- here's the field applications, here's the research, and say, here's the concepts, you know, the mathematical and physical concepts. And I was somewhere back here. So a lot of what I did could be applied to a number of different projects. And working -- I'm trying to think -- well, the silo design for the missile silos was probably the closest. But there again, it was what I had done on my thesis and subsequent work in the applied mathematics that was then used as computers came on the scene. The theoretical, the applied mathematical work was programmed into the computer to do the modeling of the soils and of the materials that were subjected to the blast designs. So yes, I could feel very proud about that, the modeling, but you see, that's another step removed from the actual building of the silos.

LK: Right. So it was just your -- it was not one whole--

AMS: That's correct, yeah. That's correct.

LK: Can you expand on why you would say the silo is what you enjoyed doing from the research end of it?

AMS: Well, I mean, from the point of view of satisfaction, just to see the mathematics take shape in something that was very important to the country.

LK: So you understood, even early in your career, how important the applications that you were working on were?

AMS: Oh, yes. Oh, yes, because these were government

contracts.

LK: Do you want to take a break?

AMS: That'd be great.

(INTERRUPTION IN RECORDING)

LK: Okay, we're back. When you were working on your research, that required you to do theoretical analyzing using the Fortran, and some of the early IBM programs.

AMS: Uh-huh.

LK: Can you talk about what that was like, and maybe even comment on how it has evolved over the years?

AMS: Well, it certainly was a lot different from what it is now. At the Weidlinger Group, we were all self-taught, starting with Fortran One, Fortran Two. I think when I left I was up to Fortran Four. I think there's now about a Fortran Forty-Two or something. I don't even know if they're using it anymore, because other languages had come in. But I found that so much fun, especially to be self-taught. And it was so logical and so organized.

But at one point, we were searching for the roots of a fifth-order determinant. Where there again, you see, I get into -- anyway, we had to find roots of this equation. And we had a small computer at the office that couldn't do it. So I went up to the Miter Corporation in Boston. And they had -- I can't remember which one, it was one of the larger IBM machines. And of course, those were all with tubes in those days. They hadn't -- they

didn't have transistors!

So you'd sit down, and you'd feed in some information to the computer. You'd wait twenty-minutes, and you'd get out a remainder from the equation. And you'd plot it on a graph. So then you'd feed in some more information, wait twenty minutes, you get another remainder. And you'd plot that, and then you'd connect it. And hopefully, if you found a root in the information you were putting in, the remainder would go to zero. So you would keep plotting the remainder until -- I'm sorry -- yeah, you would keep plotting the remainder as it approached zero, and you would keep modifying your input--

LK: Oh, my goodness.

AMS: -- so that you would get more towards zero. And when you got the remainder towards zero, you knew your input was the root that you were searching for.

LK: Wow.

AMS: But talk about, you know, old-fashioned ways--

(Laughter)

AMS: -- that was very old-fashioned. At the time it was very advanced, because most of that work had been done by hand on a Frieden machine. Oh, does that make me old. (laughs) When think about it, so much, you know, the technology has just flown by -- just flown forward, I should say.

LK: Do you use a computer yourself today?

AMS: I have a PC downstairs. Oh, sure. But I don't do much

-- you know, I don't do any computing, no, not anymore.

LK: Are there any final thoughts about the technical side of your career that you wanted to talk about before we go to the next tape, or--

AMS: Well, you know, the work I did was fascinating. It really was. It reached a peak probably early on in my career. And then -- I don't know how to put this exactly, but it seemed to reach a point that was somewhat repetitive.

And then when I had my daughter -- I'm getting into the next tape without meaning to -- two days before my forty-fourth birthday, which, in those days, you know, was very a advanced age -- I already had so many years of the work behind me. And when I tried to work and still be a parent, I found that I was doing the same work that I had done -- same type of work that I had done fifteen years before. And I didn't -- I gradually wanted to invest less time in keeping up with the technology, which was moving so fast, because my interests were shifting more toward family life.

Nowadays women manage to make that transition, still keeping current technically. I didn't. Maybe I should have. I don't know, that's the only thing that I would think about and maybe examine now that I'm quite a bit older.

LK: Well, let's stop in enough time to change the tape.

AMS: Okay.

LK: This is going to take about a couple minutes.

AMS: That's fine. I'll take this off.

LK: Yeah, if you want to just stretch your legs.

AMS: All right. That's great.

(INTERRUPTION IN RECORDING)

LK: This is tape two for our interview with Dr. Alva Matthews Solomon. And let's continue our conversation that we were having at the end of tape one, which was about family life.

AMS: Well, I mentioned that my daughter came along, and she was born two days before my forty-fourth birthday. And my husband and I were just so pleased, so pleased.

LK: What is your daughter's name?

AMS: Stephanie. And she's a graduate of Cornell, and she currently works in the city for Entertainment Weekly magazine.

LK: Wow.

AMS: So she's a career girl. But she's only twenty-five. And of course, when I first had her it was always, "It this your granddaughter?" (laughs) But I got used to that.

LK: Wow.

AMS: I got used to that. But I tried working, you know, as I started to say at the end of the last tape. I did work for the first, oh, maybe five years of her life. And then it gradually became fewer and fewer days, as I was focusing more. And I think we're living so much longer now that we can transition in our lives from one career to another career. And I think a life can have three or four or five careers nowadays.

So I eventually just retired and just went on to many other pursuits, and more in the arts, and you know, making a shift away from... Although I did quite a few database applications for friends who were starting businesses. And those things I could do comfortably at home, and I didn't have to go in and out of the city. And after my commuting history, you'd think going in and out of New York from Connecticut wouldn't have been a problem, but it does when you're focusing more on a family life.

LK: How did you move -- or what were the circumstances under relocating from Rochester to Connecticut?

AMS: It was my husband's relocation. He was with Xerox. They moved their corporate headquarters to Stamford, Connecticut, and he moved down here. And we thought, oh, that's wonderful. But then there was something about the Connecticut air that brought Stephanie. (laughs)

LK: That's wonderful. (laughs)

AMS: So she grew up here. And what's odd is that she doesn't want anything to do with numbers. Her parents were both engineers. I don't know what we did to her, but she doesn't want anything to do with numbers.

But the engineering has been a wonderful education for any other career or any other interests that you might pursue.

LK: Can you expand on that a little bit?

AMS: Well, engineering training gives you a discipline of thought. It's a problem solving, as most science education is.

It's oriented toward problem solving. So I mean, even if you're going to -- well, what's a good example? I don't know. Let's say you're going to give a great big party. It's all a problem, and you break it down into its individual parts.

LK: That's interesting.

AMS: I got into horses for a while, and I was running horse shows. I wrote the software to schedule the Dressage Shows.

(Laughter)

AMS: And that was all engineering training, you know. Those horse shows were run very efficiently.

LK: I bet.

(Laughter)

AMS: And now I've gotten into an artisan school in New York called the Isabel O'Neil Studio, and I've been taking courses there for a number of years in faux finishes and painting furniture and that type of thing. And now I'm teaching gilding, the application of gold leaf. Now, that's rather far from engineering, and yet there are many parallels -- many parallels in the organization that's required, the approach, of the teaching skills, certainly, I've used before. Now they're to an entirely, entirely different area.

LK: Is there a difference in the students?

AMS: Oh, yes. There was a difference back when I was teaching, because I mostly taught graduate students, and then when I taught that one course in undergraduate students, that was

different.

LK: At Swarthmore?

AMS: At Swarthmore. And now, you know, I'm teaching very mature women who have an entirely different work ethic and an entirely different focus in their lives. But it still boils down to providing a focus in the teaching so that you engage your students so they get the most out of the course. So that's the same. So things that -- we were talking before how your life evolves, things evolve, and if you kind of take advantage of that evolution as you go, you know, every new opportunity -- you might not want to take every one... But since my husband died four years ago, I've started singing in the church choir. All right, that's new. Now I'm taking singing lessons. That's very new. (Laughter)

AMS: So you just -- the doors open, and you follow through.

LK: Do you ever talk to your daughter about the early years of being an engineer?

AMS: Uh-huh. And she's been very interested, so she'll be very interested in this tape.

LK: Oh, good.

AMS: Very much so. We all -- I think everybody has a historical interest. You love to know what's come before, so you can kind of use it as an indicator, you know, of what might come in the future for yourself or for other people.

LK: Sure. At the end of the interview, now, can you comment

on whether or not you feel there's a need for a Society of Women Engineers today?

AMS: Well, we were talking about that. I remember the early quote was that the Society of Women Engineers was the only organization that existed to put itself out of business. You know, we thought that was wonderful. Once you educate everybody to think about engineering as a profession for women, you interest women in engineering and math and science, there would be no more need for the organization. Obviously that's not true. Your project, archiving the information of what has been, is a wonderful project. I just think that's marvelous. And there's still the networking capabilities of a women's organization in a technical field where the women are still the minority.

And there's the educational aspect for young people. You reach out to high schools. Your science fairs are wonderful. And then you still have the college chapters, which probably address that factor of loneliness, that there are no other women -- nonsense. And you go to a SWE chapter and you find lots of women with technical interests.

But it has been incredible, through the '60s and '70s, the exponential increase of women in the professions, not just engineering, but medicine and law. The curves all look the same of the increasing numbers. So women have really reached out to achieve, other than just the things they could achieve before.

LK: In your opinion, is it because of laws, is it because of

organizations like SWE, or would it be a combination of many different things?

AMS: It's a combination of all those things, and a certain spirit that seemed to sweep during those years that pushed it forward.

(PHONE RINGS)

LK: We can stop.

AMS: I'm sorry.

LK: That's okay.

(INTERRUPTION IN RECORDING)

LK: Thank you for thinking of that.

AMS: Sorry.

LK: Okay. While we wrap up the interview, do you have any advice for young men or women today, either for the engineering career, or just in general that you wanted to end with?

AMS: There are so many opportunities for occupations, for careers, for interests. And women, today, now just have an unlimited scope. I think the only -- don't be limited. Don't be limited in any way. If your studies are not specific, they will lead to another stage, which might be a little more specific or might not. But the studies, even in high school, evolve into studies in college, which evolve into interests in the workplace.

And as we were saying, doors open. And take advantage of every time a door opens, so that the evolution can proceed. And as soon as you close your mind or your close your thoughts to a

certain area, maybe the evolution is stopped. So let it keep going.

LK: Well, I thank you very much for participating.

AMS: Well, you've made it very easy. You really have.

LK: Okay. Thank you.

END OF INTERVIEW