William R. Dickson Oral History Project
Interviewers: Harry Ellenzweig and Victoria Sirianni
February 23, 2005

INT: This is the 23rd of February, 2005. We have Harry Ellenzweig with Vicky Sirianni and our topic is -- what would you like to discuss?

WD: Mainly Kresge Auditorium.

INT: When was Kresge built?

WD: I'm going to tell you that.

INT: I've been trying to find out. Harry went to Bob's Simha book, and it wasn't in the book.

WD: Bob's book doesn't have it.

INT: So he had to call Bob today. We're ready.

WD: Today we are going to talk about Kresge Auditorium, even though it was built before my actual working time in MIT and maybe a few words about the chapel, which was built at the same time. Kresge was built in the early to mid-'50s. I recall that it opened while I was still a student, and I graduated in '56 because they had an event there that I actually went to see.

INT: 1953?

WD: Well, '53 or '54. I can't remember exactly when. Let's concentrate on Kresge first. Kresge was designed by Eero Saarinen & Associates and it's unusual in its shape when one considers all its building and auditoriums. I don't think many people would have envisioned an auditorium that was the shape of Kresge. Kresge is basically one-eighth of a sphere. It's a thin shell concrete structure. It's supported on three equidistant points with cutouts between the two adjacent equidistant points so that basically it has three points of support, three sets of [inaudible word] and the cutouts and the rest of the outside surface is reinforced concrete. The building is supported, as I said, on three points. So there's three large underground buttresses, concrete, that's the foundation to the building or the footings where the shell hits the ground. There's other foundation walls -- what they used to hold the earth back and form the interior of the structure below grade. Basically, it's supported on these three buttresses -- a lot of concrete in each one. I've seen many pictures. I don't know about how much, but a large, large amount of concrete that's supported on the sand layer on top of the Boston Blue Clay.

INT: What's the shape of a buttress?

WD: Well, I think a buttress can have most any shape.

INT: But these.

WD: These are particularly -- they're wider as they get further away from the building and narrower as they protrude underneath where the ball and socket joints are. There's a socket on top of each buttress and a ball on the bottom ring breams at each location of the structure itself. The building was built by the George A. Fuller Company. And other than its shape, I think for the most part what happened underground was nothing under the ordinary. It was different because of being a support for a building with just three points of support. But other than that, masses of concrete -- not that it's too unusual, and I think the construction proceeded rather uneventfully until they got to the point of having to pour the above grade structure.

INT: Bill, just as an aside, how deep -- you said it's down to the bottom of the sand level?

WD: No. It sits on top of the sand layer, which is probably --

INT: How deep?

WD: Oh, probably 15 feet down or so.

INT: Not that far.

WD: It varies throughout the campus.

INT: And is it continuous -- from joint to joint?

WD: No. These buttresses are --

INT: They're independent?

WD: Are three independent structures. The continuation from buttress to buttress is probably just a concrete wall that forms sort of a foundation for the basement. But there's nothing buried on it. It's just contained earth that surrounds it. So when they got to -- and one other thing -- as you recall, the auditorium goes down into the ground. You basically enter it slightly above grade from the lobby and then it slopes downward so that much of the building is actually below what the original grade would have been. The structure itself, as I said, was a thin shell concrete structure. Well, what does that mean? It means that for the most part, which is the upper, say, two-thirds of the building, the shell is three inches thick, which put in perspective is relatively the same thickness as an eggshell for the volume. So that it indeed is a thin shell reinforced concrete structure. It thickens as you get down towards the point of variance. And when you get to the variant point, it's several inches thick in order to transfer the accumulated load through the ball that forms the base into the socket. And as I said, reinforced concrete and because of the [inaudible word] as you get down from the upper surfaces is steep enough so that when they placed the concrete, they had to use not only the bottom form, which formed the shell itself, but a top form for about a third of the way up the structure. And the top form had cutouts in it so that you could put the concrete in, and you started at the bottom, naturally. And as you went up and reached the cutout, you would put the cutout and nail it in place so that it formed a rigid top form and then continued to the next set of cutouts where you'd do the same thing until you reached the point where the slope of the concrete was such that you didn't need top form. And as I said, these are rough figures, but I believe it's about the top two-thirds of the structure. The structure was poured in thirds so that if you take and go to the cutouts and stand in the middle of two adjacent cutouts and drew a line, then up through the top of the dome, that would be one-third. And the first one, because it was so novel where the top forms and everything and the carefully controlled slope of the concrete, the first third took the better part of a day to put in place. And when I say day, I mean a whole day, a 24-hour day, not the 8-hour. By the time they got to the third one, they did it in relatively quick time. Now, the dome itself was formed from the ground up by a series of staging platforms -- steel staging and various shims as required so that you basically had a wood shell on top of the staging on which to place the concrete. This is important because it was done very carefully and very symmetrically so that when it came time to strip the forms, they wanted to be able to do it in a symmetrical fashion all around the building in order to avoid concentration of stress from the concrete. Eventually, the concrete did get placed, and the next step of blend -- the proper curing time was to try and strip the forms. And the procedure did not proceed uneventfully because as you tried to strip a concentric row of forms, the concrete crept in transferred rows to the next set so much so that you couldn't actually strip them. And so I believe -- I'm not sure, but I believe they put the first set of forms that they had managed to get out back in place and went to the trailer to scratch their heads. You have to recall that at this time, there were no computers in which to analyze such a structure so that whatever the characteristics were thought to be known from experience. The engineers were [Armand] & Whitney, fairly well known engineers from New York City, and they had done a lot of concrete structures. They were very big in bridges and stuff like that. They're the ones whose responsibility it was to try and analyze the structure both in the end state and what would happen to it originally. They finally managed by a method that I'm not quite sure of to remove the forms -- I believe starting at the center -- so they would remove one set of staging all around and then switch to the next set of staging until they had stripped the entire structure. So at that point, of course, the top forms, which were in place to allow for the placement of concrete, were removed first. So there it sat -- a thin shell structure in its purest form -- a shell thickening near the buttresses and thickening slightly near the ring beams, which formed the top of the openings from buttress to buttress. Of course there was a lot of interest in seeing what would happen to the structure after they stripped it. And the interest was warranted because the concrete shell started to creep. And it crept enough so there was some concern about the walls of the socket -- ball and socket joint -- slipping out of the unrestrained sockets. And of course that would have been catastrophic failure. So that as the movement continued, they put a large steel ring in the middle of the structure.

INT: How big?

WD: I'm not sure. But very large in thickness and strength, not maybe so large in diameter. And they put cables around the balls -- so there were three of them -- with turnbuckles and they took them up tight to stop any further creep or any further movement of the structure. And there it sat for a while -- while, again, they went to the trailer and started head scratching. There were several questions. One -- if they had done nothing, would the creep sort of stop and everything would be okay, or whether it would have continued so that one of the sockets would have the ball come out of it. And of course that would basically mean a catastrophic failure of the whole structure. And it was decided at that time, before they proceeded much further, to put vertical pieces of steel -- I'm talking about rather small plates around the socket. So if you went over there today, you'd see not only a socket, but you'd see that it has four upturned sides to it, which were the welded plates. That was done in case the ball did continue to slip -- that it wouldn't be able to leave the socket -- that it would be restrained by these rather significant steel plates -- again, significant in their thickness, not in their size.

INT: So they were locking it?

WD: They were basically locking it for future problems.

INT: And the sockets and the buttresses were strong enough to take all that movement?

WD: Yes. Because it truly was a ball and socket. So that there wasn't a lot of load. It was just slippage. It was able to overcome the friction and move. They also decided at that time --

INT: And who was the "they," Bill? The engineer?

WD: Well, it was a combination of people -- the Institute, the engineer, the architect -- decided that they would put three supports in each cutout --

INT: In the cutout?

WD: So three of the mullions that you see for the window wall actually carry some load -- again, not much, but this was thought to be a good idea to take some of the load and transfer it from the ring beams down to the ground.

INT: And those supports rested on the foundation?

WD: Those supports rested on another set of walls that weren't the original buttresses, but they rested on the walls that I think formed the wall of the basement. Again, they weren't meant to carry much load but to be sort of a crutch.

INT: So are they at the high point of the arch?

WD: One, I think, is at the high point and there's two more --

INT: That are closer?

WD: Like at the third or quarter --

INT: So they fan out?

WD: Yes. So, there's three of them in each opening. The big mystery of this whole thing is that after a while, and a while is not a long period of time, it's certainly in less than a few weeks and perhaps less than that, they noticed that the walls were starting to pull back nearer the center of the sockets. And of course it didn't make much sense.

INT: Pull inward?

WD: Yes. Even if the creep was over, it should have at least stayed where they were and not move backwards. When you do that, you make the shell sort of rise. That mystery was not solved by anyone until -- in one of his better times -- Dick Collins, who worked on the project for the Institute, told me that after a while, each night before he went home he would go over and take one turn on the turnbuckle -- each of the three of them -- in equal turns. And that is the reason these things retreated -- because of human intervention. I suspect that Carl Peterson, the director of the plant, knew about it, but I doubt that anybody else did including the engineers or the architect. After a while, they decided with the addition of the rings or the walls at the sockets and these intermediate supports taking some of the loads on the ring beam that didn't, therefore, transfer down to the socket -- that they would have another shot. And so the cables were released I suspect gradually, and the structure basically stayed pretty much where it was. And so the upturned walls in the sockets proved to be in the end unnecessary for however much load -- they call them columns -- and the openings carried, and for the length of time all this took place the creep basically stopped happening. And so there they stood with the structure that they felt secure about to proceed with the construction. Now, the interior of the auditorium -- there isn't a lot to speak about. It was nicely done, but it was basically what you would expect to find in an auditorium. It did have an interesting circumstance, however, in that it had quite a beautiful organ. The chairs were auditorium chairs with subdued multicolor backs. And it was supposed to be a multipurpose auditorium not a --

INT: Performance [theater]?.

WD: Not a performance theater so much and not a really musical theater. Other than that, a multipurpose -- we had done things in it that it was never expected to do.

INT: And who was the acoustician?

WD: Bolt, Beranek and Newman.

INT: Who was the associate architect?

WD: Well, I was afraid you'd ask me that. I believe the answer is Anderson, Beckwith. Perry Dean was the associate architect on Baker House. And I think Anderson, Beckwith was the associate architect of Kresge.

INT: And was Saarinen in residence?

WD: Saarinen lived in the United States.

INT: Oh, he lived in Cranbrook, right?

WD: Yes. His people were residents, and I suspect he was from time to time, also. So, even though he was Finnish, he was really from America. The interesting turn of events were having to do with the covering of the reinforced concrete. BB&N thought that you needed a covering that would help drown out outside sound. The flight paths at the time to Logan Airport sometimes took them over the Institute and of course the planes did not fly as high as they fly now. And I guess they probably took off and were climbing, too. So they were particularly concerned about airplane noise. And what they eventually came up with, and I don't know all the details of why -- I can guess -- but they put a single-ply membrane over the reinforced concrete like they would on a roof. That basically, if nothing else was done, that would have kept the building tight from water entering. But then it was followed by fiberglass insulation, which was put in, I'm sure, for like an airspace and to help in [inaudible] for sound penetration. Of course, you need mass for sound penetration so that on top of the fiberglass insulation I think there was another membrane and then a layer of lightweight concrete which was probably as thick as the original shell -- two or three inches. And that left the surface to be covered with something for architectural purposes. Saarinen's original idea was to put on copper. But nobody could really figure out how to properly attach the copper to this funny looking assembly. Lo and behold along came the magic elixir, orastone. Orastone was a synthetic material that you could trowel on that was sort of a brilliant white -- because you trowelled it on, there were no joints in it. So he decided -- when I say he -- that's the whole team -- decided to use the orastone. And it was put in place, and for a week --

INT: Did masons do it?

WD: Yes. For a week or so, it looked great.

INT: It was white?

WD: It was brilliant white. It really did look slick. On the other hand, the surface was relatively rough and porous so that it tends to pick up dirt, and it didn't stay white very long, and it started to crack the first year. By the end of two or three years, it had cracked significantly. And of course what was happening -- I don't know whether it was realized at the time -- the lightweight fill underneath it was cracking.

INT: And water was getting into it?

WD: Well, the building didn't leak, Harry, because of these membrane layers. But there was probably at first there was water that was getting through the orastone onto the lightweight concrete, and as it continued to crack, it would go through the lightweight concrete. And as the top coating on top of the fiberglass got punctured, probably from movement again, it would drain into the fiberglass itself, which, of course, is like a big sponge. You can put a lot of water in fiberglass and never see it. That eventually happened big time here. And it was generally agreed in the few years that they needed to take the orastone off, which was not a big deal. It came off quite easily -- and to use some of the material to clad the building. Now, this was done in the early to mid-'60s.

INT: So it had gone for ten years or so.

WD: So it had gone

INT: Eight years?

WD: From '54 to, yes, it had probably gone eight years or so. It looked terrible. I mean by the time it was replaced, it looked absolutely awful. It was dirty and all cracked, and people had tried to fill some of the bigger cracks. So it was multicolored. It just was awful.

INT: And how was it affecting the interior?

WD: It didn't affect it at all because the membrane layer on top of the concrete itself was never to my knowledge punctured. And so whatever water got in would flow down on this membrane and relieve itself at the buttresses.

INT: Did the building have those huge gutters on the arches?

WD: Yes. Those were the ring beams -- upturned beams.

INT: So the water was being channeled.

WD: Was flowing down to those and then down the ring beams. And eventually, although probably a little later, the buttresses -- the upturned legs, where the ball and sockets were, started to white stain, which was obviously salts that were being picked up as the water ran down through the lightweight concrete. As I said, by this time, they weren't too bad, and it was thought that if a new watertight cover was put on that you could salvage this whole thing. So, the orastone was taken off. And after fooling around with copper shingles again, where the problem was -- figuring out the best way of attaching them.

INT: You were here then?

WD: I was here and watched this. This was basically done not really by the architects but by the Institute.

INT: Was Saarinen involved?

WD: He had not. He was ill.

INT: So you did not contact him about the ideas?

WD: No. I didn't. But Carl Peterson well might have, or he might have talked with some of his associates. And so in the end, they decided to use lead, knowing well that lead tends to flow when it's under load -- would even flow if you took a piece of sheet lead and hung it up, it would flow eventually on itself, and eventually destroy itself. I knew full well this was a characteristic of lead. But they decided they could overcome it by forming a grid work of 3/8-inch stainless steel wires, and then, I think the grid was 2 by 2, and the stainless steel wires were attached through the structure to the basic concrete shell itself, the real concrete shell. So you ended up before you put the lead on with a 2 by 2 network of stainless steel wires. But underneath that network was the same old structure that was always there -- the lightweight concrete, the fiberglass. The way the lead was put on, and the reason I thought it wouldn't flow was that they would take a sheet of lead and cut it so that it basically sat within the 2 by 2 frame of the 3/8-inch stainless steel wire. So lead, I don't recall its actual thickness, but it was probably like 1/16 of an inch or so. It had some considerable thickness. And then they would put sheets of lead in the adjacent areas of the stainless steel grid, and they would cut those so that they were two inch laps or so -- so they would bend those laps over the grid wire and then lead burn them. You could actually lead burn it so that you ended up with a solid piece with no joint, although the effect was rather interesting with this because you obviously saw the stainless steel grid work telescoping through at each -- what we would call a joint.

INT: What year was this, Bill?

WD: Well, this was, again --

INT: ’62?

WD: Early ‘60s. I wouldn’t say it was as early as ’62, but it could have been.

INT: And is this the same time when [Monelle] was used on the roof of 26?

WD: No. Not that I know of. Oh, you mean [Monelle]?

INT: [Monelle], right.

WD: No.

INT: Because that would have been illogical.

WD: I’m not sure it was ever considered. It was certainly never talked about. I think, again, it was a question of attachment.

INT: And the same engineers were involved?

WD: Same engineers. Same architects. Same people at MIT The first year this worked out terrific. It was rather attractive. Of course, you can picture the color because it was lead.

INT: The opposite of white.

WD: It was a fairly attractive solution.

INT: It wasn’t turning dirty?

WD: No. And you could clean it if you had to. In the event something happened, you could always lead burn.

INT: And there was no concern about it being too heavy a material?

WD: No. That was well considered. Then the unsuspected happened. Even though these flaps were bent over a 3/8-inch standard steel wire, the lead proved ductile enough so that it started to flow over the stainless steel wire. In other words, just that tiny slope of where the flap turned over the wire, it was burned to the next sheet, was enough to let it flow and eventually crack. Oh, when one or two cracked, it wasn’t really a problem.

INT: Was this a couple of years later or longer than that?

WD: Let me see. It was probably two or three years later. And when one cracked, you could put a strip of lead over it and burn it so it more or less [inaudible word] with the rest of roof. This started to happen over most of the 2 by 2 grid, yet, again, became a terrible looking mess because it was nothing but strap after strap after strap that showed up -- started getting multi colors. The leeching down by the sockets got very severe. Obviously, at that time, a lot of water penetrating through the cracks that remained open before they were fixed, or at the end probably open because they weren't fixed. And it was decided that this had to be considered a failure and yet another roof would have to placed. They had the original -- let's see -- this was in 1978. So that gives you an idea of how long the lead roof lasted. It lasted for a decade or so or more. And the original people involved, of course, had all since retired. Saarinen had died. So this project was undertaken by Bill Combs and I and George Jarvis was a big help. By that time, I think Ken Leach, who used to be the principal person at Fuller, had gone to [inaudible]. Fuller had gone out of business, I believe, in Boston. We experimented with various ways of attaching copper. We finally decided, to make a long story short, that with all the water entry, etc., that the fiberglass must be soaked and that we would strip the roof, take off the lead and salvage it, take off the stainless steel wires, take off the lightweight concrete, take off the fiberglass insulation and ended up with only the shell and the membrane which, thank God, still kept the building tight from water entering into the building itself.

INT: Twenty-some years later.

WD: Yes.

INT: Twenty-four years later.

WD: So we decided that we put an assembly back on that would end up basically with a wood shelf on top of the concrete shelf and then there would be no mystery as to how to attach the copper. The copper had been placed in one means or another on wood domes for years. Before doing this, though, we decided to investigate the deterioration that may have taken place at the bottom of the shell near the buttresses and at the bottom of the ring beams, which showed some outward signs of distress. So that Ammann & Whitney were here on a particular day with Bill Combs and myself. We were in the office and at 8:00 o'clock we sent a mason over with a hand chisel. We had taken the lead covering off of the ring beams and told them to do some chipping until he got down to solid concrete.

INT: Bill, hold on. This is the best part, and I don't want to miss it.

END OF SIDE ONE

SIDE TWO

WD: Well, we went over about three-quarters of an hour later, and he was merrily chipping away. And he was eight inches into the ring beam, which of course was a source of some concern. The load through the shell was being transferred significantly through these ring beams down to the buttress. So a decision had to be made and, fortunately, different from current times, that decision was easy. I made it. I told Phil Stoddard, who I worked for, that I made it. He wasn't about to argue with me. And we closed Kresge Auditorium that afternoon for a year -- a year being the time that it took to do all the work that was required. And we went through a long period of carefully controlled concrete restoration where we rebuilt the ring beams. We had more experts than Heinz had pickles and lots of ways of -- they actually did sound testing of much of the concrete shell to make sure that it hadn't deteriorated over the years.

INT: Were you using the same structural engineers at this point?

WD: The same structural engineer that supplemented with --

INT: With Haley and Aldridge?

WD: No. With concrete people -- the principal one was from New York, and I don't remember his name. But Herman [Prost] was involved also.

INT: So, you were supplementing the original --

WD: Right. By that time, of course, they could put this whole structure on computer. And so they could forecast quite adeptly what the loads might be. And the ring beams were shored and all of this flaking concrete was removed and, as I said, the ring beams were reconstructed with concrete that was probably stronger than the original. And whatever turned out to be the necessity down near the buttresses itself, the concrete was removed and replaced. That wasn't too bad. The real significant part of the problem was at the bottom in the ring beams. We took significant measurements during all this period of time to make sure nothing was happening to the structure. As I said, it was shored several places in the openings as well as the original columns. And every day measurements were made to make sure that the concrete shell wasn't moving downwards. After everything had stabilized --

INT: Bill, can I ask a question? Were there any cracks in the eggshell --

WD: Not to my knowledge. There may have been one or two but not to my knowledge. We went and put on an assembly that we had actually built mockups of. The assembly consisted -- I think we put another membrane on top of the membrane that was already there -- a single ply because that had served so well -- we decided we better let it serve in the future, too. So why not put another one. It had basically no weight or thickness. We then put a series of sleepers attached to the concrete shell, the wood sleepers, creating box-like areas in which we could put Styrofoam insulation -- put it in the boxes so that the Styrofoam insulation basically took the place of the fiberglass insulation. At that time we had BB&N still involved, but there was much less concern about outside noise. So there was not a need to put the lightweight concrete back which was basically a terrible material. And I don't remember every detail, but we ended up putting the two layers of marine plywood running in different directions attached -- so we ended up with a wood building in place of the old assemblage of lightweight concrete fiberglass -- we ended up with Styrofoam and wood. Then of course it was relatively easy to figure out how to attach copper. There were several ways, however. And we picked probably the most attractive of them all, although as I have always said to everyone, I'm not an architect. But to me, it always seemed fairly attractive. So the copper was put in -- the ring beams were also put in the flat beam copper and the very top of the shell, which is very flat, was put in with flat beam copper. You never see it because you have to be at a building around the edge looking down on it to see it.

INT: Bill, with the sleepers and the two levels of marine plywood, about how much of a dimension are you adding now to the eggshell at the lower point?

WD: We're probably adding less --

INT: Than you had before.

WD: Than we had before because we had the lightweight concrete --

INT: Six or seven inches, right?

WD: No. It was three or four inches thick.

INT: Oh, even down at the base?

WD: Yes. I think so.

INT: It was getting smaller rather than bigger?

WD: Yes. Well, you can judge for yourself. That was 1978, probably finished in ’79. It’s now 2005. So, it’s what -- 26 years old? To my knowledge -- again, it’s knowledge that stopped in 1998 -- there’s never been a real problem with it. I suspect if and when they have to be replaced, the pattern is there. It has changed colors significantly, of course. It’s gone from a rather bright copper to probably dull -- what would you say -- green, gray? Someone once asked me why we didn’t use lead coated copper and yet another layer of redundancy. We didn’t use lead coated copper for a purpose. We had found that wherever water ran onto a lead coated copper service, over time it had pitted, and the lead coating, wherever it had a slightest imperfection, slag, or anything else, would pit, and we stopped, at least during my era, we stopped using lead coated copper because it didn’t seem to have longevity. It had changed appearances. But we specifically didn’t use it on this particular project for that reason. So that’s mainly the story of Kresge Auditorium.

INT: Bill, before we leave it, I remember the fact Bill Combs -- that was in excess of $1 million --

WD: It was around $1 million.

INT: And that was fairly expensive, right?

WD: Oh, it was. The whole project -- the restoration project -- I don’t remember the final totals.

INT: How did you get funded? You certainly weren’t planning on doing the restoration.

WD: We funded it because we had to. The Institute funded it. I’m sure we went to the Kresge Foundation. They had never been too willing to step up to the plate again, although they’re very proud of what’s there.

INT: The mindset of what the final solution was -- it’s so logical. Do you think it was the computerization?

WD: It was impure, Harry. They wanted a concrete shell. And so they didn't want to put a wood shell on top of it. And it only became logical when everything else failed.

INT: So you went through a hell of a lot to get it back to an historical solution.

WD: It is an historical solution.

INT: There's something about the story that I think is important. The [Combs] roof is a real design element, I think, with the strips. This looks like one of the most famous buildings, right? Certainly one of MIT's. So, in terms of design review, what did you do, Bill? Was there anybody who questioned -- the roof -- because it was such a design element?

WD: Nobody around wanted to touch the Kresge roof in any way. We had no architect who exhibited an interest in it. They might have had an interest, but they didn't want anything to do with it.

INT: Because it was so problematic.

WD: I have to say, to the best of my knowledge this solution was the solution of George Jarvis, who was a great coppersmith in his own right, Bill Combs and myself. And, as I said, we built two or three samples of different kinds of seams and stuff.

INT: And you just did it.

WD: We went ahead and did it. We thought this would look best.

INT: And all the press relations people never came calling?

WD: No. They love Kresge.

INT: So what advice would you give us?

WD: Well, a piece of advice that's easy to give is, beware of new magic materials. This orastone was grabbed upon because it fit a picture of what Saarinen envisioned. But it's best to let someone else try a material under a similar set of conditions.

INT: [inaudible question].

WD: Well, I think, it probably was, Harry, but it was new.

INT: [And you don't see the price]?

WD: No. I learned that hard way because I remember the Bush Building -- Skidmore, Owings & Merrill finally convinced me to use [saloy] flashing up on the roof in some areas. I wouldn't bite for the whole thing. And we used [saloy]. Of course, it was a plastic material that was supposed to be flexible and not griddle like copper and other metals. It was great for counter flashings. So we did use a little bit of it. And it was new. It failed. It failed in a great way in three or four years. It all cracked up. It had to be replaced. It's just a lesson. We'd get nowhere if nobody was ever willing to try a new material. But the testing of a new material is very important. It's always better if you have a similar application with a little wear on it.

INT: Bill, one more question. Saarinen was alive when the orastone group went on, and it was white. You said that he did originally want copper, right?

WD: He did.

INT: So it was a compromise with white?

WD: Well, I don't know what was in his mind. But I think he thought that -- he must have thought -- I don't know that he thought this, but he must have thought this [composite] material, which you could trowel on, and it was uniform in color even though it was white, that it would be something that would make this structure of his spectacular. And so Saarinen was hired to do the Kresge and the chapel. And the idea was that he would later do other buildings in the quadrangle, mainly the student center. By the time it came to build the student center, he just couldn't put himself to the task and later on, I think, it turned out that he had a brain tumor, and he was not well, and they eventually had to not give him a commission, and it went to Catalano. That's how Catalano got that commission.

INT: When was the paving done on the plaza?

WD: The brick paving?

INT: Yes.

WD: The brick paving was done at the original time.

INT: The brick?

WD: Yes.

INT: And the fancy, fancy plan with the herringbone design that just never came about.

WD: I don't believe so.

INT: I mean I know it never came about -- but was there -- so the brick happened before --

WD: I was in school, then. I don't --

INT: The brick happened before you. You don't know why --

WD: I don't know why. The plaza, of course, was raised like it is because he envisioned a parking garage --

INT: Under it.

WD: Underneath it. The parking garage was never built, but the plaza was raised.

INT: So could the parking be done now?

WD: You can always do something -- but with a lot of construction, though. Sure you could do it. You've got big trees and everything else.

INT: So he designed it on a raised platform and then they just proceeded to do it even though the parking didn't go --

WD: Right. And they [inaudible word] all those sycamore trees, which they planted near the chapel and several years later they had to remove every other one.

INT: And who hired Saarinen?

WD: Well, it's got to be basically Jim [inaudible -- lowered voice]. And probably with recommendation from Pietro Belluschi.

INT: Who was his architectural advisor?

WD: He was Dean of Architecture and eventually architectural advisor.

INT: The only thing that surprises me is the wide roof -- that you would think would stay wide.

WD: Well, we all know how foolish that was. Even if it worked perfectly, it would have been a nightmare as far as --

INT: Kids would climb on top of it.

WD: We did. I had two classmates who sat on the top of Kresge. I might say a word about the chapel -- not much. The chapel, although unusual and detailed for a chapel, is not that unusual as a structure. But when it was proposed, the Kresge Foundation offered to remove their funding because they didn't think any church or any chapel should look like that did. It was, of course, affectionately known as the [inaudible word]. Jim[Killian convinced them not to do that. And, of course, now, it's either one of the best -- the best or one of the two best -- pieces of architecture on the campus in most people's opinion -- that and Baker House. The chapel -- the fact that there's horizontal glass -- the light off the moat -- the water and the moat reflects into the building on its walls as the sun moves -- and if the clouds are there or not there, well, the water is in the moat, but not at all year, you get a fairly interesting effect. It's a supurb structure, piece of architecture. And Harry can probably talk on that better than I can.

INT: And you didn't have any problems.

WD: No. We had relatively few problems with the chapel because it's basically a brick wall. As I said, Saarinen was supposed to do the student center, too, but became ill. Because of the uniqueness of Kresge and the chapel, and the fact that the athletic center was going to be situated on the side of the court, and the student center which is a fortress of a concrete building, and the ice rink, which is a completely different type of structure, it was decided to try and get someone involved at least in the architecture that had been familiar with Saarinen's work. And I think -- is it Kevin Roach?

INT: Yes.

WD: I think he worked for Saarinen. And he was selected and then the inside of the structure was done by [inaudible name]. And of all the structures built since I left, I'd have to say I think the Zesiger Center is perhaps one of the nicest architecture that I've ever seen. And it managed to blend four distinctive different pieces of architecture and become -- what would you say, a background?

INT: Yes. It's a background building.

WD: And it's superbly done in my opinion. And all those involved with it should be congratulated. I think that's the saga of Kresge Auditorium.

INT: Quite a story.

[End of interview]