William R. Dickson Oral History Project
Interviewer: Susan Crowley
February 9, 2005

X: This is Wednesday, February 9th, and this is an oral history project by William R. Dickson, former senior vice president of MIT, and today he'll be speaking with Sue Crowley.

INT: It seems to be recording. What is today? February 9th.

WD: Well, I thought today we would start to talk about some of the buildings -- somewhat chronologically -- that I worked on in the earlier years of the Institute. And I'm going to start with the Green Building. When it was constructed, it was called the Center for the Earth Sciences; currently, the Green Building -- after the principal donor Cecil Green -- and its MIT building number is 54. I'm also going to talk about only the unusual aspects. From my point of view, a building is a building. And we don't need to talk about the building itself but what made it or makes it somewhat unusual. This particular building was designed by I.M. Pei & Associates, and the principal designer other than Mr. Pei was a fellow named Aldo Cossutta. I guess his real name was Araldo Cossutta, who later went into practice for himself and did several buildings. The unusual thing about Pei's office and Mr. Cossutta was they would pay extreme attention to detail. And if they had a detail that they wanted to incorporate, and you representing the owner really didn't want it, you had a long and tortuous argument that would sometimes extend on many weeks before you could come to agreement. There was at least one occasion where I took the unusual tack of just saying, no, we're not going to do that. And that was quite unusual for me to say that, particularly in this era when I hadn't gotten too much actual experience working with big name architects under the belt. So, thinking that we wanted to talk about some of the unusual things, the ones that come to mind were first of all the design you see constructed and is in place was actually the second design. The first design had reinforced concrete Vierendeel trusses so that the building would be column free and the Vierendeel trusses would basically form the framing for each floor on two sides of the building. This design was carried out and was completed. The unusual part about it is that I'm not familiar with any other reinforced concrete Vierendeel truss, although I'm sure there's probably one somewhere. But secondly, because they were trusses, even though they were made of concrete, you couldn't put a rectangular window in the opening or else it would become very small so that the windows became oval. And that maximized the amount of window area because you could sort of follow the X-bracing. The design was rather novel and, of course, the building had a completely different appearance than the one that is there now because of the number of oval windows -- sort of resemble an aircraft with its oval window. When the bids came in with a limited group of contractors that we selected ahead of time, the project was considerably over budget. And at the time, we had a clause in Mr. Pei's contract that said if the building was more than X -- I can't remember what X was -- above budget that he would redesign it at his cost. So that, basically, the redesign followed and the Vierendeel trusses were eliminated and the frame is more or less conventional. In other words, there's considerable exterior columns, windows -- now rectangular in between the columns and quite a different looking building. As a matter of fact, I can remember the picture *Tech Talk* took of the building with oval windows -- which, if you laid the picture on its side, looked exactly like a radiator cover. And somewhere in my files I have that picture. So that the second design being a little more conventional came in at a budget or a cost of something that we decided we could more or less live with. I can't remember whether we made minor modifications or not, but we proceeded to build the building.

The building is reinforced concrete -- I think the first of the reinforced concrete buildings on campus. Mr. Pei was a great fan of reinforced concrete. And his attempt was to get a concrete mix that, when in place, blended with the limestone in the old buildings. And from that point of view, he was quite successful. The cement used was Saylor cement which was made by the Copley Cement Company, and the aggregate was purple trap rock from the Rowe quarries in Massachusetts. The forms were fiberglass and basically on the typical floors, which were above three, were reusable. So they used to strip the forms and reuse them for the next floor. There was some problems in doing that. We had to be very careful with the pitch of the concrete where you had a rabbet or something or else the forms would bind, and you couldn't strip them. So, after some experimentation, we finally found a structure that we could live with for a design and proceeded. You will recall, the building is about 20 floors high. It has an open first floor with an elevator lobby and a lecture hall lobby at either end and a lecture hall on the second floor and the Lindgren Library on the third floor, and then the rest of the floors are basically classrooms, offices and laboratories. The floor is a very small floor plan which in the future as the building got more mature became a drawback because if you had an activity on the fourth floor, just to pick out one, and it grew a lot, in most buildings you tend to grow laterally and combine the activities. In this one, once you used up the floor, you had to grow vertically. It's just a fact that to travel one floor vertically, even though it may be only ten feet up the stairwell, is not the same as walking 100 feet laterally. And so, the building became somewhat unpopular in its later history because of the small floor plan.

Now, some of the odd things about the building is the roof of the building was a weather station because the occupants were going to be geology and meteorology, and meteorology was a small department, but they occupied the upper floors and then had a weather station on the roof, which had a couple of grade R platforms, balloon launching capabilities and several other nuances that you'd find at a weather station. To my knowledge, it's still used for most of those purposes today, although the meteorology department as a department is long since disappeared as a separate department. I think it's now part of the whole earth sciences regime. A couple of other factors that made the building unusual -- the windows as installed were a heat absorbing glass, and they were tinted, which gave some of the heat absorbing capability. But when you go back and read the instructions, it says that none of those sheets of glass are relatively thick panes of glass can be clipped in the fields. They all have to be cut to size in the factory. And, of course --

INT: How come?

WD: When you're inserting the glass in slots in the columns, there's bound to be enough variation that in every case -- they're not exactly the same. In many cases, they're okay.

INT: Was that because they were heat producing that they couldn't cut them?

WD: Yes. All of this came out after the fact because when the building was completed, every once in a while one of these large panes of glass would crack -- would just sit there and then one day it would crack. And after much study, it was decided that the real problem was the installation techniques. And like normal glass, they clipped a lot of them in order to get a better fit. This went on for some time. As a matter of fact, one day we had one crack, and it sort of cracked around the perimeter and fell out of the building.

INT: I was going to ask that. Remember like the Hancock windows popped out?

WD: Right. As sort of one sheet of glass.

INT: And did it fall to the ground?

WD: And it fell however many floors it was up and would have decapitated anybody that it hit had it hit someone. To make a long story short, after much study, the glass was all replaced. So, sheet by sheet, whether it had cracked or not, it was replaced -- I think by Pittsburgh Plate Glass, who was the manufacturer. So, once that was done, it was the end of the cracking of the glass. As I said, it took a long time and a lot of study and a lot of the results were used to help analyze the problems years later at the Hancock Building. Starting with the construction, another significant problem was that the building was founded on piles that were probably 100 feet or so deep. And they were thin shell piles. In other words, they were steel tubes that were driven. And then, after several were driven, they would fill them with concrete so that you'd have a solid concrete pile. The problem was that since the piles under the columns were so close together that driving of one pile would eventually cause one adjacent to it to collapse. And this turned out to be a significant problem whether to increase the wall thickness of the piles or what. I believe that the final solution was to not drive all the piles in a pile gap at one time but to drive say half of them in a gap with spacing in between, fill them with concrete, and then after the concrete had some initial curing to drive the other piles in the gaps and fill them. Needless to say, the problem was eventually overcome and if I remember right, I think there's some 300 piles under the building. Another big problem turned out to be the wind.

INT: I was going to ask about that.

WD: The ground floor was open except for the lobbies, which were small, at either end. One is an elevator lobby, and as I said, the other is a lobby for the lecture hall where people could go and wait and then walk up to the lecture hall which was the floor above. The problem was that with the other buildings around, the wind would pile up on the face of the Green Building and then in order to relieve itself would either go around the ends or drop down the face of the building and whip through the opening end of the building. And that was the troublesome point because sometimes people had trouble even walking to the doors under the building because the wind was so bad. Another time I knew it took a pair of eyeglasses off someone and ripped them right off. Also, the original doors to the lobbies were offset hinged doors and when the wind would blow significantly enough, you couldn't open the doors so that you had trouble getting in and out of the building.

INT: That's not good.

WD: This originally -- since the solution was not readily at hand -- the original solution was in the winter when the winds tended to be gustier to put a plywood enclosure on one entire side of the opening -- and so it would stop the wind from blowing through the opening. It wasn't the most attractive thing in the world, but it did the job until a permanent solution could be found. Now all of these things sound simple. But this one resulted from extensive wind studies made in the MIT wind tunnel. And that's how people came to know what the wind currents would be, and what happened to them at ground level. I think it was Joe Bicknell who invented an ingenious way of putting wires in the ground to represent people. And the wires had a certain ductility to them. And when the wind would blow, they would take a shape, depending upon how hard the wind blew. And of course, once they bent because of the wind, when you stopped, you had a permanent picture because they didn't spring back up into shape. They stayed bent so you could then work with these and tell exactly where the wind velocities were highest. Very clever.

INT: What did you say -- he was a professor?

WD: He was a professor in Aero and Astro and used to run the MIT wind tunnel. Also, we had a problem with -- let's see -- oh, the doors themselves, as you'll notice now they're revolving doors -- these sort of strange looking enclosures. These enclosures were designed, again, with the help of wind tunnel studies to divert the area of the doors, and the doors were switched from hinged doors to revolving doors. It's still windy under that building, but people are now able to enter and exit. All these things took several years to work out. So this was a long-term study.

Two other minor things in the realm of the whole thing that I remember were all this insistence that we have roll shades instead of venetian blinds -- the Institute used to have roll shades throughout. Of course, when you roll them down, the room becomes very dark. Well, not to be thwarted, Aldo decided that he could poke holes -- a pattern of pin pricks in the roll shades that would let in light and yet not make them look like venetian blinds. He didn't like venetian blinds because he didn't like the looks of them. And, again, we studied several variations of roll shades and worked with the future occupants. And finally, this was the one case that I said, no. We're not going to put in roll shades. We're going to use venetian blinds. I said, however, we'll give you this benefit. We'll let you select what kind of Levolor -- which was the name of a product -- blinds -- you can have any of the standard colors because we used to use all Institute gray. And I said we won't make you use the Institute gray. So, again, they went through, and they looked at all the colors and installed some samples. And lo and behold, when they got all through, they selected the Institute gray, and we had standard Levolor blinds in the Green Building.

Let's see if there's anything else. I think that original design, the wind problems, the pile problems, and the blinds are a problem of a different nature, are probably the things that I remember most about the Green Building. Oh, there is one more thing. As I said, we were using Saylor cement, which is a brand name made by Copley Cement, and we got up to the seventeenth floor without a great deal of trouble. And then, all of a sudden as we tried to use the concrete on the seventeenth floor, it would flash set. In other words, if you got it out of the truck, it would set so fast that you couldn't lift it to the seventeenth floor and then pour it because it became unworkable. And this presented quite a problem with the building -- 16 stories completed, and suddenly we couldn't finish 17, 18, and however many there are -- 19. So we finally had a giant meeting in Turner's headquarters in Boston. Turner was the contractor for the job. And the meeting was called by Colonel Reeves who used to be the head of the Boston office. And present were many people including some from Turner and some from the architect and Miles Claire who was head of [Thomson & Lickner] and quite a well renowned person and Mr. [Grunberg] who was the president of Copley Cement Company. And I can recall after much discussion, Mr. [Grunberg] and Mr. Claire were waxing philosophically about how little we really knew about concrete. And Colonel Reeves listened for a while and finally said -- he was a southern gentleman -- and he finally said, "God damn it, gentleman. We've got to build this building. So let's figure out what's wrong with it." At that point in mind, they ultimately decided that for some reason the grind of the cement was probably too fine; that it was not typical, but too fine. So they dumped all the cement in a bin at Boston Sand and Gravel and brought in a new load of Saylor cement and the problem went away. They were able to complete the building.

INT: But why did it just start on that floor?

WD: Because the grind somehow --

INT: Had changed.

WD: Had changed -- not knowingly. But when you make cement, you're really grinding limestone and other stuff. And somehow the grind got set so that it was too fine. So that was a very memorable occasion. I'm glad I remembered that. The next building we'll talk about is the Whitaker Building. There is not a lot to say about the Whitaker Building. It was called the Center for the Life Sciences. Everything was a center. The architect was Anderson, Beckwith who actually were the architects to the Dorrance Building, Building 16, which it is attached to. And basically, one could say was almost an extension -- same height. Basically, the same floor plan -- or not floor plan but width dimensions. I think one was set back a little from the other by a couple feet. And it was a much more modern laboratory building than was Dorrance. Dorrance was built for biology and food technology when biology moved from two rooms in Building 4 to occupy half of a building. And, of course, food technology was later abandoned, although it was still in full swing when we built Whitaker Building. And they were built so that you could extend -- remember food technology was on the first levels -- two or three levels, and you would just extend them horizontally into the new building. And then, the same with biology on the upper levels. And if I'm not mistaken, I think, the top floor at the time was a series of animal quarters for work with the biology department. It was a good design. A lot of thought went into it. But I think the thing of real interest is the foundation. When we took borings, we found that under at least half of the building, there was a substantial layer of peat on top of the sand layer. And of course, you can't bound anything on peat because it's subject to such settlement that it just can't do it. So, we had planned to have a one story basement similar to Dorrance, and ultimately the plan was to excavate all the peat, which would mean digging down considerably deeper and in water. And backfilling it with engineer fill, to the common person gravel, well graded, and then compacting it and then using that layer to found the building on, which would transfer the loads down to the sand. Well, this is something that very seldom can you claim authorship of something, but I claim authorship of this, sole authorship. And I said to myself, if we're going to excavate the peat to a depth that could house a second basement, why not excavate the better fill on the other half of the building and float the building rather than put it on caissons or footings, shallow footings and gain a basement level. And it took some selling on my part, but the architect finally got interested in this. The theory was you could put the mechanical equipment in the deep basement, and you could reclaim the first basement for general use. And they said, well, but it will cost something to create space, and we don't have a program need for the space. I said, well, leave it empty. And within a short time, we'll have so much need to fill it up. Ultimately, that was what was done. The building was built as a two-story basement with a floating foundation which means the basic [mat] was about four foot thick. And I think the engineer wasn't in favor of this. If I remember right, the engineer was severed. I think the name at the time might have been [Severett, Elstadt & Kruger]. And they, for some reason, didn't like this idea and so the architect hired Moran, Procter, Mueser from New York City and got their opinion on it. And they said it was a terrific idea. So he then discharged, severed, from having responsibility for designing the foundation, although they maintained the design of the building structure. And Meuser designed the foundation. And it worked out terrific. And we ended up with the building when we were done with an empty first floor. It stayed empty for about six months and a new project came in and occupied about half of the basement floor. And it really was a boon to the whole area to gain that extra space. And, as I said, I claim responsibility for that because I really fought that one. And my associates were very intelligent people. They weren't too sharp on foundations but were willing to listen. And I think I give Herb Beckwith the tip of the hat for having the foresight to at least test the idea with Moran Procter, whose basic business was foundation business. They've done several of the foundations at MIT. I became very friendly with Meuser. He was an MIT graduate, sort of a bull in a china shop, once trying to hire me to go to work for him in New York City, and I really didn't want to go to New York. But I remember when we were sitting in his office with his guys that were actually doing the work on another project. He said how come I've got all you guys working on these foundation projects when this guy who never took a damn foundation course is smarter than all the rest of you about them. And he was kidding more or less. I was also with him one night -- Ann and I at the president's house -- in some kind of an after Corporation meeting or something -- when Meuser said to me -- also there was Pietro Belluschi, Dean of Architecture, a very proper man. And he says to me -- do you want to see me get Pietro's ass? I said, sure. So, he said, just listen. And he walked over to Belluschi, and he shook his hand, and he said -- how are you Pedro? [laughter] So he was a card.

INT: Now did they ever find peat anywhere else on the campus?

WD: Oh, yes. But not usually in those great layers. It wouldn't make any difference if you were driving piles through it down into the bedrock or glacial till -- it wouldn't make any difference because the load is taken on the piles. But, yes, we found it. There was a little showing when they built the Dorrance Building -- nothing like this very large layer. As I said, if I remember right, it took up about half of the building. Perhaps the next building we should talk about -- as I said, I'm not going to talk about buildings for buildings.

INT: Talk about what?

WD: Buildings just for the sake of them being buildings. I want to talk about the unusual aspects. The Bush Building -- let me backtrack. The Whitaker Building was -- the basic funding was for the Whitaker people. As I said, the name of it at the time was the Center for the Life Sciences and its MIT building umber is 56. The Bush Building, built just a little after the other two that we talked about, but not much, was designed by Skidmore, Owings & Merrill of Chicago. And the lead designer was Walter Netsch one of the partners at the firm, another MIT graduate. It's only a five-story building; however, it suffered some of the same kind of problems as did the Green Building. It was built on deep piles, and we had some problems with the collapse of the piles on that building, too. I think in that case the shelf thickness was increased, and when that was done, we were able to drive them without collapsing other piles. There, again, you could say that in a few words, but it took quite a while to figure out exactly what to do. This building is only five stories tall. It was called the Center for Materials Science and Engineering -- I think at the time the name was [DARPA] which was government money, and it ultimately became the Bush Building and Building 13. Another extremely significant issue with this building -- you'll note that it has dark stained wood windows, as do all of the buildings designed by Skidmore, Owings & Merrill on Vassar Street that came after this. And I believe even Building 9 which came after it. And it wasn't always to be that way. The windows and frames were to be reinforced concrete, a product called shotcrete. And they had a design that was specifically tailored to this approach. And they worked with a shotcrete company getting estimates as they developed it. And so they felt fairly secure of what the price for that rather large element -- because there's a lot of window wall -- would be. Well, they got taken. Shotcrete basically doubled the price and, again, the buildings were so far over budget that we had to work with the low bidder -- the Fuller Company, George A. Fuller Company, in this case, to make substantial changes -- one of which was to change the whole window design to mahogany windows, dark stained, instead of the reinforced concrete, shotcrete. There was a real question of whether you can do this because timber construction was not permitted in the fire district; however, we finally worked with the City of Cambridge, and they agreed this really wasn't timber construction but a window frame. So we were permitted to go forward. So, Walter Netsch, then, fell in love with it and used it over and over again on all of his other buildings. I think it's adequate, but I never thought it was the cat's meow that I think Walter thought it was. I think the piles and the windows were the most significant things except for one other thing. And that is some pile clusters had to be driven very close to Building 10 -- about as close to Building 10 as you could actually get a pile driver in place. And when these were driven -- of course we were very cognizant of settlement and stuff of buildings. We found that Building 10 began to rise. It was the building of the campus, and it settled the most over its history almost ten inches. The concern was that after things stabilized that it would settlel

END OF SIDE ONE

SIDE TWO

INT: On February 9th.

WD: The concern was that after it settled back to where it had been that it might take up a settlement curve like it did initially, and it might settle at an accelerated rate. Originally it did when those buildings were built. But it was down at this point in time to a settlement of about a 1/32 of an inch a year, which is becoming sort of negligible. So the concern was that as it settled back down that it wouldn't adopt the 1/32 of an inch settlement rate again but some other intermediate rate that might cause Building 10 to settle significantly more. This proved to be unfounded. When it did settle back, it assumed its rate and we've never had a problem. This was of considerable concern at the time. We had a project, a foundation project, that I was involved in with the people from Soil Engineering. And, of course, we did all the monitoring of what was happening in the buildings adjacent to any construction site. I think I'll probably stop at this point in time and pick up next time with probably Westgate, which was built in a similar timeframe as the Green Building.

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INT: Bill wanted to add one thing about the Bush Building.

WD: Every building has its idiosyncrasy. In this particular building, the Bush Building, Walter Netsch had a vision. Of all these buildings to the north of Vassar Street and along Vassar Street and with hordes of people coming into the campus from that direction and using the Bush Building as their way into the main buildings or some of the other buildings connected to them -- so he wanted to have a five-story bank of escalators, and he was quite firm about this. He could picture these thousands of people coming into the lobby and needing to be transported vertically and that elevators just wouldn't be satisfactory. After much argument, I adopted the position taken by my good friend and associate, Bob Simha that Walter was correct, that there would be a lot of construction on both sides of Vassar Street and maybe even to the north of that. But the people who get into the system when they first came to a building -- it was connected as opposed to walking all the way to the Bush Building to they get into the system. So, we ended up putting in two elevators. But if you carefully look, there's room for two more where Walter was sure that we would end up needing four elevators in order to transport these people. Well, thank god we didn't do that, or that we didn't put in escalators because if you sit down there and look at it, those are probably two of the lesser used elevators at MIT. People use them that work in the building and a few other people use them. But they're really not elevators that you'll ever see a crowd out in front of the door waiting for an elevator. So, that was fortuitous and I congratulate my colleague, Mr. Simha for taking the position that he did since we would have been stuck with five escalators, which are very expensive to use and look awfully silly when there's nobody on them. All right. That's the real end of the story on the Bush Building.

[End of interview]