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OF

THE COMMISSION TO STUDY THE NEW JERSEY DEPARTMENT OF EDUCATION  
BUILDING CODE, APPOINTED UNDER THE PROVISIONS OF SENATE JOINT  
RESOLUTION NO. 4 (1956)

Held:  
Assembly Lounge  
State House  
Trenton, New Jersey  
August 18, 1958

MEMBERS OF COMMISSION PRESENT:

- Senator Thomas J. Hillery (Chairman)
- Mr. Joseph Di Stasio
- Mr. Victor N. Ronfeldt
- Mr. Hugh Stearns
- Mr. Leon Van Sant
- Dr. Howard D. Morrison
- Mr. James V. McIver

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SENATOR THOMAS J. HILLERY (CHAIRMAN): I am sorry, gentlemen, that we couldn't meet earlier but I had some personal difficulties in my family and I just couldn't, with my own preoccupation, arrange an earlier meeting of the Commission. But we are back on the track again and I apologize for holding you up.

At the last meeting of the Commission there was a long discussion about the work of the sub-committee on the one-contract bidding and the present law - the opportunity for boards of education to select a one-contract bid or the five-contract bid. The report of the sub-committee was brought in by Mr. Hugh Stearns and after a long discussion it was voted by the Commission to recommend that the boards of education have an opportunity to either use the one-contract or the five-contract bids. Since then a vote in the Legislature, in the lower house, proves that the one-contract bid is still unpopular. I think it was defeated by a pretty good vote. I don't think the labor people are happy about it and whether or not it will ever be part of the school code recommendation and law is a question. But we have gone on record as favoring such a choice for the boards of education. Of course, you know that the State Federated Boards have also made that recommendation, they would like to see that.

MR. HOWARD D. MORRISON: What happened in the Legislature, Senator?

CHAIRMAN HILLERY: Well, there was a bill in the lower house. The bill was never moved in the Senate. Assemblyman Ozzard came to me and asked me about the work of the Commission and I told him that we had made that decision and I believe he

used it but it still didn't help the cause in the lower house.

MR. MORRISON: That is the bill to allow either the --

CHAIRMAN HILLERY: To provide for the one or the five, a choice.

Now, after that was decided by the Commission, it was recommended that we bring some gentlemen in here who are conversant with building problems in the State and that we have some discussion here about the cost of building schools as it relates to heating, ventilating, plumbing and electrical work, and we have been very fortunate to have some of these gentlemen here this morning. We appreciate their giving their time to the Commission. We have representatives from Vogelbach & Baumann, from Grady & Meyer, and from Runyon & Carey.

Now I received a letter requesting that I contact Mr. Zimmer, President of the State Society of Professional Engineers. I received this letter on the 10th of August, I think it was, and I sent a telegram to Mr. Zimmer asking if he would like to come in here this morning. I don't know whether or not he is coming, I haven't heard from him.

MR. MALCOLM E. RUNYON: Senator, he told me that he did receive a telegram from you and that he was coming in.

CHAIRMAN HILLERY: He is coming. Good.

Now which of you gentlemen would like to start the discussion this morning about recommendations in any of these fields, plumbing, heating or electrical equipment in the schools?

MR. RUNYON: I think we are all conversant with all three, Senator.

CHAIRMAN HILLERY: Well, have you men prepared briefs?

MR. ROBERT C. GRADY: I have a few notes that I made this morning.

CHAIRMAN HILLERY: I see. Well, would you like to head off the discussion this morning?

MR. GRADY: All right. I'll head it off and my colleagues here can agree or disagree with me.

We are all aware of the fact that the percentage of cost of heating and mechanical work, and electrical work, in the schools has gone up proportionately in relationship to the cost of the school itself. I believe that is more or less caused by the type and trend of general construction or architectural designing, which in itself has been forced into a simple box-like structure with no basement in order to cut the cost of the general construction.

Now, that type of construction complicates the heating system. Where there used to be basements in schools where pipes could be suspended from the ceiling, - we don't have that any more. If trenches are put around the perimeter of a school the argument is that the trenches cost money. Therefore, the engineer today, in school heating design or any other design, has to find ways and means to put his heating system in and I don't believe there is enough planning, in some of the buildings that we have to put heating systems in, to make it easy to put the heating system in. In other words, what I am trying to say is that the engineer does not have much say in planning a school. He is a subcontractor or an employee of the architect who designs the school, not always but sometimes, more or less as a thing of beauty rather than function. And about the only place you can

find to run pipes probably is in the furred ceiling of the corridor because he doesn't put ceilings in the classrooms because they cost money.

Another thing, the modern trend in schools is to have these more and more expanses of plateglass in the windows which call for more heating. I think it's about five times as much heat to heat a pane of glass as it is to heat adjoining walls.

Another must in school construction which is sort of forced on the engineering profession is the fact that an exposed line or a pipe - whether it be a steam line or a plumbing line, or any exposed piping - is almost sacrilegious. They don't want it. You go to great length to conceal your piping which makes for very intricate piping systems where it really isn't necessary.

To combat that, more and more designs have been going into forced water, which doesn't depend on gradual pitches for return of the condensation flows, steam. In other words, water will run uphill and around doorways where steam won't so readily. And while there have been unit heaters and radiation developed to use this high temperature water - I say "high temperature" reservedly because it's higher than used to be used, in the range of 220° which brings it below the water code in New Jersey for high pressure. But the piping of the water- the water units primarily were designed to save money but it begins to be intricate again and requires more expert service by the personnel. And in my line of thinking, looking back over the years, the schools that seem to be giving us the best service with the least amount of maintenance are those that were heated by the

original type steam system.

And with the large glass expanses that you have nowadays in the classrooms, control gets to be more tricky than it used to be. In other words, a classroom will heat itself at 30° outside temperature if it has its full complement of pupils and the sun coming in this glass. Somewhere around 30° is the breaking point, depending on the construction of the walls.

CHAIRMAN HILLERY: Pardon me, Mr. Grady. We will note the arrival of Clifford W. Zimmer.

(Discussion off the record)

MR. GRADY: I think I left off somewhere around where I said that the large exposed surface in the classrooms calls for very precise control which must, of necessity, keep various classrooms at the same temperature with various conditions - that is, the direction of the sun.

Another factor which, let's say, causes probably higher heating costs on some jobs than others is the fact that the engineering setup in relation to the architect is such that engineering is not always awarded to an engineering firm because it is thought that engineering firm is the most capable to do the job or is one of the most capable. It is generally shopped around on price, and I believe my colleagues in the engineering business will bear me out on that. Therefore, if I accept a job from an architect or another engineering firm accepts a job from an architect on that basis - and it is no secret, we all do accept some - we quote on it or we get a percentage. It may not be what we think it should be worth but at least we got the job and we needed it.

Therefore, there is not enough money in the fund that we get paid for engineering that we can sit down and actually do an economic survey of it properly. That is, make two or three trial layouts to find out whether or not one method would be cheaper and better for that particular application. Especially in firms such as Oscar Vogelbach has, Runyon & Carey, and Mr. Zimmer - we don't do all the work ourselves, we have employees. So our general method is more or less to look at the job and tell by experience which would be the best way to lay it out. Then we start designing and work it out that way.

Another factor that influences that is the fact that in many cases, and I would say in the majority of cases, we don't tell anybody what would be the best heating system or electric system or plumbing system in the school. We are told, either by the architect who employs us or some member of the committee on the school board who had a pet idea, and it isn't within our realm to dispute them. You can't very well tell the man who is paying you - "What you're telling me isn't right. We don't want to do it that way. We want to do it our way." - because you don't influence people doing it that way.

And generally, and I believe I will be borne out on this, we don't have too much to do with the location of utilities, the central power plant, the point of entrance of electrical service, the location of the boiler room with relationship to its large loading of heat.

There are many schools built that have tremendous auditoriums, gymnasiums and classroom wings, and then they have a long classroom wing on the end and way down at the far end, where no one can see it, is the boiler room. Now, if that boiler

room were probably moved to the center of the school it wouldn't look as good but it would probably save many thousands of dollars in distribution lines.

Another factor that I think influences higher costs in the schools is the fact that I think engineers today are being forced into designing more and more intricate systems for boiler rooms and, let's say, controls. That's not only true in the heating, it's true in electric because the type of employee that handles school maintenance generally is some layman who has been in another line of endeavor until he reaches a certain age and is then hired by the school board because the pay is not too good. I can cite many instances where boiler rooms costing thousands of dollars are under the care of a man who has been a vaudeville actor all of his life or he's been a taxi driver or he has had some other kind of a job.

Therefore, the engineer is sort of forced into putting component units in there that are almost fool-proof and they get to a stage where they are not fool-proof, they get rather too intricate.

In the old days they used to fire coal and the more coal you put in the warmer the building got; but today it's different. We have oil firing and, especially in the larger schools where the heavier oils are used, the controls get quite intricate.

The same is true with operating the various components throughout the building. They are generally brought to a central control point so that the man doesn't have to walk around the building to turn off the various exhaust fans at five o'clock or four o'clock. He wants a time clock located in one central point that does it for him.

Well, all of that leads to controls, electric controls and automatic.

I would also say that the electrical costs are rising greatly. I lay that - of course, you know labor is getting more expensive. However, some of the installations in the larger schools and in our auditoriums, I believe, are all out of proportion to the use that they get. I've done it myself. I've been requested to by various members of the educational staff in a school or the board of education. Each educator has requests and he wants to build himself the best, naturally, and also have a little monument set up for his department.

The thing I have in mind mostly is some of our elaborate auditoriums. I've put auditoriums in public schools that would do justice to Broadway. And yet, I don't believe all the lighting and high-fidelity sound equipment is used more than two or three nights in the winter time and then generally by some organization that borrows the school to put on a stage production. The schools themselves have no need for that important equipment.

I don't think too much money can be spent on sound systems because I believe that's one of the best methods for mass communication that there is in the schools. I've seen schools with it and without it and I don't believe the sound systems can be stinted as economy.

When you get into the realm of plumbing - plumbing now runs about 7 to 8% of the total cost of the building. And there again I don't recommend some of the economies that are being used today in order to cut the costs of schools, such as plumbing fixtures and/or the valves that operate them. I'm talking about faucets and ordinary valves, because the difference between the

cost of an ordinary valve and the best valve is so small that it's inconsequential in the total.

Talking of percentages, your heating, I believe, now runs anywhere from 11 to 13%, and I've seen some higher figures. And electrical is following closely on its heels, in fact it's overtaking it in some schools.

But the whole theme of my talk, as you gentlemen probably have gathered, is that the engineer, as such, does not have enough voice in the design of the functional equipment. He puts it in as he is requested to put it in and he generally is clever enough to make it work, where in his own mind he knows that a boiler room shouldn't be on the end of a large school, or he knows that it should be a different system but someone has requested that it be put in that way. And he is also subject to a lot of whims of committees, really laymen committees in the schools, and yet they carry more weight in the designing of the school than the engineer does.

And there is another growing - I won't call it an evil but it is in a way, in connection with school designing and that is the fact that when you design a school today for a school board, through an architect, you must be 100% correct. You have no funds whereby you can get a contingency if you omit something. For instance, if I design a school and I design that school for say a half million dollars worth of mechanical and electrical work, and I sit up nights or use my experience to figure out ways to save that school board \$50,000 on that \$300,000 job - and in many instances I've done it - yet I can forget a plumbing

fixture in some janitor's closet or I can forget a valve somewhere where I should have had a valve, and when the contracts are let, - you know they are highly competitive -- therefore, when it comes time, the architect says, "Why haven't you got a plumbing fixture in that janitor's closet?" your only answer is, "I forgot it." So his answer to you is, "Well, put it in." So you do that, you put it in and you pay for it out of your own pocket. Therefore, the School Board has something that they didn't pay for, just because you forgot it. In other words, they capitalize on a mistake you made. And school boards are all that way. There are absolutely no contingencies. The buildings are generally designed right up to the hilt, and any mistake is paid for.

Now, if you're lucky, there might be some way you can trade with the contractor and get him to put it in at no cost to you; but if you do that, you must in some other way cheapen the quality of the material or the workmanship to obtain that \$100 or whatever that particular sink costs to install.

And I think one of the greatest evils - of course, it could be just as much an evil in the other way, it could be used to an advantage, I suppose, in the opposite direction, - the fact that the engineers cannot make a half of one percent mistake on a job where he probably has saved somebody \$50,000 by his ingenuity.

I guess I've started it off and I'll let the other boys continue on, either agree or disagree.

CHAIRMAN HILLERY: Would any of you gentlemen like to question Mr. Grady and get some further information?

MR. ZIMMER: Well, I made one note here, Bob. You mentioned that the architect often dictates or the owner dictates

what they want in a building. Had you mentioned codes before I got here? Of course, we're very highly limited by codes as to what has to be done.

MR. GRADY: No. I'm thinking more, Cliff, of the type of heating system or probably the type of equipment that goes in a building. I know we're limited by codes as to air changes and temperatures and things like that.

CHAIRMAN HILLERY: I have a question that hasn't to do actually with the building code or the construction cost. You mentioned several times the location of a boiler plant at the end of a long school wing. You said that if it were in the center of the building a great amount of money could be saved in the heating bill from then on. What percentage would you say could be saved?

MR. GRADY: I would say that it may result in at least a ten percent saving in the distribution lines. In other words, if you have a school that requires a boiler room in the center and you fan out like the spokes of a wheel with your distribution lines - we'll take an arbitrary size of three inches, say, or six inches would be the size of the lines - if that boiler room is located on the end of the school, combining them with pressure drop, that line is liable to be 12 inches which is an increase in pipe size and installation cost.

CHAIRMAN HILLERY: That was 10% saving in distribution.

MR. GRADY: In distribution.

CHAIRMAN HILLERY: What about the saving in fuel itself. Is there a savings there or not?

MR. GRADY: There would be less line losses. However, most line losses are absorbed in the school itself with heating,

if the lines are contained within the building.

MR. STEARNS: May I follow that up?

CHAIRMAN HILLERY: Yes, surely.

MR. STEARNS: Well, isn't it true that if a circulator has to function to send the water all the way up to the end of the building, it's period of functioning would be abbreviated if it were located in the center of the building? For example, in New Providence, a school that you did, where it has been my contention that the boiler room was in exactly the kind of position that you describe, it would seem that the circulator there would have to force the water to the extremities of the building for a longer period of time because the water has to travel a longer period of time to go and come back and that would mean a permanent built-in extra cost, wouldn't it?

MR. GRADY: Not only that but the extra costs come in the higher pressures required to force the water through the longer lengths. And the power cost, naturally, is proportionate to the higher pressure. The quantity is the same but the pressure is higher. I think that would influence it greater than the time of running of the pump because in most large schools the pump is running constantly until the temperature reaches about 65° outside.

MR. STEARNS: Well, when a pump has to run to force the water to travel 780 or a thousand feet, it would stop sooner and start later if it only had to travel 300 feet. That's what I'm talking about.

MR. GRADY: Well, technically, you're not quite correct there. The time element is not a factor. The factor is, as I explained it, that a higher pressure is required. It would require a little more running but that's not a big factor, I don't believe.

DR. MORRISON: I'm a little surprised, Mr. Chairman, that Mr. Grady states that it is a common practice of most architects, at least within his experience, to use the technical experience which the engineer brings to the job after the fact, after lay-out. Is that the common experience of the rest of these gentlemen?

MR. GRADY: That is not the rule but the exception is that the engineer is called in on the original design of the building. There are some very good architects in New Jersey who do call engineers in. I don't say they are all alike. But there are a great number of them who hand you a set of plans and say, "This is it."

DR. MORRISON: Now, do you think most of them do that?

MR. GRADY: In number, yes. In number of architects. I don't like to go into personalities and I won't, but there are certain firms of good architects in New Jersey who recognize the fact that they have to coordinate their work with an engineer. I am sure all these gentlemen here know who I mean. They're all working with them and so am I. There are some architects who do call you in for discussion before the building is laid out but they are in the minority.

DR. MORRISON: I see, and we will be hearing the testimony of the other gentlemen later on that point.

CHAIRMAN HILLERY: There was another question that I had about the auditoriums, the electrical costs. What do these involve.

MR. GRADY: They involve dimming panels that run into several thousand dollars extra; big long rows of border lights, lighting on the sides, intricate sound systems, stage pockets and all those fancy things that you use in a large production play

which probably have no bearing on education. It's more window dressing.

CHAIRMAN HILLERY: Well, are these recommendations those of an architect or are they requests made by members of the school board?

MR. GRADY: Well generally, on the larger schools, you have conferences with the architects and/or members of the school board and faculty, and generally those things are left more or less in the hands of the faculty or, let's say, through the principal. The librarian will want certain things and the dramatic teacher or those in charge of the auditorium will want certain things. And everybody seems to want the best for his or her department which naturally builds the cost up. Some of the kitchens that we put in some of the schools - generally the engineer doesn't specify kitchen equipment, the architect specifies kitchen equipment and the engineer has to make it work. In other words, he has to run electric lines and the steam lines and the water lines and the drain lines to all this equipment and some of it is pretty elaborate and would do justice to a high class restaurant. However, I'm not criticizing the fact that they're too elaborate, maybe they're needed.

CHAIRMAN HILLERY: You referred to the use of glass paneling. Is that a prevalent practice today, Doctor?

DR. MORRISON: Well, yes. A good many architects are designing these buildings with the curtain walls, a good deal of glass and a curtained wall. It saves money, doesn't it?

CHAIRMAN HILLERY: It does save money?

MR. GRADY: On original cost. The average school today has 75% of the classroom walls glassed.

CHAIRMAN HILLERY: Well, that's good for health and lighting too, isn't it?

MR. GRADY: Yes. But that, of necessity, boosts the cost of heating in relationship to the over-all general contract or construction contract.

DR. MORRISON: Mr. Grady, you are in favor of sound systems in buildings?

MR. GRADY: Very much so. I've seen sound systems omitted in buildings just to put in something else that I didn't think was as important as the sound system.

DR. MORRISON: And the installation of a couple of speakers in the auditorium wouldn't materially increase the cost, would it?

MR. GRADY: No. It's a necessity in an auditorium and I believe it's a necessity in a large school sprawled out over many fields, because the sound systems used today are the same wires they use for private telephone communications by the principal to the various teachers and it is also used for signaling classrooms and there is a savings there if the sound system is put in.

DR. MORRISON: Then your suggestion on the auditorium with regard to special equipment would bear relation mainly to the installation of, let's say, a few ceiling spots, say a half dozen, and your scenery lighting and footlighting, etc.

MR. GRADY: Something simplified, rather than elaborate.

DR. MORRISON: Of course, we find that mainly in our high schools or senior high school buildings as opposed to our elementary building cost.

MR. GRADY: In most cases. However, I've done work on elementary buildings where they have had some fairly tricky stages just in the assembly rooms or cafeterias. They have a dual purpose room.

DR. MORRISON: I would like to say, Mr. Chairman, that it has been our experience in our senior high school auditoriums-- you spoke of the infrequency of the use of this equipment - it is used in connection with a good deal of our school work, public speaking, dramatization and English, and so on, so that the facilities are in use several times a week. And in addition, in our particular district, our buildings function almost continuously for the general public in one manner or another. And I would be interested in knowing, Mr. Grady, how much would be saved if we were to go to the bare minimum on this type of installation as against what you think is slightly elaborate.

MR. GRADY: Oh, I would say that it would range anywhere from two to ten thousand dollars.

DR. MORRISON: A modern panel board would cost what? about \$2,000?

MR. GRADY: At least. The one I put in in Newark cost between four and five thousand.

DR. MORRISON: Have you found in the newer school design the elimination of balconies?

MR. GRADY: The last school I did had a balcony.

DR. MORRISON: If you eliminated the balcony would that effect a saving?

MR. GRADY: That would reflect an architectural saving. What I have been discussing, and my colleagues here might not

agree with me, and maybe you won't, but at least I am giving my views.

DR. MORRISON: I'm just trying to get information. I'm not technical in this field of engineering.

CHAIRMAN HILLERY: The only school that I have heard criticism on was the Hanover School where the auditorium had gradations of lighting, colored lighting and things, and they were told they'd be used for appreciation of music, I believe, the tones of the orchestra or something of that nature. That was the criticism I heard. Are you gentlemen familiar with that school in Hanover? It was written up in the papers at one time.

MR. GRADY: I'm not familiar with it.

MR. VOGELBACK: I am, Senator.

CHAIRMAN: What was the system? Are you familiar with the system?

MR. VOGELBACK: I'm not in lighting, colored lighting.

CHAIRMAN HILLERY: Are you?

MR. RUNYON: No, I'm not.

MR. STEARNS: Would you say, based on your experience, it would be wise to advise all boards of education to contemplate having a heating room that was lower than the general grade of the rest of the school? In that connection I might say that my own reaction to reading the School Guide would be one of suggesting to the boards of education that it would be better or more expedient to have single story buildings. On the other hand, from my own experience most of these boards of education take this book fairly literally, do you think the incorporation

of a statement urging them to use sunken boiler rooms might in anyway mechanically improve the system?

MR. GRADY: Well, since the classroom is not as high as it used to be - I believe it's reduced now to  $10\frac{1}{2}$ ' average or 9'6" now, it is practically impossible to put proper heating equipment in that height. So you only have two things to do, either build the superstructure higher over the boiler room or drop it into the ground, and dropping it into the ground seems to be the more economical method and also the more practical from the standpoint of heating return, especially if it's done with steam.

MR. STEARNS: So you would recommend that?

MR. GRADY: Yes.

MR. ZIMMER: On the New Providence High School, I might remark that the property dictated to the design. The water table was only about three feet below the surface.

MR. STEARNS: But not the location of the boiler room.

MR. ZIMMER: Well, the location was not perfect. But there the boiler room had to be on grade and we had to use a forced hot water system because we couldn't have pipe tunnels because of the static water level.

MR. VOGELBACH: Mr. Chariman, in connection with that, I don't see what difference it would make whether the boiler room was sunk or whether they built it above grade because you are dealing with hot water today in most of the schools. There are, as Mr. Zimmer points out, conditions where you have to put it on grade or above grade.

MR. STEARNS: Well, I had two pointed feelings in that particular case. One is, the building was shaped like a

swastika; the boiler room was at one end of the swastika and it had to travel all around the arms, if you can visualize that from that explanation. It has always been my feeling that the boiler room should have been more properly located at the junction where the arms of the swastika crossed, in that particular respect. The other thing was that I studied the grade there and a lot of dirt has been moved around and taken out. It's a matter of conjecture as to what could have been done. But certainly from the original plans it looked that way.

MR. RUNYON: Mr. Chairman, this whole subject of the boiler room is something of a diversion from the main line of thought here.--

THE CHAIRMAN: Yes.

MR. RUNYON: -- but I would like to make one point in connection with the location of boiler rooms. It is always very, very dangerous to put a boiler room below grade. For example, Millburn had a boiler room below grade in one school and the boiler burned up because the control failed. Scotch Plains had the same experience. You see, mechanical controls, electric controls are not always perfect. If they're perfect when they leave the factory, there may be some little piece of foreign matter there and with a hot water heating system you can put the boiler room on the roof, if you care to. Since there is a great deal of danger in putting a boiler room below grade and since it costs more to put it below grade, to dig the whole and to dig the rock, there is really very little excuse to put a boiler room below grade today and a very dangerous thing to do.

MR. STEARNS: Would you say then that if this were to say that it is expedient that it be at a lower grade

than the rest of the building it would take care of it? I have in mind several schools where there is adequate drainage from the boiler room and the possibility of a flood or an accumulation of water is nebulous because of the proximity of a much lower grade --

MR. RUNYON: Don't you really mean this: that the site conditions are such that the boiler room would be lower than the school but still be above grade?

MR. STEARNS: Yes.

MR. RUNYON: That's perfectly all right. I'm referring to a boiler room dug out of the bowels of the earth.

MR. GRADY: That wasn't my thought, Malcolm. I was visualizing, I think as this gentleman did, a boiler room depressed probably four or five feet below the grade of the school rather than a boiler room underneath. I am talking about depressed boiler rooms.

MR. RUNYON: I'm referring to any boiler room that is below the exterior grade of the school at that particular point where the boiler room is located.

MR. STEARNS: Well you see, in the school that I am familiar with, that I had in mind when talking to you, they raised the grade of the plateau on which the school was going to be built and by so doing I felt that almost a split level could have been effected in the boiler room. It would have taken it out of the natural grade and still have flow to the South Brook because right now the drainage from the original grade still goes to South Brook.

CHAIRMAN HILLERY: Mr. Runyon, would you like to be the next gentleman to speak on this?

MR. RUNYON: I have no questions to ask of Mr. Grady but find myself, I regret, in disagreement with about 90% of everything he said.

I think that we should define our position here. What is the basis for the cost of school buildings? I believe this Commission is concerned with that basic principle. Now, is the basis the increased cost of school buildings over other buildings, or is the basis the increased cost of school buildings over school buildings when? 10 years ago? What are we talking about as our yardstick as a starting point? Has that been defined by anybody?

CHAIRMAN HILLERY: No, I don't believe it has. The work of the Commission has been investigating the cost of schools paid directly by the taxpayers in the State of New Jersey who are being burdened by the cost of these schools. They think they have been costing too much and this is where most of this originated.

Isn't that true, Hugh?

MR. STEARNS: Yes, sir, with one addition and that is, does the School House Guide - because ours is a revision of this School House Guide - contain controls or criteria that contribute to increased costs, and what suggestions would you have for modifying them?

CHAIRMAN HILLERY: I can give you an example of something that's happening today in a community adjacent to the one in which I live - Mountain Lakes, New Jersey. They have been building several schools there and they are completing a new school there now for a million and a half dollars. The tax rate is fifteen dollars and seventy-some cents. When those

things happen there will be a turnover in that community - it has already started - and I was a little bit startled the other night to read in the paper that some of the people in the community who would like to remain there, they're old-timers in the community, have made an appeal in the newspapers for the industries in the area to come in and help them pay to finish that school. They have also asked some of the nurserymen around there if they won't please give some trees and come in and grade the grounds for them.

Now, to me, those things are unheard of in a community the type of Mountain Lakes and yet those things are happening.

That may answer the question that you have asked.

MR. RUNYON: I think that gives as a basis the over-all picture rather than one particular phase. However, there is no one particular cause that is solely responsible for the increase in the cost of school buildings.

One of the phenomena that we engineers have had with us in the last seven or eight years, very particularly, is the popularity of the single-story school over the multiple-story school.

Now, of course, we can go on and talk about different departments of a school and get lost in a forest of trivialities, but I think we want to avert that. However, visualize, if you will, a single-story school of the same size - meaning in square feet - as a two-story school. Obviously, the single-story school has twice the roof area, flat area, drainage area, so your leaders must be much bigger. Obviously, your steam lines, or whatever lines you use for heating, must go to farther extremes;

and similarly your electrical lines because they have loss of pressure, electrical pressure.

Now, the architects will tell you, and I believe they are absolutely right, that the single-story school is cheaper, all factors considered, than the multiple-story school. If that were not so, they would not be building so many single-story schools. But we engineers here are testifying only - or should testify only in our own field, engineering.

Before the single-story school became popular, the multiple-story school resulted in the total cost of the mechanical trades - and by that we mean the plumbing, the heating-ventilating, and electrical - of between 20 and 25% of the total cost of the building. That's what the sum of your three mechanical trades cost.

With the advent of the single-story school the mechanical trades now go 30 to 35% of the total cost. But still the over-all school may, and probably does, cost less than the multiple-story school.

I'm speaking now from experience with quite a few schools. We have engineered some hundreds of them in New Jersey.

There are other causes for the school mechanically, electrically and plumbing-wise costing more. As Mr. Grady correctly said, the position of the utilities is important - the position of the boiler room, the position of your lines going out, the position of your electric lines coming in. However, the center of the building is not necessarily the position where the boiler room should be or the electrical service or anything else. It's the center of gravity of the load. What is the center of the mass of steam distribution

which is desirable? And we find in our experience, engineering for four out of the five largest architects in the State concerned with school construction, that they are so concerned with the cost of building and trying their hardest to keep the cost down that they are very eager to hear our opinions or suggestions as to where everything should be and they cooperate and try their best to put these things where they belong, economically, if it's at all possible.

That has been my experience. Also with four or five other architects who, while they're not the largest in the State, are just as sincere in their efforts.

Now, there's another angle. In 1953 the National Electrical Code was changed. It was changed very materially. Up to 1953 you could, if you so desired, put in electrical feeders for 55% of the load. In other words, a diversity factor was anticipated - all electrical items were not going to be on at one time. Since 1953, excepting only electric ranges in schools, you must design for 100% - for everything that's connected to it.

CHAIRMAN HILLERY: For the full load.

MR. RUNYON: The full load. Now that is a very major contribution to the cost of electrical work. And that is one of the reasons why the electrical work, formerly being 9, 10 or 11%, is now running 12 to 14 and sometimes 15% of the total cost. It's just one of those factors.

Of course, we all know that the cost of labor has gone up, and materials, but that's common to all buildings. It isn't peculiar to schools in any way.

Now, there's another factor. In some cities in this State we have very onerous local codes which take jurisdiction and apply - their plumbing codes, their electrical codes; and, gentlemen, in our considered opinion, and speaking for our firm, all of these codes are simple make-work propositions. That's what they have been in the past. They're unjustified.

For example, - I'll use names - Elizabeth has an electrical code that goes far beyond the requirements of the National Board of Fire Underwriters, in many respects, and this adds to the cost and you must adhere to it.

Some of the codes are very contradictory. If you engineer in Newark, for example, your plumbing must be of a certain type of piping system and it's the most expensive form there is.

If you go down to Margate City or Atlantic City it's against the law to do that and you must do just the opposite, which happens to be the cheaper way too; and the cheaper way is just as good in all respects, and it produces the same results, in fact it is the way recommended in the National and State Plumbing Codes.

Those are some of the factors that add to school costs unnecessarily.

Now, one of the biggest reasons for the cost of the school is the educational program - and I'm not criticizing the program one bit. When I went to school, which was Columbia High School, South Orange, - that, of course, was the old Columbia High School, not the new one, - the only tools we had in the shop, of the power variety, were the "Armstrong" tools. There were

absolutely no power tools. We were living in a different era. When my sister took cooking they had a single gas range in the middle of the room. And if you go into any school building today, you'll find the same things in all, - if you go into a typing room, you have a modern typing room and it's laid out for electrical typewriters, not wholly but largely. Why? Because the girls are going to use electric typewriters when they get out and you can't go from one machine to the other. I type myself, I know.

Go into any room that's a functional room and you will find that the school must be built around a contemporary program, otherwise it wouldn't be serving today's needs.

I think that even applies to the auditoriums. As for footlights, those are considered obsolete in most forms today, but we find that our auditoriums are used almost every day. Sometimes they are used for study halls; sometimes they're used for little dramatic groups; and while I believe, Mr. Grady, that every school in town shouldn't have a great big Broadway production auditorium, I do believe that every town should have at least one school with a modern auditorium.

There are ways of engineering stage lighting where you can save as much as 50% of the total cost if one knows how to do it.

We do not find any architects building monuments today. We don't find any educators deliberately building monuments either. It's natural for each person in each department of the school to want his particular department to be the best, and they cost more money when they are. For example, in a cooking room,

if they put in six or eight electrical ranges and six or eight gas ranges, the electrical range costs more - not because the range costs more but the electricity you have to build up - the feeders are tremendous in size. But if you talk it over with the educators, if you talk it over with the superintendents and explain these things, they will usually say, "Well, what would you suggest?" Well, we'd suggest two or three electric ranges and we would suggest four, five, six or seven gas ranges. And they are just as much interested in economy as we are; and as a rule that's the way things go, according to our experience.

Now, as to shopping around for jobs, we don't have that experience at all. We do about half of the jobs that are offered to us, from one-third to half, and we have a set fee. If a person doesn't want to pay that set fee, well, we're very sorry. Maybe some day he will want to pay that fee and he'll feel we are worth it. So we are not shopped down. We get enough money to do what we consider is a good job, and once in a while we make mistakes. We leave out plumbing fixtures, as Mr. Grady said. Sometimes we forget a light here or a receptacle there. We put it in and we pay for it ourselves and we say nothing about it. We're getting enough fee to do those things. We try to make them right. None of us are perfect. But as Mr. Grady also said, no extras are permitted by school boards today, generally speaking, and that is true.

I think that problem itself is not one you're concerned with here. You're concerned with school costs. And whatever our individual problems are, those are our problems and we'll have to solve them.

So, I would suggest, in connection with school building, there aren't too many things that you can do, if you wish to maintain contemporary education, in the way of lowering the cost.

If you want to go back to the horse-and-buggy days - yes. We can put a single gas range in; we can cut out all power tools; we can build schools as they were built 30 years ago. But we aren't going to do that today. The public doesn't want those kind of schools.

On the other hand, I do think we can do this - and I think wherever it's possible, by legislative action or otherwise, these local codes should be banned. They should be prevented from being operative so that a school is not unnecessarily penalized by having to adhere to standards that are totally unnecessary.

That is just summing up our position.

CHAIRMAN HILLERY: How much percentage of the cost of the school do you attribute to these bad local codes that you are talking about?

MR. RUNYON: Your plumbing work would normally go to 7 or 8 per cent. It might go as high as 9 to 10 per cent of the total cost of the job just in the piping systems by changing of the code. In the electrical work, you might also add a similar amount; in other words, 2 or 3 per cent of the whole cost of the school, by adhering to a code that is absolutely unnecessary.

MR. MORRISON: Actually, Mr. Chairman, and Oscar will bear me out on this, our Guide stipulates that we are free from the application of local codes. Mr. Runyon knows very well - and Mr. John Black of Elizabeth is on our Committee, isn't he, Oscar - that actually, if you don't conform, you can get into trouble. Isn't that right, Oscar?

MR. VOGELBACH: Yes, that's true.

MR. MORRISON: You almost have to. It is specified right in there, Senator, that we shall be free from -- I have forgotten how it is worded.

MR. RUNYON: But that doesn't mean much. The way they get you is this: The plumbing inspector knows that he cannot in the final analysis have jurisdiction because the State Code takes precedent. So you can tell him to get off the premises and don't even come around the place, but he is always a member of the Board of Health. So the Board of Health condemns the work, and you are caught in the backwash of that. Sometimes the Plumbing Inspector will be a man of considerable influence. In a South Jersey school a plumbing inspector told me that if we didn't adhere to his code, he would defeat the school. And

he did. He went out and led a campaign and he defeated the school, prevented it from going ahead. So we learned a lesson there. We learned the hard way.

MR. DISTASIO: What is the reason these codes are detrimental? Labor?

MR. RUNYON: No.

MR. Di STASIO: You made a remark that struck me, that there are many codes that have labor--

MR. RUNYON: That's the origin of the code, Joe. I believe these codes were passed, many of them, in times of depression to make work for people who were out of work.

MR. Di STASIO: So isn't it a fact that what you are talking about really comes right back to labor again and labor unions?

MR. RUNYON: I don't want to condemn the unions for it. I condemn the politicians for it, in that town.

MR. Di STASIO: Well, whoever we condemn, this has been a question in my mind here, and you come back and attack the problem from a different angle. You said the plumbing is high because they have a lot of codes to make labor.

MR. RUNYON: To make work.

MR. DI STASIO: Now, let's call a spade a spade. That's what you said.

MR. RUNYON: To make work. When the need has gone by, when everybody is working now, or were until very shortly ago, the code remains.

MR. DI STASIO: Well, now, we have a member of this Commission who is a representative of Labor, and he is going to be against it.

MR. RUNYON: I don't know so. I doubt if he would be against it. I can't speak for him though.

MR. RONFELDT: Well, Malcolm, how would you suggest that the Commission attack the problem? In other words, you would have to pick up the codes of each community.

MR. RUNYON: Not all communities have them - very few.

MR. RONFELDT: Well, the communities that do have them. We would have to review them, and we could either take the State of New Jersey Code or the State of New York Code, which has been used in many cases, and set up a standard. That would be the standard code for the State of New Jersey and, if it was recognized by the State of New Jersey, each community should recognize the same code and not add to that code unnecessary items. Now, that's quite a job. You could pinpoint certain communities and the only way you could do that would be to have some people question the code and bring it to the Commission's attention. Correct?

MR. RUNYON: Yes, although wouldn't the wholesale remedy be the approach that this guide here would take precedent over any and all local codes and in some legal way make it stick?

MR. RONFELDT: Well, we are also getting around, I think, to the same question which one of these gentlemen from Brick Township mentioned; I think he was the Plumbing Inspector of Brick Township, and he was giving some engineer some trouble down there because the plumbing wasn't being put in in accordance with the way it should be. Actually, I don't believe that in many of these communities they have a plumbing inspector capable of going in and making a survey of a job or inspecting it. Usually they are house contractors or something like that, and when there is a competent engineer employed by the architect he makes the inspection. I don't think there should be allowed on that job a local electrical inspector or a local plumbing inspector - on these public works. It is the duty of the

architect and the engineer to build those buildings in accordance with the best standards that they know and to see that they are turned over to the clients as the client's specifications read.

Maybe that's the easiest way out of this. We also have in our specifications - the architects have it in their specifications and, I believe, the engineers, that the work should be done according to the standards of the local code. We could strike that out of the specifications. Follow me? In our specifications, to safeguard everybody, we even bring in the local code, and we ought to just strike out the local thing and keep it on the standard of the state level.

CHAIRMAN HILLERY: Mr. Runyon, there has been a bill in the Legislature for about three years as I recall, where the electrical contractors are trying to have a state setup to license contractors from the state level, and we have gotten a lot of opposition to it from our small electrical people and in my own county. The reason given for that by the people who were lobbying for that in Trenton was that they could never get in the City of Elizabeth, and I know that some of the big contractors called me and they are very anxious to have these small electrical men classified out of a state screening so that they could work their way into that city. Is that part of the problem that you are talking about?

MR. RUNYON: We haven't had very much with electrical. Certain towns do require an electrical license - Highland Park, for example. But the minute they put in a local requirement of that nature requiring that men be licensed in that town, you automatically increase the cost of the work and gain nothing. It is an added factor, entirely unnecessary.

MR. STEARNS: Under the Department of Conservation and Economic Development, there has been published the electrical code and the plumbing code of the State, and there has been published a one and two-family house code, and so on. Does the requirement of the State Board of Education, as well as the local boards of education, require that their buildings be in strict compliance with the state code as published on plumbing?

MR. RUNYON: The Guide requires the State Code as a basis, or gives it as a basis. I am speaking of the plumbing now; I haven't seen the electrical.

MR. STEARNS: Wouldn't it be adequate then to follow along Mr. Ronfeldt's idea that he suggested that the only requirement be that of the State Code and that that code be adopted by every municipality, on the basis that that would be compatible with everyone's needs? I think that would be highly desirable.

MR. GRADY: I agree with Mr. Runyon wholeheartedly that codes are causing higher prices in some localities with both electrical and plumbing, and it may be in some instances, as he mentioned, that it might be to provide work. However, outside of one or two cities where it may be the case, I believe in a lot of the smaller municipalities it has been more through the ignorance of the man who drew up the plumbing code; that it has been generally drawn up by a man who had a little local standing in the town, and now that the Federal Government and the State Government have a standard code which is far better and easier to work with than some of these little local codes, that would be a good step forward if the school could be built according to the State Code rather than the local code.

We all know that the City of Elizabeth is tough on electrical

work. I have done work in Elizabeth and I've done work in Newark, which I believe is just about as bad. I have known of cases in Newark where an out-of-town contractor didn't get the same consideration that an in-town contractor got as to what he could do and what he couldn't do. That is not only true in Newark but is true in some other places. And the Underwriter's Code is plenty strict when it comes to schools because, as Mr. Runyon pointed out, it is a hundred per cent of the load, and some of the feeders in some of our schools are fantastic. However, I am not going to argue with the Underwriter's Code as to its not being correct.

DR. MORRISON: Do you have the State Guide right there? It might be interesting to the Commission to hear the wording and what is stated there as to plumbing. Possibly you can find it.

Mr. Chairman, while Oscar is looking that up, I am interested in what Mr. Runyon has to say as to the rising cost. What is our yardstick of comparison? I don't have the figures here but perhaps some of you gentlemen have run across them. I think there have been some statistics published to the effect that school buildings, for instance, are the least costly of all of our public buildings. Does anybody have any thoughts on that?

MR. RONFELDT: Excuse me, but this is just something else along the line of getting away from local government and putting anyone under the jurisdiction of the local government. In our specifications we also state that the contractor shall pay for all permits. Now, I don't think the contractor should have to pay for any construction permits as to school buildings, and it might be well at this time, in thinking in terms of getting away from this local thing, to relieve the contractor from having to purchase a building permit. Many times they stick him.

When a contractor really knows his way around, he won't pay a fee because it is not necessary that he do so. I think in the specifications we ought to eliminate anything of that kind, so far as the local government is concerned, and always stay at the state level.

CHAIRMAN HILLERY: What do these fees cost?

MR. RONFELDT: Well, it varies in the various communities.

CHAIRMAN HILLERY: What is the maximum and minimum? I am just trying to get an idea.

MR. RONFELDT: It may get up into a couple of thousand dollars. Actually it is the community's money that is going into the project, so why try to take it out of somebody? The community is the only one that should pay that two thousand dollar fee. So why not strike it right out?

CHAIRMAN HILLERY: I don't want to be critical. My impression may not be the same as that of some of the other members, and if so, I would like to be corrected, but I got the impression that you don't feel there can be much saving in the present school setups in the State. Is that true? I mean, I got it from your thinking here this morning, Mr. Runyon, that you don't think that you can make much of a saving in school building costs in the State.

MR. RUNYON: I don't believe there can be a very great saving in school building costs over the way schools are built today by leading architects if they are going to sustain the contemporary educational program. I sincerely believe that. We see roof construction that wouldn't have been thought of years ago. For example, when I went to school, as Mr. Grady said, we had attics over the school, we had basements. Then

the attic went, the basement went; then we built tunnels around the building for our pipes. Those have gone today. Now we have nothing to run our pipes in but a furred ceiling, but the furred ceiling piping is the most economical way of doing it, and sometimes necessity has brought forth economy. Very many of these things that we have to do for and with architects are challenges which, when met, do result in over-all economy. I would say that almost all result in economy. We have shaved the thing right down now to the last point that is consistent with a decent program.

CHAIRMAN HILLERY: Have you ever built any private schools?

MR. RUNYON: Yes, we have.

CHAIRMAN HILLERY: How much difference is there? There has been a great deal of argument over the difference in building private schools and public schools in the State, and that is where some of this criticism came from in reference to this study that we are making. Is there a great difference in the cost of private schools and public schools today?

MR. RUNYON: I wouldn't like to speak from the religious private school angle, but I can speak from one other particular experience at Pingry School in Elizabeth. Pingry School is a very good boys' school. When Architect Elasser did that particular job originally, which was about six years ago, I think, the argument arose as to which would be the best way of bidding it - to have five separate contracts or one contract. Architect Elasser insisted that five separate contracts would result in a lower price. The Board didn't agree, so they bid it both ways and the five separate contracts came in cheaper. The net cost of the building compared practically the same as the public school buildings Mr. Elasser had been doing. Later on when he

made the addition to Pingry, which was a year and a half ago, he did the same thing - bid it both ways if I recall rightly, and I think I do - and the result was the same. The five separate contracts were cheaper than a single contract. That's the way it went and, again, the costs per cubic foot were just about the same as the school that he was doing elsewhere in the State in public school work.

I can't speak for the parochial schools because we have done very few of them.

CHAIRMAN HILLERY: Well, that is chiefly where the comparison is being drawn around the State as I hear it, between the cost of parochial schools and the public schools.

MR. GRADY: Mr. Chairman, I've done both public and parochial schools. The parochial school as such does not have the high standards of heating, fresh air, or lighting that the public schools of New Jersey do. There are specific instances where some of them do, but as a rule - and I have done work for several prominent architects in that field - the fresh air is sort of glossed over, the lighting is as someone wishes it who probably is money conscious in the church that is building the school, and they are not up to public school standards. That's why they are cheaper.

CHAIRMAN HILLERY: Are there any other questions?

MR. STEARNS: That brings us back to the point of recommendation again. Mr. Grady says the parochial schools are cheaper and are not up to the standards of the public schools.

CHAIRMAN HILLERY: I think he refers to that U.S. construction standard.

MR. STEARNS: That's right.

MR. GRADY: I'm speaking strictly of the standards of the trades we are familiar with. I am not talking about the other trades. The heating in the parochial school doesn't cost as much as in the public school because there is nothing but thin radiation on the wall to heat the room. If they want fresh air, they open the window. We have elaborate control systems which cost per room in a school almost as much, and sometimes more, than a unit heater itself.

MR. RONFELDT: I would like to ask a question on that: What is the experience of these engineers regarding these unit heaters? Do they feel that they are absolutely necessary in the classroom? And over a period of five to seven years in the schools, are these unit heaters in general still operating?

MR. RUNYON: Do you want me to take that?

MR. RONFELDT: Would you mind?

MR. RUNYON: I'd be glad to. There are various means of heating and ventilating a school. Actually, your heating of a school costs you practically nothing, in any school. In your ventilating of a school in compliance with the State Code - and the State Code is a very reasonable code - you are bringing in a certain amount of warm, fresh air, and most of the time that warm, fresh air which gives you the ventilation that is required by law heats the building. Now, you can bring it in either by a unit ventilator, which is a separate device in each room, or you can put in a central system whereby you squirt the air from a given duct all the way around. Now, our office has done a great many of each kind. We did Trenton Central High School when it was built in 1926, which was the largest high school in the world, and that was central ventilation. We have

regretted it and will regret it to our dying day. Orange High School is another one.

The reason that you cannot successfully ventilate and heat a school from a central system is this: The windows are openable by the teachers, and that is the only reason. Air tries to follow the path of least resistance. If you had a duct bringing air into this room and one of the windows were open, that air would tend to rush out that window. If you had this duct coming along the corridor and feeding a series of rooms and one window was open, that particular classroom would hog the ventilation and the air would rush right out there. And that's what happens.

Several architects in this State have tried central systems, and I know where several of them lost the addition to the school because they were so troublesome - where the unit ventilator custom-tailors it to each individual room.

Now there is another thought comes to me. I don't know what the future of education is going to be in New Jersey in relation to all-year-round schools. They are talking about it. But if the all-year-around school comes, the unit ventilator uses today, most of them, hot water. Now it's just as easy to pump chilled water through there, add a few more controls and an intake to condensate and, with the same unit, you could heat the room in winter and cool it in summer, if you are going to all-year-round controls. So with the unit ventilator, our experience is yes, they are used indefinitely, they are used all the time and they have to be because there is no other means of heating the room except a unit ventilator. We don't put in supplementary radiation unless the room is very, very long, and that's only one room in ten schools.

Does that answer it, Mr. Ronfeldt?

MR. RONFELDT: Well, Malcolm, I've had experience, and it's probably purely a maintenance problem. We did several jobs maybe ten years ago, and we've gone around to these schools and we've walked into a room where the ventilator wasn't operating.

MR. RUNYON: But there were radiators there.

MR. RONFELDT: We had supplementary radiation in there, but the unit ventilator wasn't operating. We would go over to the janitor and say, "Why isn't this going?" and he would say, "Well, it started to screech and the teacher asked us to turn the thing off," and that was the end of that unit ventilator. That happened five years previous. Now, that happens quite often and I think you gentlemen have seen it in some of your schools, too. There are a couple of little places where you oil the motor, and so on, and you have to do it periodically. But they are not taken care of in the schools. So eventually they are not being used. I know of a couple of high school jobs where that has happened. It's an expensive proposition and it costs eight or nine hundred dollars a room to put in a unit ventilator and, if the administration isn't going to take care of it, that is expensive.

This opening of the windows goes back to the horse and buggy days. It's just a maintenance problem and I feel that these schools today, instead of getting simpler to operate and control, are getting to be more complicated and are requiring more engineers in the custodial force to operate them, and these various little school districts cannot afford or don't seem to have the personnel in the community, or it's a political job, and they just put somebody in there and they just think these things are going to operate by themselves. And they just don't. We are putting in fans and everything else and we find out, when we go into the schools, that they are not operating.

So I wonder whether we are not overloading these schools. As much as we want to bring the standards of these schools up to the type of living today, the boards of education, on the other hand, could defeat us by not putting in the proper staff. Therefore, that school gets to be an expensive proposition. The people pay for all this machinery and then it's not operating.

So should we think in terms of finding foolproof equipment? If we could only find foolproof motors and foolproof this and that.

DR. MORRISON: Then you would have to guarantee that every teacher will open the window--

MR. RONFELDT: So, therefore, are we putting too much of this in and not having proper maintenance? We could buy a Rolls Royce but if we don't take care of it-- I have walked through classroom after classroom in the schools and the ventilator is not operating; the roof fan is not operating.

DR. MORRISON: But there is no reason why they can't. And these engineers will agree with me when I say that our buildings have outgrown our janitorial and maintenance staffs. We need a higher type of Head Janitor, one of the sanitary engineer type. You can't blame the system because the fellow who operates it is not on the job.

MR. RUNYON: I was talking to Dr. Lynn the other day. Dr. Lynn is at the Teachers College of Columbia University and is a specialist in education and its relation to buildings. He has devoted many years to it, and he told me that Columbia University is now recognizing that problem and they are training and have a course for janitors - people who are just scarcely literate, maybe, some of them - to teach them how to

operate contemporary heating, ventilating, plumbing, and electrical systems. In other words, here is a college that recognizes this problem and is going to do something about it.

Now, maybe Rutgers would do the same thing, or the Newark College of Engineering. As Mr. Ronfeldt says, we need that type talent.

MR. RONFELDT: Well, is there anything, again from the state level or from the educational level, where we could say to these boards of education that this service or this schooling is available and that it would be worth while to send a janitor in the summertime for a four-week course, or something like that, to learn how to operate all these new devices. Get Herman Nelson and get these various fan people to show them what has to be done and bring it down to three-syllable words so that they can generally understand, and give them charts of their type of mechanism. But it's foolish to give people a good, sensible building and then just have that money thrown out the window.

DR. MORRISON: There are a number of factors involved here, Senator. It is my opinion that many boards of education don't have enough money to properly run the maintenance department of their buildings. There is one area where you can effect economy. Seventy or seventy-five per cent of your money is tied up in lavatory items, and there aren't too many items where you can cut your budget. You can cut maintenance and repair; you can let your roof go another year, and you can stagger along with the boiler, and that's one reason.

As a matter of fact, Henry Lynn, whom you referred to, was one of our consultants, if you remember, Oscar, on the construction



of this Guide in Schoolhouse Planning. He was a very close associate of this chap across the street who we had in here in November, Cleve Westby of the State Department - who is one of the best in the country and who now is writing a book in conjunction with this Henry Lynn on this whole subject of school buildings and maintenance.

We have that same thing all over. I had the hardest time getting our janitors to eliminate the use of these pine oils. They want to go around and spray a lavatory, whereas the only thing to do there is to get down with a little hot water and soap. That's the answer - not lay a sweet smell over it.

MR. RONFELDT: I believe that in some of these communities way up in the country, they are never going to get that janitorial staff, and the state standard is so high, as far as the ventilation and so on, that we are forcing a little community way up there with this good equipment, to put this good equipment in, and nobody knows how to operate it. Actually, they would prefer the policy of exhaling and inhaling. It's a very tough situation, but we are cost conscious here in a way. We are cost conscious in one way, and a lot of them have old buildings and we are putting on half a dozen rooms, or putting on two rooms. Now, the first thing, you've got to have this number of air changes in the room and it has to be mechanical. Would you gentlemen feel that in some cases you would and in some cases you wouldn't? I know it's hard to deviate and you try to set a line.

MR. GRADY: Mr. Chairman, in answer to this gentleman here, I think the unit heater, as such, as we've known it since the war, has been so vitally improved that from my personal experience with them there is very low-cost maintenance. When we ran cost studies on central heating systems versus unit ventilators,

using various types of heat - thin radiation on the wall with central air systems, and they present problems, as Mr. Runyon pointed out, and the cost we find doesn't vary too much. Not being a medical man, I won't comment too much on the fresh air, but I don't think the fresh air in the unit heater presents too big a problem. I have two or three schools that have been under surveillance for about 10 years, and I have been making a little private investigation on unit heaters of the various manufacturers and, in fairness to all of them, I think they all work pretty fine, because there's nothing in there to go wrong hardly today outside of the motor which supports the rotors; there is nothing but one motor in there and a school with half a dozen or fifty of those units in there requires probably only \$100 worth of replacement parts.

I think that your maintenance and operating trouble on a central system will probably outweigh the maintenance and operation on the unit heater. That's been my experience with it.

MR. RONFELDT: Well, it gets around to who's going to maintain this equipment.

MR. VAN ZANT: Mr. Ronfeldt, are you referring to the suburban area or in the cities?

MR. RONFELDT: I am just taking the over-all picture. I would say that in the cities, in Newark and probably in Elizabeth and some of those areas, they would certainly have to have engineers or people of that nature to operate their plants, because they are so large, and they have maintenance staffs that are fully qualified. I think we are interested in not only those areas but we are interested in five hundred and some other school districts throughout the State of

New Jersey. I don't know how many referendums have been turned down in Newark but I know that there have been a lot of referendums turned down in the different communities and those are the people who seem to get the full blast of these economic changes that we are going through.

That's what I'm talking about. It's the little John Doe and the little John Smith who is pulled off the farm and he has to clean up the school and he does this and does that, and here we are giving him as nice a plant but we are trying to set it up to the standards of today, not 1900 when they built the school. But he's not interested in taking care of these little items and, therefore, we're giving him a plant that he won't take care of and then we find out that he has machinery that's broken down.

MR. VAN SANT: Well I know in the larger cities most schools have maintenance men there who are well qualified to take care of that.

MR. RONFELDT: I don't think there's any question about that.

DR. MORRISON: I think the remedy is simple. You can't take a classroom with 30 or 35 youngsters in it and a 9½' ceiling, maybe a square room with greater depth than they used to have a few years ago, and expect to get a satisfactory circulation of air by natural means. You can't do it. I don't think there's anything in this situation that can't be solved and solved quite readily by a little adequate supervision. As a matter of fact, it's a State law that these things are supposed to work all the time the classes are in session. That's in the law.

MR. RONFELDT: Well, it is an increase in the cost. Now, I don't believe that general construction costs have in-

creased as rapidly as mechanical costs. I mean when we take our ratio on a job. As Malcolm was saying a few minutes ago, 20 to 25%, I think our ratio now figures between 28 and 31 or 32%. Now, I feel that on mechanical costs many things effect it, localities, union problems. You get in a certain area and you have to get so many electricians, for example; they don't want any more electricians; they won't take any more apprentice boys on; and the electricians are just not available in that community. There is sort of a closed market on it. The prices go up but also, as I say, these mechanical devices that we're putting in, - I'm all for it, but can we afford it.

MR. VAN SANT: I don't agree with you, Mr. Ronfeldt. You seem to be knocking labor more than anything else. The only way you can economize on construction is to cheapen the material. That's when you can do it and that's when you are going to get inferior work and inferior workmanship and everything else. There is no use kidding about it, Union labor goes up with the times and it may contribute to the cost of the schools. The way the mechanics have to work today to earn what money they get is terrific, and you know that. Today the general contractor goes to work and buys all modern equipment. He eliminates all the labor men that he can. And where does the money go? into this one central pocket, to the general contractor. Let's get the men to work. Let's get business to stop cheating. Let's spend our money to put men to work.

MR. RONFELDT: Well, I think this is an unbiased Commission and that we are here to try to find out something, and whether labor is being discussed or professional men, I think we should just discuss this problem.

MR. VAN SANT: I think that's a very good idea but let's not just single out one group, in other words, labor.

MR. RONFELDT: Well, it's either material or labor that we're talking about, or administration, and why do they cost money. Let's put it that way. I think we will all agree - at least my experience has been that when a job goes out for bids, I have noticed in certain localities job costs are lower, the same type of job, than in another locality. The material is the same and the ask the contractors - I'm referring to the five trades - you don't know what you go through. Now, let's leave it at that, and not argue.

MR. VAN SANT: I've been in labor for 46 years and I know a little bit about it and I can show you certain conditions that could be corrected. I can take you to one job now where they can't take time off to get a drink of water, the water is brought to them and they earn every cent that they get on that job because they are hard-working men. And as I said before, labor can help, so can the businessmen and so can the men who reap the profits from these big jobs. It's usually the general contractor and a few others that want to get more instead of distributing it.

CHAIRMAN HILLERY: Let's get back to our topic here this morning, plumbing, heating and electrical. Mr. Vogelbach, would you like to add something?

MR. VOGELBACH: There is little that I can add to the discussion, after listening to Mr. Grady and Mr. Runyon, except to say that I think your cost is going to keep rising, it isn't going to stay status quo. It has changed in the last ten years some five to six percent in the various trades. For illustration,

the plumbing, heating and electric, has been about 25% up until 10 years ago, it was about 24%. We will take that as a base figure. Today it runs 30-32%. And I think all other commodities have increased in cost relatively the same, if not more in some cases. Automobiles is an illustration. I think in the interest of progress and the demands of the public for new and better things - education, to begin with - you are going to have to pay a little bit more for it. An illustration is the type of school building that we are building today. It's spread over a large area and, as pointed out already by Mr. Runyon and Mr. Grady, this means longer runs of copper, longer runs of piping, more pumping equipment and everything that increases our mechanical costs.

Now, looking over the records of 300 schools that were analyzed by the Federal Government, from the analysis that I recall it seems as though -- that was 3,000 schools that they analyzed, not 300 - the cost of the multiple-story school was the same as the single-story school. The mechanical cost increased but the general construction was reduced. So your relation is about the same. We're not doing anything by reason of that code, the New Jersey State Code on public schools, or any other code that is going to increase too much either our electric or our plumbing.

The code stipulates that, as far as plumbing is concerned, the United States Department of Commerce Code governs the design. That's a good code, it's a reasonable code, and it has been well worked out by many experts. It also leaves it open to the local code of any municipality or

any city, providing their code has been submitted and accepted by the State Code, and that's a very reasonable thing, I think.

Now, electrically we have a little bit more difficulty insofar as Elizabeth and the City of Newark are concerned. Maybe part of it is political, I don't know. But in all cases when we work in those towns we have to go to the Local Code and get a clearance. That has existed for years. That hasn't increased this cost any. We had to work with Mr. Shadeen of Elizabeth back 20 years ago. He set up the minimum requirements and they were always in excess of the National Electric Code.

So I don't believe that any one code has increased our cost. I think our cost is a natural result from wanting bigger and better things. Now, how we can eliminate that - as was cited before, if you want to go back to the horse-and-buggy days, that's one way you can do it. You can certainly save money but you would never satisfy your client. Your school boards wouldn't be happy with it.

To begin with, I think when it comes to controls, that's a very essential part of any heating system - and we're just talking heating now - because one of the most effective things is temperature in the classroom. If it's too hot, they complain about it, and if it's too cold they are sure to complain about it. With a unit ventilator, coming back to that, we have the means, to my mind the most ready means, for controlling the temperature in any one classroom. If you want to do away with the unit, you can use a central fan system or break it up into groups of central fans or central units. That has been done with some degree of success.

But your problem, as I see it, is to try to reduce the cost of school house construction. I don't think we can accomplish that by reducing the code requirements anyway.

As I said before, I can't add much to what has already been discussed but I would like to answer any questions, if you have any.

CHAIRMAN HILLERY: What was the last statement you made? Our problem is to reduce the cost of school --

MR. VOGELBACH: The cost of school construction. That is what you are after.

CHAIRMAN HILLERY: Yes, but what was the rest of it.

MR. VOGELBACH: I don't think you can accomplish that by changing any code, unless you are willing to go back in your designs; unless you are willing to eliminate temperature regulation, mechanical regulation, both the exhaust and supply, - and we have a lot of problems in auditorium ventilation, supply and exhaust, to say nothing of the classrooms. The bulk of our trouble and complaint, taking it as an engineer, has to do with the temperature regulation in both classrooms and auditoriums. Now, there's nothing in the code that controls that. That is a matter of individual design and function of the contractor, and complying with the plans and specs.

As I said before, your heating has jumped from about 10% to as high as 14 and 15, in the last ten years; your plumbing from 6% to 8; your electric from 9% to 14. In one or two cases it has been 15%. It's equal with our heating.

MR. ZIMMER: But at the same time the over-all cost of the project has remained fairly level.

MR. VOGELBACH: That's right.

MR. ZIMMER: We must remember that when we reduce the cost of the general construction the cost of the mechanical goes up in proportion automatically, not by adding additional features. When we talk dollars and talk percent, we're talking about two different things.

MR. VOGELBACH: That's a good point.

MR. ZIMMER: Now, could I add one more point to what Mr. Vogelbach has said?

CHAIRMAN HILLERY: Surely.

MR. ZIMMER: Could I make a statement to the Commission? a broad statement?

CHAIRMAN HILLERY: Yes, sir.

MR. ZIMMER: In heating and ventilating the school 90% of the season the problem is to remove heat, not to add heat. That's a very radical statement but it's absolutely true. The only time a school building needs to be heated is before the people come into the building. Once you bring in the people we have a heat gain in the classroom or auditorium or any room where there's a group. So the heat must be exhausted to prevent overheating. And a temperature control system functions 90% of the time to limit temperatures, thereby effecting economies. A building without temperature control is a very, very wasteful installation. Temperature control equipment will be amortized in ten years, every time.

Now another thing for the Commission to remember is this: When you build a public building, like building a school, you're not building it for a short life term. We're talking about 40, 50 or 60 years of life. And the equipment that goes

in that building should be selected to last that length of time.

I would also like to comment on this code. I think the Committee has done an excellent job. They have been conservative to the point where I doubt there is anything excessive in that code, and it's comparable to any other code in this United States. I might use the word "loaded" - there is nothing in that code that "loads" a job. Everything is necessary, in my opinion, for good healthful conditions, from the standpoint of heating and ventilating, plumbing for good sanitary conditions, and lighting for the preservation of eyesight.

CHAIRMAN HILLERY: At one time in our studies here we had a handbook from the New York State Building Commission that was brought before this Commission and it showed the pitfalls in building public schools. Some of the members were interested in that. Dr. Westby, who wrote it, was here that day and we asked him why he didn't do one for New Jersey and he said he would get in trouble with the architects here if he did. Do you remember that?

MR. VAN SANT: I don't remember him saying that.

DR. MORRISON: I don't think he meant that. I think this Commission realizes and I think more people should realize that the architects in New Jersey who are building school buildings have done a remarkable job in maintaining the cost of school construction at the present level. They have taken off these clock towers and these facades, these monumental main entrances and a lot of things like that. As Mr. Runyon said, we are going into some types of construction never dreamed of. We are doing almost a million dollar renovation job on a high school now and I'm a little bit worried because I think the public is going to criticize us.

CHAIRMAN HILLERY: Well, Doctor, do you have any figures - a statement was made here this morning - as to how many referenda have been turned down in this State - I understand you may not have them with you - for new schools within the last year?

DR. MORRISON: Well, it's in the Commissioner's office. I don't have that right at hand.

CHAIRMAN HILLERY: I know it has been increasing in our own county. I see there are three or four elections now before they get a school and that's the resistance that's coming from the people who promoted the type thing we are doing here this morning, the average little family with a small home, two or three bedroom home, paying \$700 taxes and the school people still telling them that we have the problem with us for 15 years and they're wondering what's going to happen to their existence.

DR. MORRISON: Well, I think the perfectly logical reason for that is that most districts of the State have their Article VI and Article VII - in the Article VII districts, of course, the public decides by referendum on this - and the school budget, school costs, is the only tax they can get at, and it comes along about the last thing. They can't do a thing about the federal income tax. They're invited to the hearings by municipal governments but not too many attend, I'm sorry to say, but they can go out and vote on the budget and they can listen to a lot of wild statements. There have been a lot of wild statements made about school costs and other things and they take it out on the schools.

We lost our budget last year and put it back the second time at the same figure and we lost it again. Then the Township

Committee cut it by a rather sizeable chunk and then we decided that since we were spending \$175,000 in transportation that we would cut out about \$35 to \$40 thousand in routes which were not being supported. So we announced the fact that we would effect a saving in that respect and the Board simply had to back up like a fiddler crab. The mothers came in and said, "We'll lie down in the road if that bus doesn't stop. You'll stop that bus and take my child." I think we're going to put them back and pay for them.

CHAIRMAN HILLERY: Well, I can tell you what it has done in my own county because the complaints have been transferred from the Boards of Education and the school people to the Legislators, screaming for the continuance of that type of service. Many of those people moved out of congested areas and built ranch houses out along country roads where there were no sidewalks and they had the advantage of having their children brought to school. But the Boards, in an effort to save money, stopped that transportation and then, of course, they come to us and say, "What are you going to do about it?"

But getting back to this other subject, you say the taxpayers have an opportunity to be heard on the school costs. What's the percentage of local tax rate used for school cost in the State, if you know?

DR. MORRISON: Ours, over the years, in spite of all increases has maintained a steady 53 and 54%.

CHAIRMAN HILLERY: Well, you're lucky.

DR. MORRISON: You will find it lower in the larger districts, that is the cities, I dare say --

CHAIRMAN HILLERY: I know.

DR. MORRISON: -- because the cities have more services. They have more police, more public services than do some other communities. So the cities are under 50% - 8, 10, 15 and 20% in larger cities.

CHAIRMAN HILLERY: I know in some areas the school rate is 75% --

DR. MORRISON: And in some it will run over that.

CHAIRMAN HILLERY: -- in a good many country districts, today. That's why they're conscious of it.

MR. RONFELDT: In Greenwich, Connecticut, they have a pay-as-you-go plan and Point Pleasant Beach started that. Of course, sometimes it is pretty hard to put a thing like that over. A community, as it's growing, they'll put in say \$35 or \$40 thousand, maybe \$50 thousand, every year. They know they're going to build a building four or five years from now. And if they once get that in that budget, they can't touch it for any additional building program or anything like that, but all of a sudden they're faced with either a new school or an addition, say four or five hundred thousand dollars. Well, they're in that pay-as-you-go plan for 8 years and they have already accumulated \$400,000, with interest added to it, and all of a sudden the public is faced with maybe a hundred thousand dollar referendum for a good size job and those things will go through.

Of course, that's not helping, but once it's in the budget it's a very good approach. Then it just repeats itself each year and people are not faced at the end with a big tax problem. When you throw a \$500,000 school at them all in one jump you get the effect of that immediately, where this other way you just go along.

Somewhere I heard the figure, last year, that there were pretty close to 190 some odd schools in the State of New Jersey turned down.

DR. MORRISON: No. I would say less than a hundred.

MR. RONFELDT: Of course, it's the timing. So many referenda are presented to the public right after the people have received their last tax bill. If they could let it go for three or four months till it simmered down, this might not have happened.

CHAIRMAN HILLERY: Are there any questions for any of the gentlemen - Mr. Grady, Mr. Vogelbach, Mr. Runyon and Mr. Zimmer - who have been kind enough to come before the Commission this morning?

DR. MORRISON: I think their talk was very helpful.

CHAIRMAN HILLERY: I do too.

MR. Di STASIO: Mr. Runyon, wouldn't you sum this up by saying that the cost of the mechanical equipment has not kept pace? In other words, the efficiency or the lowering of the cost of the general construction - we have better construction with less money, but the mechanical work has not kept pace with the other work with more money?

MR. RUNYON: No. I wouldn't say so at all. The cause of the mechanical work being higher when prorated to the general construction is solely or largely due to the single-story schools. That's the prime cause.

MR. Di STASIO: Is that the only reason?

MR. RUNYON: Yes, sir. That is 90% of it.

MR. DiSTASIO: All right. Then that's the answer to this Commission, that single-story schools cost more.

MR. RUNYON: Mechanically. Only mechanically.

MR. DiSTASIO: How about the multiple-story schools?

MR. RUNYON: The multiple-story schools definitely cost less, mechanically, in every trade.

MR. DiSTASIO: In other words, you've kept pace with the rest of the construction.

MR. RUNYON: Yes, sir. And I think my contemporaries here would say the same, wouldn't you?

MR. GRADY: Yes. I think that's one point we all made in common, that the cost of schools has come down but the mechanical work, of necessity, has gone up because of the way schools are designed today with large glass areas and no basement and no attic. There's a need for ingenuity now to make things work as intended. We used to have basements to hang pipes in but we don't any more. Then there was one other thing that brought the mechanical end of the work - the electrical work particularly, as was pointed out I believe by Mr. Runyon, and that was the more stringent National Board of Fire Underwriters Electrical Code.

MR. DiSTASIO: And that's because you have more consumption. In other words, you have four or five gas ranges instead of one gas range.

MR. GRADY: No, it's not because of increased consumption. It's because of increased rating of feeders. We used to be able to say we had a connected load - that is, we add up the amount of lights and receptacles and we come up with an answer of, we will say arbitrarily, 100 kilowatts - that's by adding up the amount of electrical equipment in the schools. We all are aware of the fact that not everything is working at

one time. It might have a diversity factor of probably 50% or 40% or 60%. The National Electric Code does not recognize that in school buildings. They say provide the feeders for 100% of the load as if the school had some condition where everything was operating at once. That means that all the lights and every receptacle had an appliance pushed into it, which is almost impossible. That is one of the things that has caused the electrical increase.

MR. DISTASIO: What is your opinion? Do you think the National Code is justified in requiring that? I am asking for your professional opinion.

MR. GRADY: I think the National Electric Code is good but like every other code it has some things in it which I believe could be improved on. But as a whole, I believe it's good. This one particular thing though-- a school building probably should have a certain percentage of diversity factor in it, as a factory does.

MR. RUNYON: May I add one point there?

CHAIRMAN HILLERY: Go ahead.

MR. RUNYON: I think we can prove the point. Public Service does not put in transformer capacity in any school for more than 75% of the true connected load and they don't have any blowouts. And neither does Jersey Central Power & Light or New Jersey Power & Light.

MR. DISTASIO: That's an interesting point to note. In other words, instead of 100% would you gentlemen recommend 75%?

MR. RUNYON: I would recommend 75% but we have the National Code and you can't get around the National Code.

MR. DiSTASIO: Well, that's beside the point. In your professional opinion you would say 75%?

MR. RUNYON: Yes, I would.

MR. DiSTASIO: Then that is something that I think ought to be noted.

MR. GRADY: And the other point that Mr. Runyon brought out, about some towns having fantastic plumbing codes is also very good.

MR. DiSTASIO: Well, I think that could be rectified. You know I guess that we did several buildings together.

MR. RUNYON: Right, we did.

MR. DiSTASIO: And the City has no jurisdiction at all.

MR. GRADY: They do in Newark. We are having trouble right now with public housing.

MR. DiSTASIO: Oh, public housing is different.

CHAIRMAN HILLERY: I would like some recommendations as to the course we should follow at a future meeting, in reference to our problem here. I think we have covered this field very well this morning.

MR. RONFELDT: As far as the recommendations are concerned, I would like to say that, in view of what we have discussed here, I don't believe there is any course that we can take regarding the mechanical equipment in these schools, other than leaving it up to each architect and each engineer to try to locate the sources in an area where we can reduce the lines. As far as heating is concerned, all we can do is ask them to try to cut down the lengths of piping as much as possible. But if your controls are going to remain the same, there doesn't seem to be any way out of this ventilation problem other than retarding our

progress in life. But we feel that we're on the right track and we're going to continue it and we will probably do it for years to come and probably the schools will be getting more and more expensive.

The only thing that I arrived at here at this meeting was that we should keep these local municipalities out of the picture entirely, as far as any jurisdiction they have over the construction of these buildings. And it is probably the duty of this Commission to recommend that this State Guide, as well as architects and engineers, not even mention that we comply with any local regulation. Then in the event that the regulations are more strict than the State regulations, we just require the State regulations.

Another thing is building permits. We should not even ask for those, and there's a few thousand dollars mixed up in that.

We have gotten a resume as to where this money goes but we can't reduce it.

MR. DiSTASIO: Well, would you go along with that 75% requirement?

MR. RONFELDT: Yes, but you will have to fight all the insurance companies on that, as Mr. Grady said. Isn't that true?

MR. GRADY: That's right.

MR. DiSTASIO: My experience has been with fireproofing requirements that you could do a lot of variations on it and they only give you an iota of a penalty. I think it would be worth while exploring with the insurance companies. If Public Service does it --

MR. RONFELDT: First, what kind of money are we talking about here? For instance, with a feeder line taking 100% of the load and a feeder line taking 75% of the load, what kind of money would be involved?

MR. RUNYON: You would save a lot of money.

MR. GRADY: 25% of the cost of the feeders.

MR. RONFELDT: Is there any way that we could talk roughly by citing one case of that kind? What kind of money would be involved?

MR. RUNYON: 5% of the total electrical cost.

MR. RONFELDT: 5% of the total electrical cost?

MR. RUNYON: Right. You see, it's not only the copper feeder but the containing pipe, the conduit, that would have to be increased proportionately, as well, and all the facilities that go along with it - extra panel board sizes, circuit breakers, main circuit breakers --

MR. RONFELDT: Well, that's a worthwhile saving.

MR. RUNYON: Very worthwhile.

CHAIRMAN HILLERY: You say a 5% saving, approximately.

MR. RUNYON: Yes, sir.

CHAIRMAN HILLERY: We had a discussion here this morning several times with reference to multiple-story schools being a saving. I don't think we have had any recommendations for that type of building in many years in the State, have we?

DR. MORRISON: Bloomfield is building a junior high school now with a multiple story core - a Micklewright & Mountford job.

CHAIRMAN HILLERY: Bloomfield is building a junior high school, a Micklewright & Mountford job, and the main instructional area is a two-story building.

MR. VAN SANT: I think they just built one in Flemington too.

DR. MORRISON: The North Hunterdon Regional High School.

MR. VAN SANT: Yes.

MR. DISTASIO: New York City has built a lot of those.

MR. RONFELDT: Oh, there's a lot of multiple-story schools.

MR. GRADY: Land value has a lot to do with it.

MR. RONFELDT: As Mr. Grady just mentioned here, in Newark and Elizabeth it's a question of land. There is no land and the cost of the land is what bothers them.

CHAIRMAN HILLERY: Well, doesn't the School Guide require that you have so many acres for so many pupils?

DR. MORRISON: It's a recommendation, not a mandatory requirement.

MR. RONFELDT: No, but when you get out in the country, with relation to elementary schools, I think it's the general opinion that they do like to keep them on the first floor, on a one-story level. But it's not mandatory and I don't believe the State even enters into it. They make recommendations but they don't say this is what you have to do.

CHAIRMAN HILLERY: Well, in view of the fact that it has been brought up here before the Commission as a means of saving money, do we want to refer to it at all in the recommendations?

MR. ZIMMER: Well it saves money, Senator, in mechanical work only. It increases the cost of your general construction work because the first floor has to be built to support the second floor. It involves stair wells.

CHAIRMAN HILLERY: Well, is it an actual saving then, or not?

MR. ZIMMER: No. The net would be approximately the same.

MR. STEARNS: Well, I feel very strongly on that subject, Senator. My experience has been that a good many people in the municipalities where I have had occasion to talk with them have taken this book fairly literally. I think somewhere the diction with relation to sites should be more emphatic as to the appropriate use of the site. For example, a two-story building on one portion of it, incorporating the split level design or any of the other architectural features, might involve an economy. Instead, we find towns, like Morris Township, considering a site and they take a site that has a natural lovely run to it and, from my own construction experience, I would have felt that it would have lent itself to easy access to the second story and the grade entrance there, and the hiding of the utility core, like the boiler room, but instead of doing this the consideration given to the site was to make it level because their interpretation was that a flat site was required and was more desirable. The general run of the terrain could have given them a split level or two-story building that, to my mind - and I am not trying to invade the architectural field - would have come out a little less expensive.

So I feel compelled to say that our recommendations should state that more careful examination of the site and consideration as to all costs be given, and that the site approval facilities of the State Board be used on a mandatory basis.

MR. DiSTASIO: In conjunction with that I would add that that also goes for your foundation problems. We have seen sites

which were a little cheaper insofar as the land value was concerned but the foundation was bad and all the economy just went up in smoke. That's very important but I know it is very difficult to have money appropriated in the preliminary stages for this purpose. But I think consideration should be given to your foundations.

MR. RONFELDT: Also for bringing in utilities too.

MR. DiSTASIO: Oh, yes. We have some sites right now where the utilities are a problem.

CHAIRMAN HILLERY: Well, for a future meeting of this Commission would it be advisable to have some architects come in here to talk with us?

MR. STEARNS: Well, I would recommend that.

MR. VAN SANT: I will second that.

MR. DiSTASIO: I think some of our prominent school architects. I made quite a study of the structural part of the code and I can't see too much to improve it.

MR. GRADY: My personal opinion is that it's very good.

MR. ZIMMER: Speaking of site centers, there is one other point. It's normally true that a school board finds itself in the predicament where they must construct additional facilities and they have to take the land that's left. Many times it's a case where this is the proper location for the school and this is all the land that is available. I know of a site which was recently purchased, which was the logical location for the building, and the rock excavation alone cost \$120,000. If the architect or his mechanical engineers had a choice they certainly would not have chosen that particular spot.

As I mentioned before, in New Providence a piece of property was available where the static water level was just below the surface of the ground. I call that sub-marginal land, as far as construction is concerned. That happens many, many times.

If a municipality can plan for a school project many thousands of dollars can be saved.

CHAIRMAN: All right. Now, if you men would send me the names of the architects whom you would like to have appear before us at a meeting, probably in mid-September if that's agreeable to the members of the Board, I will be glad to invite them here.

MR. DiSTASIO: You mean the members of the Commission send you their names?

CHAIRMAN HILLERY: Yes, if you have a recommendation. I will contact them and have them appear.

MR. RONFELDT: Can't we do that right now?

CHAIRMAN HILLERY: All right.

(It was suggested that the following architects be requested to appear before the Commission:

Micklewright & Mountford, Trenton, N.J.

Alexander Merchant, New Brunswick, N.J.

Frederick Elasser, Union, N. J.

Lawrence Licht, Englewood, N. J.

Arthur Rigolo, Clifton, N.J.

Edwards & Green, Camden, N. J.

Epple & Seaman, Newark.

CHAIRMAN HILLERY: We have seven or eight here and I think that will be sufficient. Thanks for coming.

(Meeting concluded)



