From: J. D. Williams
To: RAND Staff
Subject: Comments on RAND Building Program

These notes are going directly from dictation to vellum, so as to save a little time; it follows that I am not prepared to defend their organization, the grammar, or anything else about it that looks weak in the light of day.

We suddenly find ourselves in a rather advanced state on our building program. It has changed from a vague gleam in our eyes, which was the steady state for several years, to a state where the building site is looking pretty firm and the architect is about to walk in the door. It's a little like Korea: our preparations for the event, while far from negligible, leave something to be desired.

We have discussed this subject among ourselves only a little, and usually at times when we felt we should be doing something else. We have had time to sound off extreme ideas, ranging from an eight-story obscenity at Hollywood and Vine (with a supermarket on the first floor), to whatever the character had in mind who wanted to be able to hear a cricket. I feel that the subject deserves some thought and time, that we should try to reach a meeting of minds, and that now is the time to do it.

If it does no more than provide a basis of disagreement, I thought it would be valuable for somebody to set down some of the facts and fancies that we hold. With these as a starter, I hope we will add and subtract items until we arrive at a set of essentials which can not be compromised, at a set of desirable entities, and at a set of things to be avoided. This memo is not organized along those lines.

Why are we building a building? Aside from some intangibles, such as a feeling of and a look of permanence, that it would give us, the motivation must come from some or all of the following:

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John D. Williams, "Comments on RAND Building Program," memo to RAND staff, December 26, 1950, M-4251, Brownlee W. Haydon Papers, Box 2, Folder 20, Hauser RAND Archives, Santa Monica, Calif.
1. better location;
2. a better organized facility;
3. better space for individuals.

If it is the need for these that drives us, we had best make sure—in fact, damn sure—that we get them in gobs. For this is going to be a very permanent and very expensive operation; it will be a long time before we can second-guess, and we could do a lot of interesting and important research, and/or stake some of our people to advanced training, with the money. While it is inevitable that compromises will have to be made all along the line, it is important that we not get winded by the details; we must be prepared to abandon the project even at a late date, if the potential benefit gets too low.

But excluding both tents and marble, there is probably a factor of two floating around in the costs. A rural site might be purchased and developed for under two hundred thousand dollars, and a building which would satisfy our present needs might be built for as little as half a million. On the other hand, an urban site might cost over half a million, and a building estimated to satisfy our ultimate needs could cost a million. It is my guess that a building on an urban site would tend to be more expensive than one on a rural site, simply because it would have to make up by artifice some of the values inherent in a rural site, such as quiet.

We have given no thought for a long time, so far as I know, to the question: How should a facility for RAND be organized? Several years ago Frank and Arthur Raymond gave some thought to it in connection with the Douglas loft. They made some sketches of an office layout comprising concentric rings of offices with the senior people being concentrated toward the center. While the particular design they explored was suited only to the Douglas loft, or some similar dungeon, the underlying motive still should attract us; namely, that RAND represents an attempt to exploit mixed teams, and that to the extent its facility can promote this effort it should do so.

This implies that it should be easy and painless to get from one point to another in the building; it should even promote chance meetings of people. A formal call by Mr. X on Mr. Y is the only way X and Y can develop such a tender thing as an idea—the social scientists have taught me to use X and Y in that bawdy manner. If the inter-office distances are to be kept reasonable, the building must be compact. It need not be circular; coverage work shows, a square is often a good substitute for a circle, and even a rectangle is not bad, if the aspect ratio does not get out of hand.

The argument which favors having a compact structure does not extend to space-filling solids. Inter-floor travel is undesirable, but chiefly because so little of it is done. When coupled with inter-building travel, it almost vanishes. As current examples, I hazard
that Lloyd, Jimmy, and Gene rarely see each other except at formal staff meetings, and their divisions must maintain contact by the Christmas list.

Because of the absolute side of our organization it doubtless is not feasible to have it arranged so that Elaine Pond in Electronics and Ethel Burton in Publications have optimum physical communications, nor is it especially useful that they have it. But it would be worth a lot if people like Harris and Kahn, Specht and Marcum, Drescher and Wiley, Ansoff and Clement, etc., were as accessible to one another as Goldy and I.

The compactness criterion, unfortunately, runs headlong into another set of values, namely, those that concern the characteristics of a desirable office.

I believe that the qualities that are most desired are, approximately in the order of importance:

1. privacy;
2. quiet;
3. natural light;
4. natural air;
5. spaciousness.

There is room for argument on some of these. Working from the weak end, it could go without saying that, because of space in the sense of building footage is an expensive and rare commodity, that spaciousness must be obtained mostly through illusion — this is the place where the architect must make with the magic. And there are some sports (in the Mendelian sense) such as Goldy, who like to live in tubes and take their light and air from bottles, and there may be some people who have to be seated in rows in order to keep each other awake. Almost everybody like it quiet.

While we undoubtedly require several office types for single occupancy as well as several for multiple occupancy, it is fairly important that the desirability of offices, within a type, be fairly constant throughout the building. Otherwise those who get the less desirable ones will be unhappy.
I believe that almost all of our requirements can be satisfied, and in a reasonably priced structure, if we have enough land. Since we have a strong internal reason for building compactly, the argument in favor of a substantial piece of land is not that it is desirable to spread out the building. The principal function of land is to provide insulation and isolation, and spaciousness. Insulation from noise, isolation from distractions and from the public gaze - my present office windows are high to begin with and then the bottom section is frosted - just so that people waiting for buses, or otherwise loitering, cannot participate in my meetings.

One of the really interesting, and pressing, questions is: Can we put up a building on a piece of land as small as that opposite the city hall and still get approximately what we want. On my own part, there are times when I think we just can, and other times when I think we just can't.

Just to have something concrete to think about, I invented some typical offices and structure to go with it, and have been trying to fit on to that piece of property. For purposes of illustration, I will describe them briefly; but let me say that I appreciate that others will have ideas, and doubtless better ideas on sizes and arrangements - I am only prepared to shed blood from my veins in defense of these; not artery blood.

But first, recall that RAND now has about four hundred and fifty people, of whom about three hundred are office dwellers; the rest live in Washington, machine rooms, and open areas, or they are nomadic, such as the guards and janitors. These people live in about two hundred offices; about one hundred of these are singles; about seventy are doubles - correction, about one hundred and ten of these are singles; about seventy are doubles; and about twenty are occupied by three or four persons. I guess that in a new building there would be fewer of the last and more doubles.

I consider three office sizes, for purposes of exploitation. These were - these are - nine by six and one-half, nine by thirteen, and eighteen and one-half by thirteen; inside dimensions, in all cases, I require that the first have one window and that the other two have two windows. The first is suited only to single occupancy, the others, single or alterable or for two occupants.
I hypothesized six-foot width for hallways. Offices of these types can be accommodated in a building element, or wing, or section, thirty-four feet wide, outside measure, allowing six inches for each wall. The hall can be central with 9 x 13 or 9 x 6½ offices on both sides, and the hall would be at one side where 16½ x 13 offices prevail. I have played with this a little, and it is pretty flexible and efficient. This model at least serves to give some ideas about total building footage required.

The first peak at the problem suggests that with our present size of organization and the size of the urban properties that we are considering, a one-story structure is infeasible. This is strengthened if we can take into account the possibility that R&RD may grow. I have, therefore, considered the elements of R&RD in two categories, research and non-research, in the hope that at least the research people could be kept conveniently together on one floor. This does not quite get us off the hook; however, because future growth of R&RD, if it occurs, would presumably be growth of the research arm principally. Therefore the building plan should be flexible enough to encompass (say) another 150 research people.

The 9 x 13 offices mentioned earlier are a convenient unit. In terms of them, I estimate that our present needs for research offices and associated facilities (e.g., conference rooms) are 200 units. Similarly the non-research functions (e.g., numerical analysis, publications, business administration, etc.) seem to require about 150 units. In the future the research elements might require 300 units and the non-research perhaps 200 units. If you treat the 9 x 13 affix unit as occupying 13 x 13½ of building space (thus including the walls and half the hall), you get 175 square feet per unit. This indicates that the present needs for research and non-research are like 38,000 and 25,000 square feet, respectively, and that these may eventually change to 50,000 and 35,000, respectively. Using a standard building section, 26 feet wide, the research staff would need about 1300 linear feet of such structure and the non-research staff would need about 1000 linear feet of such structure; eventually these might change to 1900 and 1300.

Now having some idea about how much space we needed, and of a way of packing it into a building section in a manner to provide light and air for all concerned, I was then ready to festoon the landscape with this stuff in some useful manner, if possible.

Judging from modern buildings I have seen, a popular way of spreading stuff around is to arrange it like the bone structure of a fish: a central structure with wings jutting out at intervals on both sides of the skeleton. It may be a useful design for us, if we have enough land, but for the parcel which we are now considering so seriously, the fish skeleton eats up the available space very fast; and it is not the affix best design for inter-office travel.

I was therefore led to try a system of closed courts or patios, and became involved in the theory of regular lattices, which is a fascinating subject; the square, the figure eight, and a hierarchy of more complicated designs.

As a rough measure of the utility of such designs, from our special point of view, I have taken the average distance between offices, measured along the grid, i.e., the halls. With any intelligent arrangement of our people, we can do better in practice than these average distances; but they still offer some information which is pertinent to us. I insert here a little table which gives the average distances for various simple lattices, expressed as a percentage of the total length of all the halls in the building. I also exhibit a picture of one of the lattices. The
Average Distance Between Points in Lattice
(measured along lattice lines, expressed as a percentage of the total length of all lattice lines)

<table>
<thead>
<tr>
<th>No. of horizontal lines ($\mu_1$)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td></td>
<td>15</td>
<td>12</td>
<td>9.6</td>
<td>7.5</td>
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</tbody>
</table>

$\mu_1 = 3 \quad \mu_2 = 4$

S = length of side of the square lattices
(as percentage of all lattice lines)
last column (S) in the table shows the overall size of the lattice. We note that the average travel distance decreases as the lattice becomes more complex, that the decrease is most noticeable for the square lattices, and that the decreases are particularly noteworthy in the first two or three steps. For example, in a nine-patio lattice (i.e. a 4 x 4) the average distance is 10 percent of the total length of halls, as compared with 25 percent in the case of the simple square. Also the size of the building as measured by by its side S is half as great as that for the square.
Of course, you have to watch it a little when you begin to translate the lattice into building structure. The building sections have finite width (twenty-six feet in my model), which reduces the width of the lattice openings; the people who live there, and who were so happy initially, will begin to notice it if the patios shrink too much. What the useful minimum is, perhaps our architect can tell; perhaps our psychologists can assist him.

A little playing with this will convince you that it is possible to put us on a fairly small piece of land—maybe. For example even our hypothetical future research organization, requiring nineteen hundred feet of halls on this model, could be fitted on and around a nine patio system, measuring two hundred and sixty-four feet on a side; on the three hundred and forty-four feet deep property opposite the courthouse, this would permit a forty foot set-back on front and rear. The patios would be like fifty-three feet across. I don't know what you would do with the non-research fractions of R&D. Of course, a second story would be put over two-thirds of the ground floor. Such second story space might be regarded as less desirable than the first story space, and it might depreciate the first story space: for example, the patios might have to be larger to be equally desirable what with all that overhang (correction—what with all that structure rearing up about it).

There is another way to make the patios somewhat larger, and which would make small ones more tolerable—and which would moreover reduce the average inter-office distance below that of the lattice: it might be that, in view of climatic conditions here, we could throw all or most of the halls out of the building. The patios could be surrounded by porches onto which the office doors would open. The porches would provide cover against the rain on those three or four happy days each year; otherwise, one could cross the patios from office to office. These small sheltered areas would not be windy.

My guess is that if a multiple patio scheme were artfully done, it would develop that "outside offices", in the normal sense would rank low in popularity for they wouldn't be less quiet and intimate; in fact, the vista from them would be filled with unrewarding objects such as automobile traffic and the rear of the Elks Club. Of course, the number of outside offices diminishes as the lattice becomes more complex.

Later: After seeing the above, I was tempted to fix it up a little. But reason prevailed: The way it is, those who disagree with a point will have to guess whether it's me they disagree with, or my secretary, who often construes my "would" as "wouldn't", etc; conversely, they may find me biting their flank just when we seem to have reached harmony.