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SOVIET BUILDING DESIGN AND CONSTRUCTION

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by

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I was terribly disappointed when I first saw current Soviet construction. I saw 14 story apartment building of precast concrete and glass walled office buildings. None of the new buildings had minurets or onion domes. So much for what I thought I know of the Soviet Union. But when I had the chance to look much closer, I found the construction was really quite different. The materials were used in different ways than was common in the U.S. The construction proceedures and methods were quite different. My first reaction was that there was not much that we could gain from the current Soviet practice. But one though came through clear from this initial experience, if anything was to be learned, we must start by understanding the difference.

But before we try to understand the difference, we must look at our own building history. You will find that our building industry has had a continual evolution. This evolution has continued in modern building history for approximately 100 years in an affluent country with an abundance of raw materials. The growth has been steady without major jumps or discontinuities. Changes in the current state-of-the art have been gradual and orderly. We might not be completely happy with the way the industry functions but most of us would not entertain any radical changes.

Our industry has tried some experiments aimed toward radical change but these are generally shortlived, undermanaged and underfinanced. We accept innovation slowly and with much question. Maybe this is good.

The Soviet building industry is entirely different than this. Their industry was deliberately created after the second world war to rebuild industry and to create housing. These priorities were and still are rigidly controlled.

So in the past 35 years, the U.S. and Soviet experience bare little resemblance to each other. The U.S. has built to satisfy consumer needs, a wealthy and affluent consumer. The Soviets have built to satisfy the priorities set by government, basic necessities of housing and factories and to do it with all haste.

This has set us and the Soviets on two different tracks. We look at their buildings and say "drab and poorly constructed". They look at our buildings and say, "extravagent and wasteful". Both of these comments are damning, but are they corrrect. There is some truth in both comments. But still that's just looking on the surface.

The original question posed was concerned with our learning from the Soviets. The companion question is can the Soviets learn from us. In general we have not considered thie latter question because we have started by assuming the answer is yes. Maybe that is not so. Maybe the answer to both questions is "maybe".

Buildings must meet the real needs and the systems used to build them must match the resources. This thought seems very obvious but I think I can show you that many times it gets lost in the rush.

But if that is the case, what can the Soviets get from us. Clearly the Soviets are entering an era of increased demand for consumer goods. The effect on their building industry will be slow in coming but, even in Moscow I have seen evidence of some change due to their experimental building programs. There is more evidence of this outside of Moscow.

We, on the other hand, are entering an era of less waste and extravagence. We are bombarded on all sides with talk of conservation and of re-use and recycling. This probably will be slow in coming but it is leading to a change in thinking and some change in practice. So I feel that these two different systems are beginning to become less different. With this in mind then, we are encouraged to look at different ideas and methods.

In order to benefit by what the Soviets are doing, we must understand them and the various methods and processes they use. Now I haven't seen anything they have developed in the building industry that we could buy 12 of and immediately put to use. But as we begin to understand them a central idea starts to emerge. And you have to go back to the days after W.W.II to see it.

Soviet housing and heavy industry were destroyed. Most all of the housing and industry you can now see in the European portion of the Soviet Union simply did not exist before 1945. With the heavy industry destroyed, re-creating it was like pulling yourself up by your boot straps. Also the resources of both material and labor were in short supply.

I don't know precisely how the Soviet building industry was created after the war, but what resulted is quite clear. They have devised a system of standard, modular building components. With only slight modification, all of the components are interchangeable between different building types. For example, there are standard components of precast concrete beams, columns and slabs used to construct an industrial building. If an industry has a need to carry very heavy loads, such as the tanks of a chemical plant, the basic building design is not changed. Instead, a separate frame is constructed within the basic building shell to carry the heavy load of the tanks separate from the building. The Soviet word for this special structure translates directly as "bookcase". That incidently is one of the problems associated with our understanding of the Soviet methods. Word translations are misleading. But more on that later. It is clear though that one of the major thrusts of the standard component system is to make as much use of each component as is possible.

Lets examine at each element of this building industry in some detail. First, the standard design procedures. They have instituted procedures that can be followed in cookbook fashion. In fact, it is generally manditory that a designer follow the recipe prescribed. In this way, they are able to maximize the people resource. This procedure allows the use of a lower grade engineer than might be required when doing original design. It also should

be faster in that fewer people, those preparing the standards, are doing the research and investigation required for doing original design. Fewer decisions are left to the building engineers and more uniform buildings are a result. For example, the construction rules and regulations (SNIP) contain factors accounting for the behavior of the structural elements under different conditions of humidity, temperature, chemical attack, frequency of loading, accuracy of the methods of calculation, and so on. In our system, most of these are left as judgments to be made by each individual designer.

Next standard components are used to maximize the material resource. This allows the component designer to optimize the design of each element. He can design each part to do just what is necessary and no more. This also should provide for maximum productivity in the plant manufacturing the components. This productivity should carry over to the actual construction of the project. Fewer skills must be mastered to accomplish a given project.

Also the number of standard components is held to the necessary minimum. For example there exists a comple, detailed catalog of building components that contains types of standard windows. The windows are designed to fit with other standard wall components. On the typical project, the Soviet designer can use only one of those types listed. And he will know that it will fit with certain standard wall components. This may not sound very exciting, but it certainly is quicker than what we do in this country.

Will any of this be useful to the U.S. in an immediate sense. I don't think so. Our system is simply too different. There is no way that we could require that much standardization even if we wanted it. Our system is based on maximizing profit in all segments of the industry. The Soviet approach does not provide for the maximization of profit. Operation breakthrough is an example of the Soviet approach applied to a specific portion of our building industry. The results were dismal at best. The California school system standard design (SCSD), failed in its basic approach and a number of manufacturers lost substantial money. GSA's systems buildings approach to office buildings does not look like it will succeed simply because it was an attempt to change design procedures. Most designers don't want dramatic change or procedures dictated. However, all of these approaches at systemization of the building delivery process in this country produced some lasting benefits. But these benefits were absorbed into the standard way of doing business. Industrialization of building systems have failed in this country because we don't need them. They suceeded in the Soviet Union because they match the materials available. There must be a balance between the needs and the means. The Soviets had urgent needs for great numbers of housing units and great quantities of industrial space with limited resources. They chose a system that would maximize the use of these limited resources of trained people, and materials to fill quickly these needs.

In the U.S., we have an abundance of resource in both trained people and materials. We have had the wealth to be able to demand that each house at least look different than its neighbors. Our apartment buildings are generally built from custom designs. Even our so called low income housing has a new architectural design for each project. This is because we want and have been able to afford this.

I suggested that the Soviet system will not be useful to the U.S. in an immediate sense. I meant that purchasing or copying Soviet designs would not sell in this country. But there is an overall benefit. In fact, there is a very basic economic lesson that continues to fall through the cracks. That lesson is that you must balance the needs with the means. This thought is so basic that it is many times ignored. (As an aside, I think a whole rationale for gasoline rationing could be developed on this basis).

The major place we are ignoring in this lesson is in our work in developing countries around the world. We are exporting complicated custom designs around the world today. We are designing buildings for countries in Africa that would be difficult to maintain in North Platte, Nebraska. I mention North Platte because we did a building there that the owner complained had controls too complicated to be serviced by their janitor. Also this owner said there was no local contractor that could service the controls. If you couldn't get these controls handled in North Platte Nebraska, imagine the difficulty an owner with these same controls would have in Mali. Unfortunately, much of this is really happening. But the problems are more basic than controls. The problem goes back to matching the needs with the means. If we really are going to help developing countries work into the twentieth century (before it ends), then we should look at this match.

That is where we can gain the most by studying the development of the construction industry of the Soviet Union. The Soviet Union started in 1945 with very limited resources of both material and trained manpower and proceeded with very little outside help. Numerous countries around the world are faced with

those same obstacles today. The difference is that there is help available. However, we must make sure the help we give is an asset and not a liability.

I am suggesting that we study in some detail what the Soviets have created.

A viable building industry is one of the keys to the development and growth of any nation. The Soviets actually began working on this in the 30's when German architectural teams introduced some industrialization in the country. The major contribution of this era and capitalized on in the 50's was the use of massive block buildings, which used the Soviet Union's most available building material, concrete. The use of concrete dictated the type of design and the component modularity evolved from the need for specific building types. The component system evolved into a more flexible and adaptable panel system. But all of this followed as part of a continuing development of standardized designs using components based on a standard module.

I am suggesting that we assist developing countries with more than just buildings. I suggest that we help them develop the necessary building industry by matching their needs with their means. It seems to me to be the rational approach for solving building needs in a reasonable time.

Also, I predict that we would gain some significant collateral benefits. I mentioned that all of the attempts at systemization of the building delivery process in this country had generally failed but each had produced some benefits that were absorbed into our standard way of doing business. I feel the same is true of what we will learn by looking hard at the Soviet system.

An example of this are the factors accounting for the behavior of structural elements under differing environmental conditions. From what I understand, there has been a substantial amount of research done in developing these factors. Certainly not redoing the research would be a benefit. I can give you what I think is an interesting example. In the United States a parking garage to be located in upstate New York will probably be designed using standard structural design procedures. That means that the structural concrete frame for this hypothetical parking garage will be designed using all of the same procedures that would be used for the frame of an apartment building. At first glance this appears to be the proper approach. But remember that the structure of the parking garage is exposed to the extremes of temperature, left out in the rain and snow and is covered with salt carried in by cars. Compare this with the apartment building structure that is protected from the elements, maintained at a relatively constant temperature and even covered up so that it doesn't get any wear. Is this logical. In the Soviet Union they don't think so. There are factors based on some research that account for the chemical attack of salt, factors for structures subjected to the extremes of temperature and so on. I feel there is much to be gained from a study of Soviet design procedures and some that we could use in our practice.

I have one last point to deal with in learning from the Soviet Union. One of the reasons greater use has not been made at the information available is the difficulty of understanding. Our different political systems have produced all sorts of ideas that don't translate well, and that includes the building industry. At the beginning of my involvement in these exchanges, I found that ideas, not necessarily words, came through garbled. As both sides worked harder to understand, we found we were spending more and more time defining terms. The need for a special glossary was soon evident. A special

project group was formed just to work on this glossary. It was agreed that this glossary would contain construction related terms that did not contain corresponding equivalents in American or Russian, or words that had the same general meaning in both American and Russian but whose precise definitions don't coincide because of specific differences in each country. There has been substantial work on this and the first edition of the Soviet-American Glossary has been published. If we are going to continue to try to understand and learn from each other, then this work must be continued. In fact, the members of this project group on both sides are soliciting the contribution of definitions. Simple dictionary definitions do not work. The only practical method seems to be to discuss and obtain the meaning for terms that come up in conversations. If you have a definition to contribute, we would appreciate receiving it. If you are interested, you can obtain copies of the glossary from the Superintendent of Documents for $2.45. I think this is important work, as without this level of communication, little real understanding is possible.

I do feel we can learn from the Soviet Union about building design and construction. We can relearn an old lesson about matching needs with means. With this in mind, we should be able to help developing nations help themselves. So can the Soviet Union for that matter. We can take advantage of significant costly research that has been and is being done in the Soviet Union. I know of significant research in the areas of heating and cooling, as well as structures, that is not being done in this country. And to facilitate all of this, we should continue with aids to understanding such as the Glossary mentioned. The more we understand each other, the more we can gain from each other.