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CONSTRUCTION AND RELATED INDUSTRIES

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USSR REPORT

CONSTRUCTION AND RELATED INDUSTRIES

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CONSTRUCTION PLANNING AND ECONOMICS

GOSSNAB OFFICIAL ON BOTTLENECKS IN SUPPLY SYSTEM

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE in Russian No 10, Oct 84 pp 3-8

[Article by N. Arkhipets, Deputy Chairman of USSR Gosstab: "Supporting Capital Construction at the Modern Requirements Level"]

[Text] The development of capital construction and its transformation into a huge industrialized branch of the national economy is a subject of constant attention of the Communist Party and the Soviet state. A major program for construction and the rehabilitation of fixed capital is being executed in the country. During the Ninth and 10th Five-Year Plans and the first 3 years of the 11th, more than 3,000 industrial enterprises, as well as housing with a total area of more than 1 million square meters, were built and put into use. Construction and installing work volume during this period almost doubled.

The successful erection of the Kama Truck Plant, the Baykal-Amur Mainline and facilities for the Foodstuffs and Energy programs testify that our party's Central Committee and the Soviet Government are extending daily assistance to the builders. The CPSU Central Committee and USSR Council of Ministers Decree, "Improvement of the Planning, Organization and Management of Capital Construction," is a bright new confirmation of this.

The decree emphasizes that, along with the achievements in capital construction, there are many unsolved problems. It is generally known, for example, that not one branch of the national economy can be developed without the rehabilitation of fixed capital. This is why vast resources are being allocated to the construction of new enterprises and to the rebuilding and reequipping of old ones. Our country occupies one of the leading places in the world in amounts of capital investment. However, it is still being dispersed over numerous facilities, in some branches uncompleted construction above the norm is still great in volume, and the proportion of work done to rebuild and reequip production facilities is inadequate.

At present, the dispersal of funds and material resources has reached such a level that the construction industry is becoming uncontrolled, and the significance of a further increase in capital investment volume is being lost. And this is natural. Suffice it to say that right now some hundreds of thousands of facilities are under construction.

Such a large number of construction projects hampers the supplying of them with materials and equipment. Let us cite just one example. This year, in

order to carry out the program for construction and installing work, the construction ministries have requisitioned an additional 500,000 tons of rolled metal. If this amount were allocated, then each construction project would get about 1 ton. Would the supplying of capital construction with metal be improved? Of course not. Indeed, a similar picture also prevails for other types of resources. Moreover, worker personnel and construction equipment are being dispersed.

All this entails the nonfulfillment of plans for introducing capacities and facilities into operation. It is no secret that 10-15 years elapses between the start of design work and assimilation of the average enterprise at full design capacity. This is by far higher than the norm-set duration for building such enterprises.

The CPSU Central Committee and USSR Council of Ministers Decree points out that such negative phenomena are the result primarily of deficiencies in the organization and management of capital construction. The responsibility of the client ministries and their associations and enterprises, as well as of the construction ministries, for fulfillment of tasks for introducing capacity and facilities into operation, for the effective use of capital investment, and for improvement of financing and economic indicators in construction is weakened. The existing system of evaluating the activity of construction organizations and the absence of cost-accounting relationships do not aim them at the final results--the introduction of facilities and complexes into operation.

Unfortunately, construction science and practice have not worked out an economic mechanism that will join into a single whole the complicated economic system which capital construction represents. Therefore, the potential capabilities inherent in them are not being used completely. From this flows the necessity to create an organizational structure that will connect all capital construction participants into a single complex and will present them with rules under which they will bear responsibility for putting capacity and facilities into operation on time.

It is precisely this at which the CPSU Central Committee and USSR Council of Ministers Decree, "Improvement of the Planning, Organization and Management of Capital Construction," is aimed. It contemplates a broad program for further improving the whole system of construction affairs. It emphasizes that successful fulfillment of the intended measures for increasing capital construction effectiveness should rest upon a balanced plan, with the construction and installing work volume coordinated with the regional capacity of construction organizations.

It should be stressed that this decree is a long-term program that can be implemented only on the basis of improvement in the planning, organization and control of capital construction and reinforcement of the responsibility of each person for the matter entrusted to him.

The decree defines with precision the tasks of the statewide system for supplying materials and equipment. "USSR Gosstab's regional organs," it says, "should supply resources for construction projects in complete sets in terms of selection of the items and the grade thereof, in accordance with work orders and job authorizations, with the schedules of construction and installing operations taken into consideration."

The USSR Gossnab Board has examined measures aimed at realizing the CPSU Central Committee and USSR Council of Ministers Decree. A directive has been issued which defines the tasks of interbranch administrations, soyuzglavsnabsbys [All-Union main administrations for the supplying and marketing of materials and equipment] and regional organs. The main thing is that they should assimilate the principle that the supplying of materials and equipment largely determines the level of capital-construction plan fulfillment. All our work should be built upon this fact.

If, let's say, the construction period for some facility is stretched out, then funds are frozen and turnover thereof is slowed. Consequently, the requirement for materials for a given time interval is increased. This necessitates constant improvement of construction technology based upon modern equipment.

Unfortunately, the opinion exists in certain Union-republic Gossnabs, main regional administrations and other supply organs that the introduction of new equipment and advanced work methods at construction projects is not our affair. This is a radically untrue judgment. In actuality, any innovation relies primarily on appropriate support with materials and equipment. Therefore, everything that is new in capital construction should be reflected in our plans.

For supply specialists, even the forms for organizing capital construction cannot be a matter of indifference. Even though indirectly, they exert an influence on the degree of material-resources utilization. If, for example, reliable management of an object's erection is lacking, then a continuous operating process is not provided for, construction time is extended, materials are overexpended, and the equipment allocated does not yield the proper benefit.

Therefore, the whole economic mechanism of capital construction should be of interest to the workers of USSR Gossnab regional organizations. It is their duty to see to it that the material incentive for builders is correlated with savings and rational use of resources.

The first-priority task of supply organs is not the various verifications but integrated measures to improve the supplying of materials and equipment for construction operations, the same as, incidentally, for any other production endeavor. Literally, everything should interest them. We say that uncompleted construction, with which supply and marketing organizations supposedly are not concerned in any way, actually provokes arrhythmia in the system for providing the construction project with materials. Therefore, the organs should in every way possible give help and reduce the amount of uncompleted construction.

In brief, the CPSU Central Committee and USSR Council of Ministers Decree, "Improvement of the Planning, Organization and Management of Capital Construction," requires the whole activity of USSR Gossnab organs to be restructured. Their function now is being expanded greatly. They should also go into problems they did not previously become involved with. Indisputably, this will also require a restructuring of the psychology of the workers of the nationwide system for supplying materials and equipment. This job is difficult, but it is absolutely necessary.

The USSR Gosstnab directive indicated that the most important tasks of our system's organizations are to provide material resources and to fulfill plan tasks for putting production capacity and facilities, housing, preschoolers' institutions, and educational and municipal-services facilities into operation, accelerating construction, reducing the prime cost of construction and installing work, and increasing labor productivity and savings of material resources.

In order to fulfill these requirements, our organs should operate in close collaboration with other participants on the construction assembly line: clients, designers, builders and installers. Back at the stage of formulating plans for capital investment and construction and installing work, allocations of material resources and financial resources for facilities connected with introducing the newest scientific and technical achievements into the national economy and for the technical reequipping and rebuilding of existing enterprises should be made, and the integrated development of the economy's raw-materials and processing branches and elimination of inter-industry and intraindustry disproportions should be achieved.

Let us say it frankly: we have not been concerning ourselves with this matter. Therefore, special groups of people must be selected and freed from all their current tasks so they will insure successful fulfillment of the work assigned. It should be kept in mind that the success of their activity will depend greatly upon how correctly we define the scope of the tasks and arrange for precise mutual action with other construction participants.

Such mutual action has been absent until now. The cause is bureaucratic isolation. Therefore, many workers of USSR Gosstnab's central staff and regional organs are of the opinion that they are called upon only to fill orders for the so-called stocks. This is an incorrect, outmoded view. Our task is to achieve a balance in the capital investment ceilings and the amounts of construction and installing work with the material resources. On that basis alone can we arrange for regularity in supplying capital construction.

Or let us take another example. In order to solve some question correctly, corresponding information about progress in organization of the supplying of materials and equipment is necessary. Unfortunately, we are not providing it. There is a mass of tables, forms and various documents, but there is no information. Much information is so distorted that it does not inform, and in some cases it misinforms. This will not help, and it will interfere with the work.

And even the clients, designers and the builders themselves, in maintaining their agency's interests, at times put a stick in the wheel, as they say, of the supplying and marketing organizations of our branch. USSR Gosstnab soyuzglavsnabsbyts and regional organs should accept orders to support construction jobs with supply and equipment resources only where there are approved design and budget-estimating documentation and lists of requirements for materials and constructional structure. An active instrument for the rational use of resources is thereby placed in the hands of our organs. But the fact is that they seldom get the indicated documentation. The designers and builders are in no hurry to carry out the requirements laid on them.

In their decree, the CPSU Central Committee and USSR Council of Ministers instructed clients and construction ministries and agencies to review prior to 1 April 1985 and to refine design and budget-estimating documentation for construction projects carried over to the 12th Five-Year Plan, with a view to providing a high technical level for the enterprises that will be built under these designs and to exclude from the designs and estimates any excesses that will cause an irrational use of supply and equipment resources. This is a new field of work for our system's organs. Therefore, it must be approached with all responsibility.

All activity for implementing the decree of the CPSU Central Committee and USSR Council of Ministers should be creative in nature. Highly qualified economists and engineers who can independently resolve problems that arise should be involved in it, and rational use should be made of material resources.

Execution of the measures contemplated by the party and the government will require substantial capital investment and a long period of time. At the same time, there are also those questions that can be solved in a short time and without any considerable expenditures.

One of these questions is improvement of supply for capital construction. Today, because of arrhythmia and technical infeasibility (keeping in mind the whole cycle, from the planning within the construction organizations to our territorial organs), work time losses are at least 10 percent. As a result, each year about 7 billion rubles' worth of construction and installing work does not get done.

This does not mean to say that there are not enough materials. They are completely adequate. However, the supply often is not linked with the construction technology and is not executed with complete sets and with the range of articles that are necessary. If one goes by the gross amount (as is being done now), then the general picture is sort of favorable. Actually, idle time occurs with regularity at some jobs and in some organizations and even regions because of a lack of various resources. This can be confirmed by a mass of examples of interrupted deliveries this year. I think that there is no necessity for this, and the examples are well known to the regional organs.

We must rid ourselves of evaluations of gross amounts in supplying construction projects with materials. All deliveries should be executed according to specific agreements, in strict accordance with the construction schedules. This task should not be taken as a simple one: since we are carrying out the tasks within the funds allocated by the ministries, then there can be no special difficulties. It must be said frankly: our systems' regional organs today are not ready from either an organizational or a technical point of view to solve it. Enormous work is to be done. Particularly at enterprises that make deliveries, reserves of material resources should be created that will permit construction organizations to be supplied with them with regularity.

Many organizational and technical questions will be resolved with the introduction of a single system for supplying capital construction. It will enable not only material resources to be used rationally, but the functions of supplying them with materials and equipment to be performed in a new way,

obsolete styles and methods to be dispensed with, and unnecessary meetings, reports and other paper-generating activity to be precluded.

According to our calculations, this system will enable 10 billion rubles of capital investment that are now spent on creating construction and installing organization capacity to be saved and reserves of materials and articles to be reduced by a billion rubles. By excluding irrational substitutions, over-expenditures of materials will be reduced by 500,000 rubles. The introduction of fixed capital will be increased by 10-15 billion rubles. Finally, manning by workers engaged in supplying capital construction with materials and equipment will be reduced by 100,000 to 120,000.

This is why it is necessary to speed up the execution of measures that call for a unified system for supplying capital construction. This is still being done at a slow pace. The fact is that some supervisors of construction ministries and of our system cannot rid themselves of old methods, while a multitudinous army of workers of USSR Gosstroi regional organizations and construction organizations is engaged in supplying construction jobs. But there is no other way. This important matter should be put in one pair of hands--the nationwide system for supplying materials and equipment.

It is especially necessary to speak about problems in supporting the construction of housing and cultural and domestic-services facilities, a most important question of the social program of the current and the 12th Five-Year Plans. As is known, at the initiative of the Volga Regional Main Administration and the builders of Saratovgesstroy [Saratov Trust for the Construction of Hydroelectric Power stations], an experiment is being conducted to work out a new system for supplying housing construction, under the provisional name "Housing for the Newcomer." This will enable housing construction quality to be improved and a large amount of material resources to be saved.

Fulfillment of the CPSU Central Committee and USSR Council of Ministers Decree, "Improvement of the Planning, Organization and Management of Capital Construction," will require a high state of discipline and aggressiveness on the part of all USSR Gosstroi workers and improvement in the style and methods of managing the branch. We must discard everything that interferes with the work: paper-generating activity, red tape and a striving by some comrades to avoid the solution of concrete questions. Everything will depend upon the people, upon their creative activeness and a national understanding of the responsibility for the job assigned.

As an example of conscientiousness in performing one's duty, the activity of USSR Gosstroi plenipotentiary representatives at the various construction projects planned for startup this year can be cited. They have done much to see that these jobs have been provided with all that is necessary and to enlist the services of everyone considered necessary to solve the questions that arise. If today the work of our regional organs, the soyuzglavnabstovys, the soyuzglavkomplekts [State Administrations for Outfitting Especially Important Construction Projects of the Coal, Oil and Other Branches of Industry with Equipment, Instruments, Cable and Other Items] and interbranch administrations were raised to this level, then the task would basically be solved.

Not much time is left before the end of this year. The main burden of fulfilling the construction program will be felt in coming months. Therefore,

it is the paramount duty of all our system's organs to provide all construction jobs with material resources and not to allow interruption of their introduction into operation.

The central staff and the regional organs of USSR Gossnab, which have enormous work experience, should do everything possible to insure that the CPSU Central Committee and USSR Council of Ministers Decree is carried out and to make a meaningful contribution to improvement of the planning, organization and management of capital construction.

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NEW CRITERIA SOUGHT FOR DETERMINING MATERIAL REQUIREMENTS

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE in Russian No 10, Oct 84 pp 23-28

[Article by V. Spektor, doctor of economic sciences, professor: "Project Documentation and Computation of Demand"]

[Text] The resolutions of the CPSU Central Committee and the USSR Council of Ministers on improving the economic management mechanism, strengthening the conditions of the economy, and increasing discipline in deliveries present high requirements for the planning of material-technical supply to the national economy, particularly to capital construction. First of all, it is necessary to eliminate the serious shortcomings in the methods of determining the demand of building organizations for resources and solving problems of balance in the sector.

The existing methods of balancing plans for construction-installation work with plans for material-technical supply at all levels of management and stages of planning still do not allow for sufficient coordination of these plans by the complete resource nomenclature and time intervals. Moreover, these methods do not consider the probable character of consumption and supply of materials. As a result, a shortage arises in one resource or another. This leads to obvious or hidden losses in work time, to increase in time for performing construction-installation work, to growth of the volume of unfinished construction and to formation of above-norm reserves of material goods.

As we know, one of the primary tasks of supply-marketing and complement supply organizations is the timely and complete delivery of structures, parts and materials in accordance with the construction schedules, the concentration of material resources at start-up construction sites, and the economical and rational application of materials. In order to resolve these problems in construction, a progressive sector-wide system of production-technological complement supply is being introduced, along with the implementation of a gradual change-over of construction organizations to complement supply according to demand determined by projects and estimates. In this case, the territorial organs of the USSR Gosstab [State Committee for Material and Technical Supply] are taking on the functions of supplying construction sites to an ever larger degree.

However, this system is still not finding sufficiently widespread and complete application. To a certain degree, difficulties arise at the moment of computing the need for resources and formulating delivery orders on this basis. Because of incorrect determination of needs, and consequently delivery of materials in the wrong nomenclature and volume, there is a disruption in the schedules for operational introduction of facilities in a number of cases. More importantly, excess reserves are formed in one place, while shortages of resources arise in another. All this leads to imprudent application of the existing material resources at building organizations.

The solution to this problem must begin with the project-estimate documentation. It must define the amount and types of materials, structures and parts needed for each building and structure undergoing construction.

How is this question being resolved at the present time? In fulfilling the resolution of the CPSU Central Committee and the USSR Council of Ministers on improving the economic management mechanism, the USSR Gosstroy [State Committee for Construction Affairs] has developed and introduced into effect the new GOST 21.109-80 [All-Union State Standard], according to which the project design institutes of all ministries and departments must submit reports of demand for materials, structures and parts as part of their working documentation. To develop the GOST standard, the Scientific-Research Institute on Construction Economics has compiled, and the USSR Gosstroy in cooperation with the USSR Gossnab, have ratified the Methodological Directives for Determining Demand for Materials, Structures and Parts as part of the project planning documentation on construction.

At the present time, the data on demand for materials, structures and parts within the project planning documentation is formulated at three levels. First, in the specifications on appropriate blueprint sheets developed in accordance with the previously effective GOST 21.104-79. Secondly, in the reports on demand for materials compiled in each set of blueprints for buildings and structures (architectural decisions, reinforced concrete, metallic, wood structures, architectural-construction decisions, electrical supply and others). There are three types of such reports compiled, each of which considers the specifics of their development within the individual sets of blueprints. These are reports on metallic structures according to types of profiles and grades of metal--a computation of need for materials for the manufacture of metallic structures; reports on the volumes of prefabricated concrete and reinforced concrete structures--a computation of need for these products according to a consolidated nomenclature; reports on need for materials--a computation of the necessary amount of materials for the production of construction-installation work and the manufacture of structures and parts according to the remaining sets of blueprints.

Finally, the data on the necessary amount of resources are indicated in a summary report of need for materials. It goes into the full set of blueprints for the buildings and structures.

The planning indicators of need for material resources which are contained in these special documents, which have been introduced into the project make-up for

the first time, are aggregated from one level to the next, with adaptation of natural demand to specific units of measure. The aggregation and adaptation is done in such a way that the standard information formulated at each level may be used for determining the need for material resources by construction-installation organizations for the plan year by physical volumes of work, for formulating orders with full complement supply through the territorial organs of the USSR Gosstroy, and for preparation for building production.

After the issuance of the GOST standard and after obtaining the Methodology, project planning institutes have begun to develop this important work. However, it has not yet everywhere been precisely organized or implemented in full measure. An investigation into adherence to the new GOST standard performed by the USSR Gosstroy and its scientific organizations, as well as sections of the USSR Stroybank [Bank for Financing Capital Investments] has shown that at many project planning organizations the development of reports on needs is done only in individual sets of blueprints (primarily reinforced concrete and metallic structures, architectural-construction decisions). Some project planning institutes have not even begun this work. In connection with this, the USSR Gosstroy, USSR Gosstroybank and USSR Stroybank have taken appropriate measures aimed at stopping these infractions, including special economic sanctions.

Having accumulated experience in working out reports by hand, a number of leading project planning institutes have begun seeking out possibilities for reducing the labor consumption for their compilation by means of automation. The question of which direction to choose had to be resolved. Was it better to go through partial automation--"reports for the sake of reports," which is considerably simpler and quicker, or was it better to plan an automated system which, aside from producing reports, would make it possible to perform further automated computations of the annual demand by construction organizations for material resources in accordance with projects and estimates, and to resolve the question of delivery times as adapted to the technology and schedule for construction of the facility within the system of preparation for building production? Moreover, the following problem has arisen: to develop an autonomous system for project planning institutes or to adapt it to the existing automated systems for output of estimate documentation?

The previously performed studies made it possible to begin the development of the Automated System for Formulation of Project Information on Material Resources. The decision was made to conduct the development of this system in conjunction with the Automated System for Output of Estimate Documentation, since it was the most widespread and effectively functioning system in the project planning organizations. As a result, a new automated system was developed and introduced into operation. This work was implemented by the USSR Gosstroy NIIES [Scientific-Research Institute on Construction Economics] in conjunction with the project planning institutes and organizations having considerable experience in the application of mathematical methods and computer technology--Belgosproyekt, KazpromstroyNIIProyekt, Moldavgiprostroy and others.

The automated system for formulation of project information on material resources compiles reports on the need for materials for each basic set of blueprints,

as well as a summary report for the building, structure, or part being designed. For example, in blueprints where reinforced concrete structures are being planned, reports are developed on the materials for manufacture of these structures according to GOST 21.109-80, as well as a report on volume of pre-fabricated reinforced concrete structures according to GOST 21.503-80.

Moreover, a report is compiled in the automated mode which includes materials for the production of construction-installation work. A summary report is compiled on the basis of reports for the sets of blueprints and for production of construction-installation work. This summary report considers the full expenditure of materials for the building or structure. The system also makes it possible to formulate information on material resources for application in solving problems on preparation of building production—determining the need for material resources for the plan period, compiling documentation for complement delivery within the make-up of the plan for work production, and compiling indicators on material consumption of the planned facilities. It also formulates certain initial information necessary for the Unified System of Planning of Capital Construction being developed by the USSR Gosplan.

The process of formulating reports on needs provides for obtaining project information on material resources in various nomenclature (specified, plans for economic and social development of the USSR, USSR Gosplan, USSR Gossnab, ministries and departments, as well as for the development of norms and standards). The specifications for industrial structures and products, reports on the volumes of construction-installation work, a unified estimate-standard base for construction, special and installation jobs with inclusion of necessary norms and standards for obtaining reports on need for materials which are based on estimate standards comprise the initial information for this process.

In accordance with the decision of the USSR Gosstroy, last year the developmental institutes passed on this automated system to the base project planning institutes of all the construction ministries and departments, as well as to the USSR Gossnab Main Computer Center. They all received magnetic tape with program provision and a normative base, as well as technical documentation which describes the methodological and normative provision of the system. At the present time, this system is being introduced at over 100 project planning organizations, and most widely in Belorussia, Moldavia, Latvia, and Kazakhstan.

The transition to an automated system makes it possible to reduce the labor consumption of determining need for material resources by 30-40 percent at the planning stage. According to the data of Moldavian institutes, in organizations with planning work volume of around 2 million rubles, there is a conditional staff reduction of 47 persons with potential growth of such jobs in the sum of around 175,000 rubles. Construction organizations also benefit greatly. Due to simplification in accounting methods, they are able to more precisely determine the need for materials for the plan year. Ultimately, this facilitates improved provision of construction sites through the USSR Gossnab organs in accordance with projects and estimates.

After appropriate correction, the reports on need for each facility worked out in the project planning documentation should be used in the USSR Gossnab

automated system. The plans for material-technical supply to construction must be formulated on the basis of these data.

Under conditions of intensification, it is especially important to ensure balance of the plan assignments for construction with the available resources. Developing the standard base and increasing the degree of scientific substantiation of methods for computing the need for materials in accordance with the plans and estimates increase the level of plan balance to a certain degree. However, this is not enough. It is necessary for the demand to be coordinated with the material resources which are produced and allocated in a centralized order for ministries, departments and their building organizations.

For purposes of rational application of material resources and their concentration at vital facilities which are being introduced into operation, it is necessary to improve the methods of their distribution at various levels of management for the purpose of formulating plans of building production which are balanced with the plans for material-technical supply. The way in which the resources are distributed determines to a large degree the level of balance between plans and results of production-economic management activity of construction ministries and their organizations, and specifically the level of their material expenditures.

We must note that the plan for the current year provides for a 0.2 point reduction in the production cost of construction-installation work in prices effective until 1 January. This includes a 0.15 point reduction in the level of material expenditures. Expenditures per one ruble of construction-installation work are planned in the amount of approximately 92 kopeks, including around 56 kopeks for material expenditures.

Under conditions of existing limitations on certain types of materials, their distribution should be implemented with consideration for the priorities of individual sites.

At the present time, the scientific-research institutes and the practical work of the ministries does not devote enough attention to all these questions, while the existing scientific developments of methods for distributing material resources are oriented toward the traditional system of planning "by gross", i.e., by the volume of construction-installation work, and do not consider current requirements for planning construction according to finished (commodity) production.

An analysis of some of the existing methods of distributing resources with consideration for priority of the facilities, as for example in the Ministries of Construction of the Estonian, Latvian SSR and others, has shown that they are based on expert evaluations. Among their basic shortcomings we may list primarily the absence of an integrated approach to the application of priority factors in determining the significance of the facilities for the national economy. New conditions for planning construction and its supply through the territorial organs of the USSR Gosstab are also not considered. There are no scientifically substantiated methods which make it possible to determine the

priority of facilities in an automated mode on the basis of a formalized multifactorial system of priorities. Such requirements for intensification of construction as first priority allocation of resources to facilities under reconstruction and technical retooling of existing enterprises and reduction of material consumption for facilities are also not considered.

The identified shortcomings are eliminated to a significant degree in the proposed methods of balance coordination of plans for building production and material-technical supply on the basis of improved methods of distributing material resources. These have been developed by the USSR Gosstroy NIIES and have been experimentally tested in planning material-technical supply at the level of the union republic and republic ministry, glavstroy [main construction administration], and territorial administration on construction.

In order to achieve coordination in the republic construction ministries between the plans for material-technical supply formulated according to the average and average sectorial material expenditure norms and the demand for these materials, which is determined by plans and estimates, a special economic-mathematical model for distribution of material resources has been developed. This model considers the priority of facilities under construction. The model is proposed for use as a method of balance coordination for plans on material-technical supply and building production implemented in the period of formulation of annual plans in the republic construction ministry and allocation of materials to its organizations.

The proposed method provides a solution to the problem of distribution in complex with determination of need for materials, and with the formulation of plans for material-technical supply based on unified information provision with the application of computers. The data on need for materials by each facility are used as the initial information for accounting in the republic ministries, glavks, and territorial building administrations. These data are determined from plans and estimates, as well from planned volumes of commodity building production and construction-installation work. The results of resource distribution, in turn, are used for formulating a plan for material-technical provision in the middle link of construction management.

Distribution of material resources is implemented by means of comparing the existing limit with the need for resources by facilities, ranked in order of descending priority, i.e., by their significance to the national economy.

The determination of the priority of each facility is done according to the combination of the following indicators: the importance of the facility, the stage of construction, the state of construction, the character of construction, the time of introduction, and the effect of the allocated material resources on the creation of commodity building production.

In accordance with this classification, the facilities are ranked by their importance. They are subdivided into construction sites of union, republic, and departmental significance, and others. The indicator of "union significance" is given to facilities in the plan for economic and social development of the USSR which are being built on the basis of compensation agreements and foreign

licenses, on the basis of integrated imported equipment, as well as in extremely important sectors. The other indicators are defined in a similar manner. In accordance with this, the most important facilities for the plan year are identified.

Facilities of equal importance are subdivided according to the indicator "stage of construction" into start-up and non start-up facilities. The group of start-up facilities (those to be introduced in the plan year) are given preference.

Facilities with identical indicators of "importance" and "stage of construction" are subdivided according to the indicator of "state of construction" into those carried over from the previous year and those which are new starts. Preference is given to those which are carried over from the preceding year. This also ensures a limitation of the number of facilities under simultaneous construction.

If the first three indicators are identical, the facilities are distinguished by character of construction as those undergoing reconstruction or new construction. The first group is given preference.

Start-up construction sites with all identical indicators are subdivided into facilities which are to be introduced in the first, second, third or fourth quarters. The sooner the facility is introduced into operation, the higher its priority.

Start-up and non start-up facilities with identical indicators ("importance of facility," "state of construction," "character of construction," "time of introduction") are ranked in ascending order by value of the newly introduced indicator, "effect of the allocated material resources on the development of commodity building production."

The application of this indicator makes it possible to complete ranking of the facilities within each priority group. All the other priority factors presented above are group indicators. For start-up facilities the indicator of effect of allocated material resources on the development of commodity building production is defined as the relation of the site's need for sheet metal stock to the planned volume of commodity building production (metal is selected as the leading material in the industry and as the material in short supply). For non start-up facilities this same indicator is defined by means of the relation of need to planned volume of construction-installation work.

The priority of a facility is characterized by the set of numerical values of the priority indicators indicated above, which represent the classification code. The ordinal number of the facility is determined in accordance with it. The lower it is, the higher the priority of the construction site. This system makes it possible to automate the process of establishing priorities.

This system is taken as the basis for the economic-mathematical model for distribution of material resources. Four distribution algorithms have been worked out on the basis of this model. The first determines the priority of the facilities in accordance with the adopted classification of their indicators. It

provides for ranking of the facilities in descending order of their importance (increasing priority numbers and priority codes). The first algorithm is a component part of the second--the distribution of a single resource, and the third--the distribution of a group of resources mutually dependent by technology of consumption in the production of construction-installation work. Finally, the fourth algorithm determines the order of formulating the indicators characterizing the degree of balance for plans of building production--commodity building production and construction-installation work with material resources.

This economic-mathematical model and the algorithms for distribution of resources are used in the Belorussian Ministry of Industrial Construction in automated balancing of plans for contract work and material-technical supply. As a result of computer accounting, plan documents are issued in the current planning of supply. The annual economic effect from the introduction of the proposed methods comprises 0.22 percent of the estimated cost of construction-installation work performed by the republic construction ministry.

The results of the performed studies have been taken as the basis for further development of optimal methods for distribution of material resources in union republic construction ministries. In solving plan-balance problems, all the basic principles presented above must be used. However, it is necessary to consider the considerable peculiarity of the methods of planning material-technical supply and the normative base, which function specifically at this level of management.

Thus, in distributing materials, the main supply administrations of the union republic construction ministries must consider, on the one hand, the amounts of funds centrally allocated by the USSR Gosplan [State Planning Committee] and the USSR Gosstnab for the plan year, and on the other hand--the need for resources determined by average materials expenditure standards, which depend on the sectorial and intrasectorial structure of construction-installation work for each republic ministry, main construction administration, and territorial construction administration.

The average expenditure norms for building materials reflect the effect of changes in the sectorial structure of construction-installation work for the plan year as compared with the base year. In connection with this, they must facilitate optimization of such a structure with consideration for the problems facing the ministries in the plan period.

Optimization should be tied in with a new mechanism of managing building production which is oriented toward finished (commodity) building production. The structure of the construction-installation work must ensure the fulfillment of the plan for operational introduction of production capacities and facilities, the fulfillment of the tasks on volumes of commodity building production and contract construction-installation work, and the creation of a standard volume of unfinished construction. The change in average expenditure norms for material resources in the plan year as compared with the base year resulting from a change in the sectorial structure of construction-installation work with unchanged material expenditure norms for the facility per one million rubles of construction-installation work is quantitatively expressed by the coefficient of optimal structure effect.

The average standards for the distribution of material resources by organizations which are part of the union republic construction ministry must be formulated on the basis of this coefficient.

We must note that under traditional methods of material resource distribution, the main supply administrations of the construction ministries do not give sufficient consideration to these most important positions. Moreover, they do not take into account the presence or development of production capacities of building organizations in the plan year, nor the fixed capital of building industry enterprises, or the state of labor resources of the republic ministries, main construction administrations, or territorial construction administrations. This leads to the situation whereby some administrations cannot effectively utilize the distributed material resources because of a lack, for example, of the necessary amount of labor resources and fixed capital. In other administrations, on the other hand, there is a shortage of material resources. This situation leads to underutilization of materials and non-fulfillment of tasks on finished (commodity) building production.

Studies have shown that without the application of economic-mathematical methods and computers, it is impossible to solve the problem of optimal distribution of material resources in the union republic construction ministries in such a way as to consider all these requirements and to utilize a significant volume of standard-reference information.

For this purpose, NIIES has developed an appropriate economic-mathematical model. A special role in it again belongs to priority. Depending on the method of its formulation, the criterion of optimal character orients the process of distribution toward a concentration of material resources at start-up facilities, the implementation of maximal output of finished building production and minimization of its production cost and reduction of construction time. It is thereby aimed at the rational application of the material resources allocated to the ministry.

The optimal distribution of material resources on the basis of an economic-mathematical model is performed with consideration of several conditions. First of all, the limitations in material resources are taken into consideration. The amount of material resources present in the computation is determined by the funds allocated by the USSR Gosplan and USSR Gosstrib, by the economy according to the plan for organizational-technical measures, and by the reserves at the end of the current year and materials remaining at building organizations at the start of the plan year.

Secondly, there are limitations in the fixed production capital of every territorial organization. The balance cost of the active portion of fixed production capital in the plan year serves as the limiting value.

Thirdly, the limitations in labor resources must be considered. The total need for them, which is determined as a result of optimization of the structure of construction-installation work, must not exceed the average listed number of workers in the plan year.

Finally, the limitations in volumes of construction-installation work must be taken into consideration. This condition predetermines that in every territorial administration the volume of construction-installation work must be no less than that planned in the five-year plan and must not exceed the volume reported by the customer in the plan year.

Based on the proposed methods, experimental computations of the effective distribution of material resources have been conducted (using metal as the example) at the USSR Ministry of Construction. A program developed by the Scientific-Research Institute of Automated Systems, Planning and Management was used for this purpose. The computation was performed at the Main Informational Computing Center of the USSR Ministry of Construction.

Two computations were performed with different criteria. In the first one, the criterion reflected only the rational distribution of metal. In this case, a plan for its distribution was formulated, according to which the average expenditure norm became 3.3 percent less than the norm computed according to the existing methodology.

In the second experimental computation, a criterion oriented toward maximal increase in the operational introduction of production capacities and facilities was used. As a result, a more complete plan for distribution of material resources was formulated at the USSR Ministry of Construction. According to this plan, the concentration of these material resources was greatly increased at start-up facilities as compared with the first computation, and consequently the application of these resources was improved.

Thus, the examined methods allow us to achieve a higher level of balance between plans for material-technical supply to construction ministries, while at the same time determining the demands according to plan average norms per million construction-installation jobs and on the basis of computations of necessary material resources for their construction organizations in accordance with projects and estimates.

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CONSTRUCTION PLANNING AND ECONOMICS

NEW APPROACH TO CAPITAL CONSTRUCTION PLANNING DISCUSSED

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[Article by V. Serov, section chief, USSR Gosplan, and V. Borodin, director of NIEI sector under the USSR Gosplan: "On Developing a Unified System of Planning Capital Construction"]

[Text] The development of a highly effective economy is a task of primary importance. Its resolution requires the restructuring of social production management and the entire economic management mechanism. The key direction in improving management of the national economy is the cardinal transformation of the existing system of planning capital construction.

The resolution by the CPSU Central Committee and the USSR Council of Ministers entitled "On Improving Planning, Organization and Management of Capital Construction" outlines an extensive complex of measures for radical change in the state of affairs in this sector. Among the most important and first priority measures is the development of the Unified System of Planning Capital Construction (YeSPKS) on the basis of broad application of computer technology. This system is to be developed prior to 1 January 1986 by the USSR Gosplan [State Planning Committee], with the participation of the USSR Gosstroy [State Committee on Construction Affairs], USSR Gossnab [State Committee for Material and Technical Supply], USSR Stroybank [Bank for Financing Capital Investments, USSR TsSU [Central Statistical Administration, USSR ministries and departments, and the Councils of Ministers of the union republics. What has necessitated the development of the indicated system in such a short time?

The scope of capital construction in the country is huge. It is enough to say that over 20,000 sites of production function alone are being built, and on the average over 300,000 square meters of general housing area are submitted per day. Capital construction is planned and carried out in 15 union republics and in over 90 ministries and departments of the USSR. Over 3,000 trusts are performing construction-installation work, and almost 2,000 organizations are engaged in planning-survey work. Over 6,000 enterprises in almost 35 USSR ministries and departments manufacture building structures and parts. Tens of machine building ministries manufacture equipment. There is a wide network of organs for planning, statistics, material-technical supply and financing of construction.

The existing mechanism of managing capital construction came about generally in the 60's, during the period of extensive development, and has not undergone any significant restructuring despite the considerably increased scope and complexity of the economic ties and intensification in specialization by the participants in the investment process. As a result of this, as noted in the decisions of the 26th Party Congress and subsequent Plenums of the CPSU Central Committee, numerous unresolved problems have accumulated in capital construction. Plans for the operational introduction of capacities and facilities are not always fulfilled, and their construction time is often significantly higher than the standard. Shortcomings in planning capital construction have not been eliminated. Dispersion of capital investments over numerous construction sites is allowed, as well as the diversion of construction and installation organizations, materials and technology from facilities provided for in the plan to unplanned ones, etc.

One of the reasons for the situation which has arisen is the insufficient organizational role of the plan for capital construction in implementing centralized management of the investment process. Specifically, we are referring to the absence of an effective mechanism for ensuring precise coordination of action by all participants in capital construction at the national economic and subsequent levels. Only in the presence of such a mechanism, which is based on current scientific-methodological, informational, technical and computing means, will a multi-level system of management organs (as an organic part of this mechanism) be able to manage the investment process as a unified whole and to withstand departmental and local tendencies.

Planning is the leading link in management. Therefore, YeSPKS must become the nucleus for the integrated system of management of capital construction which is currently being formed. The make-up of this system also includes the automated system of state statistics of the USSR TsSU, the unified system of supply to capital construction (YeSSKS) of the USSR Gosstroi, the automated system of financing construction of the USSR Stroybank, the ASU [automated control system] of the USSR Gosstroy, and others.

The main target function of YeSPKS consists of realizing the most effective directions for capital investments; the provision of balance in plans for capital construction with resources, as well as with the capacities of construction-installation organizations by sectors as a whole as well as in the territorial crosssection; the achievement of an integral connection in the plans between planning existing production and new construction, etc.

However, this may be implemented only on the basis of management systems of a qualitatively new type. They have an integrity which encompasses all the stages of the planned process and all its participants. They utilize not simply computers, but computer complexes and automated systems, and therefore ensure the comprehensive mechanization and automation of management. However, all this requires a radical restructuring of the existing organization of planning and technology of plan development, a preparation for informational and mathematical provision, and training of the personnel. It is expedient to introduce the new management systems not in individual fragments, but comprehensively. We must concern ourselves not specifically with computers and with the solution

of individual problems using these machines, but rather with the formulation of a new technology, organization and methodology of planning as an integral whole which is based on current computer technology. Such work presupposes the skilled application of a systems approach methodology and the broad application of systems analysis methods and formal and informal research methods.

In order to develop a Unified System of Planning Capital Construction in full volume, it is necessary, along with a subsystem of the USSR Gosplan's YeSPKS level, to develop sectorial and departmental subsystems at over 90 USSR ministries and departments and republic subsystems within the union republic gosplans. Moreover, it is necessary to prepare project-methodological, technical-technological, mathematical and informational provision for the system as a whole as well as for each of its subsystems in order to achieve methodological unity of the utilized methods of plan formulation and uniformity due to unification of dictionaries and classifiers of technical-economic information and forms of plan-accounting documentation. All this will make it possible to integrate the subsystems of individual USSR ministries and departments and union republic gosplans into a unified system of planning capital construction in the country under the aegis of the USSR Gosplan. This will create the necessary conditions for improving the qualitative level of plan work at the current stage.

For purposes of improving coordination and correlation of plan assignments for the basic participants in capital construction, it is necessary to organize the interaction of YeSPKS with the USSR TsSU ASGS, the USSR Gosplan YeSSKS, the USSR Stroybank ASU, etc. Based on the achieved methodological unity and identity of indicators for forms of plan and accounting documentation, it will be possible to obtain mutually coordinated outlines of plans for capital construction, material balances and distribution plans, and financial plan (USSR Gosplan) on the one hand and outlines of a plan for material-technical supply to construction sites (USSR Gosplan) and a credit plan (USSR Stroybank) on the other.

At the present time there is a plan for work on formulation and introduction of the YeSPKS. Its purpose is to unite and coordinate the efforts of organizations within numerous ministries and departments, and thereby to accelerate its preparation. Five basic directions have been outlined.

THE FIRST IS IMPROVEMENT IN ORGANIZATION OF WORK ON DEVELOPING THE UNIFIED SYSTEM OF PLANNING CAPITAL CONSTRUCTION. A corresponding project formulated by the USSR Gosplan has been prepared for this purpose. It provides for a confirmation of the plan-economic task and of the work plan for formulation and introduction of YeSPKS. It gives particular attention to the definition and regulation of the rights, duties and responsibilities of the customers and developers of the YeSPKS as a whole as well as the republic, sectorial, functional consolidated, integrated sectorial and territorial subsystems. It defines the managerial make-up of YeSPKS projects as a whole and its subsystems, YeSPKS projects of USSR ministries and departments, union republic gosplans, Moscow and Leningrad gorplans [city planning committees], and also regulates their rights, duties and responsibilities.

THE SECOND DIRECTION PROVIDES FOR THE PERFORMANCE OF WORK ON PLANNING THE YeSPKS AS A WHOLE, AS WELL AS ITS SUBSYSTEMS. Over 2 years has passed since the start of formulation of the system. However, planning work is still in the initial stage, and should be expanded on a broad front. First of all, it is necessary to prepare the basic project planning decisions for YeSPKS. The plan-economic tasks and basic project planning decisions must be developed both for sectorial and republic (regional) subsystems.

It is necessary to prepare projects for methodological provision, integrated planning of informational, mathematical, technical and technological means, etc. for YeSPKS as a whole, as well as for its subsystems at the USSR Gosplan, sectorial and republic levels.

THE THIRD DIRECTION CONTAINS MEASURES FOR CREATION OF A YeSPKS INFORMATION BASE distributed by levels: USSR Gosplan--ministries and departments--customers (contractors)--VPO [All-Union Production Associations]--production associations (trusts), etc. The main structural elements of these bases must be the so-called unified site cards (YeKS) for enterprises (structures) to be planned and built and for previously started (carryover) facilities.

At the present time, an informational base for YeSPKS subsystems at the USSR Gosplan level is being developed. A considerable part of this base is comprised by the informational fund formulated on the basis of the YeKS. Each of the cards contains a detailed description and data on a specific construction site, beginning from the moment of its inclusion into the scheme of development of the sectors and placement of production forces and down to the stage of assimilating the project capacities of the constructed enterprise. Special methodological materials have been developed (for example, temporal directives for filling out the unified site cards). Methods experts have been trained among the workers of construction ministries. Work groups have been formed in the ministries and departments--the customers for first filling out the YeKS, which at the present time is being completed for 8,000 major sites. The project and plan indicators for construction sites of 45 ministries and departments have already been entered into the computer. Subsequent entry of accounting information on each of the facilities into this base, as well as entry of changes associated with revision of the project-estimate documentation for individual sites, re-computation by new estimate prices, etc., will make it possible to bring the informational base into a state of readiness for performing accounting according to the 12th Five-Year Plan.

The informational base of the YeSPKS subsystem at the USSR Gosplan level will be augmented by a fund formulated from card files of trusts. These contain the basic descriptions of the construction-installation organizations, as well as data on the prospects for development of their capacities and of the network based on departmental and territorial schemes of construction management developed in accordance with the above-mentioned resolution of the CPSU Central Committee and the USSR Council of Ministers. Among such characteristics are indicators on the number of workers, fixed capital, and the program of construction-installation work of the given organizations. This part of the informational base on the building trusts will be formulated with the direct participation of the construction ministries and departments. A unified form of building trust card has been prepared with the participation of the USSR Stroybank and other organizations, and is currently undergoing approbation.

In the future, information on construction materials and equipment will be introduced into the informational base, i.e., the YeKS, based on plans and estimates. At the present time, the USSR Gosplan in conjunction with the USSR Gosstabs is working out this entire complex of questions.

Principle questions have arisen in development of an informational base for the YeSPKS subsystem at the USSR Gosplan level. The polemics on these questions are still continuing. Among these is the following: why has the YeKS been selected as the initial document, and not the site title sheet? We must say that in determining the structure and content of the YeKS, the need for solving a wide range of problems in planning capital construction and management of the investment process was used as the basis. We know that in the process of formulating projects for long-term, five-year and annual plans for economic and social development, the ministries and departments submit proposals to the USSR Gosplan on outlines for plans on capital construction including lists of new construction starts, title lists of new starts and carryover facilities, and other documents. Moreover, the USSR Gosplan must consider the volumes on capital construction which are envisioned by resolutions of directive organs adopted by that time.

In this connection, the USSR Gosplan is called upon to formulate a summary plan of capital construction from a national-economic standpoint, and at the same time to resolve in a scientifically substantiated manner the timely and qualitative operational introduction of production capacities and fixed capital; to ensure balance in plans with material, labor and financial resources, technological and power equipment, as well as capacities of construction-installation organizations; to provide for the rational siting of enterprises and facilities planned for construction by territories, keeping in mind their provision with energy, fuel, water, and labor resources for operation; to protect the environment, etc. However, in order to perform the appropriate computations, the USSR Gosplan must have at its disposal specific information on each construction site even at the stage of its inclusion into the schemes of development of the sectors and location of the production forces. These are the accounting characteristics of the production capacities of the enterprise, the fixed capital, the cost of construction, the number of industrial-production personnel, the enterprise's demand for energy, fuel, water, etc.

However, at the given stage there are still no title lists of construction sites, and it is specifically for this purpose, to be able to perform accounting, that the corresponding form containing such indicators was included in the YeKS. If after performing the computations the USSR Gosplan comes to the conclusion that specific facilities must be built, then the lists of these facilities will be ratified within the composition of the plans, while the indicators for each of the construction sites are used as the basis for developing project plans for them. In turn, after approval of the project plans for these enterprises, information on the necessary technological and power equipment for the proposed facilities is included in the appropriate YeKS forms along with the indicators of the site project title. This information is taken from the enterprise project plan, since it is absent in the title sheet. Only in this case is it possible to perform precise calculations on coordinating all the indicators in plans for capital construction with the production capacities of the machine building sectors.

The YeKS also includes a form on the planned facility's need for construction materials, products and structures based on the project plans and estimates. The site title sheet also does not contain this information, yet it is necessary for performing computations on the comprehensive provision of sites with materials through the territorial material-technical supply organs by orders of the construction-installation organizations and in accordance with their need, which is determined by the project plans and estimates.

Moreover, the site title sheet does not contain any information on the distribution of tasks on the introduction of capacities between the contracting organizations. It also contains no data on the volumes of commodity building production and construction-installation work performed by the efforts of the contract organizations themselves and by subcontract agreements. Without this information, the USSR Gosplan sections cannot perform computations on formulating tasks for the operational introduction of production capacities and facilities built by the construction-installation organizations. They also cannot formulate plans for commodity building production and volumes of contract work. The absence of such information makes it impossible to precisely determine the load on construction and installation organizations, which makes it impossible to realize the computations on coordinating work volumes with the capacities of these organizations and on the development of their material-technical base.

Considering this fact, it becomes clear why the YeKS includes a set of indicators which are expanded as compared with the site title sheet and which are grouped by all stages of the investment process in such a way that the YeKS forms will reflect all the stages of development of a given enterprise or facility, starting from the preliminary decision regarding its construction and going through the stages of planning, construction, assimilation, and up to reaching project capacity. In other words, the information in the YeKS reflects the genesis of the enterprise or facility. From this it is clear that the site title sheet appears as a document after computations have been performed on the balance and substantiation of long-term and five-year plans for capital construction, after development of the enterprise project plan and adoption of a final decision as to the necessity of its construction. This document is not the initial one for planning, but is rather a result of it. The approved site title sheet defines the mutual relations of the customers, contractors, finance, supply and other organizations in regard to construction of the given facility.

However, all that has been said above does not exclude the need for improving the structure and indicators of the YeKS by means of reducing or expanding its indicators and forms at the level of the USSR Gosplan as well as at other levels of management of capital construction. However, it is necessary to always adhere to the basic principles of the YeKS (covering all the stages of the investment process, compatibility of indicators at different levels, possibility of solving the necessary circle of problems related to planning capital construction, etc.).

THE FOURTH DIRECTION INCLUDES MEASURES FOR IMPLEMENTING THE EXPERIMENTAL INTRODUCTION OF THE YeSPKS SUBSYSTEMS. Specifically, in 1985 the process of preparing a plan for capital construction for 1986 provided for the experimental

introduction of republic subsystems in a number of union republic gosplans, as well as the experimental testing of the means and methods of sectorial subsystems in the individual USSR ministries and departments. The basic goals of the experimental introduction consisted of developing and perfecting a new organization in planning and technology of formulating the plan for capital construction, for document turnover of its participants, and for verifying methods of balance coordination of plan indicators with the capacities of the construction-installation organizations in the territorial section, with limits of capital investments and construction-installation work and other resources.

The tasks of the experimental testing are, first of all, to work out an interaction between the YeSPKS subsystems of the ministries and departments with the subsystems at the USSR Gosplan level and with the union republic gosplans, as well as with the organs of the USSR Gosstrib, USSR Stroybank and USSR TsSU. Secondly, their task consists of verifying the organization, technology and methodology of developing sectorial plans for capital construction. The obtained results will have a positive effect on accelerating the formation of such subsystems in other republics and sectorial ministries.

In order to successfully implement the experimental introduction and testing of the means and methods of YeSPKS, the USSR ministries and departments and union republic gosplans must fulfill the necessary work program.

THE FIFTH DIRECTION IN THIS WORK IS THE METHODOLOGICAL PROVISION OF YeSPKS. This, along with definition of the content of plan-economic procedures, includes methods and models for solving problems in formulating plans for capital construction at all levels of management. Here the methods and models must be the basic elements in the technology of plan development and must be clearly written into the new organization of system planning.

With consideration for the listed requirements, the section on building and the construction industry, the joint section on capital investments, and the section on plan-survey work of the USSR Gosplan and the NIEI under the USSR Gosplan have created a principle scheme for preparation of an outline for the five-year plan on capital construction under conditions of YeSPKS. The subsequent development of the plan-economic task for formulation of YeSPKS, as well as the need for realizing the above-mentioned resolution by the CPSU Central Committee and the USSR Council of Ministers have determined the further development of the named scheme, into which certain clarifications and additions have been introduced.

At the moment of performing computations according to this system, the USSR Gosplan must have actualized data on every construction site contained in the informational base of its YeSPKS subsystem. For example, if computations are being performed for the 12th Five-Year Plan, then the actualization of information on the construction sites is performed according to the results of plan fulfillment for 1981-1984 and the indicators of the revised plan for 1985.

Moreover, the informational base at USSR ministries and departments and union republic Councils of Ministers for the planned period must contain summary

data on the technological retooling of existing enterprises, industrial and rural construction (for facilities with estimated cost of up to 4 million rubles which are not part of the USSR Gosplan informational base), as well as data on non-production construction. With consideration of this fact, the projects under the Basic Directions and Five-Year State Plan for Capital Construction under conditions of YeSPKS functioning must be developed in the following sequence.

The USSR Gosplan formulates preliminary plan outlines on indicators of expanded reproduction, including capital construction (control indicators) for the five-year period, broken down by year.

The indicators for development of the sectors of the national economy and industry are defined for the future, with consideration for intersectorial coordination on introduction of production capacities. The indicators are computed based on the potential possible growth in production at enterprises which are in operation at the beginning of the plan period, on the planned output of products for the sector at the end of the period, and on the need for attaining the given level of production effectiveness. Quantitative characteristics are clarified in the course of the computations (amount of production capacity and fixed capital, wage funds, number of industrial-production personnel, etc.). These are determined for the sector as a whole, as well as quantitative proportions for the combination of productions (enterprises) which are being discontinued or introduced into operation during the course of the plan period. Along with this, target qualitative technical-economic characteristics are formulated for the combination of introduced enterprises whose level must be reached within the plan period (labor productivity, production cost of products, yield on capital, specific production outlays, specific capital investments per unit of production, etc.).

The amount of increase in production capacities (fixed capital) for the sector is determined for the plan period, as well as the amount of stockpiles for the end of the period due to capital construction. The values of the capacities (fixed capital) are computed as the difference between the overall demands of the sector in their amounts and the available production capacities at the beginning of the plan period, with consideration for improvement in their application through exclusion of discontinued capacities. Here, the introduction of production capacities and fixed capital due to carryover construction sites in the sector are determined, as well as the necessary volumes of capital investments, construction-installation work, equipment, etc. The USSR Gosplan, having at its disposal actualized data on each carryover construction site, formulates preliminary indicators of start-up programs for the plan period by means of the developed methods, as well as plan stockpiles for the carryover sites to ensure operational introduction in coming years.

The amount of increase in the sector's production capacities for the plan period, as well as the volumes of stockpiles at the end of the period due to new construction starts is determined as the difference between the overall demand for expanding capacities by means of capital construction and their introduction at carryover sites. The computations are performed using the data of the YeKS informational fund on new construction starts. This information fund is formulated on the basis of lists of existing enterprises and new

construction sites marked for technical retooling, reconstruction and expansion, as well as on lists of large and integrated enterprises and structures requiring technical-economic substantiation and lists of projects subject to development. Such lists are drawn up based on the schemes for development and location of sectors and production forces.

After the set of mutually related computations has been performed, preliminary projections are formulated on indicators for the operational introduction of production capacities and volumes of non-production construction; on limits of capital investments, construction-installation and contract work, and on volumes of equipment, materials and structures for carryover and new construction sites. Moreover, the load on construction-installation organizations of the contracting ministries is determined in economic regions, oblasts and cities based on the planned volumes of work on facilities for production and non-production construction.

Then the USSR Gosplan performs balance coordination of the preliminary projections of capital construction indicators with the part of the national income allocated for expanded reproduction, with material-technical resources and with the capacities of construction-installation organizations. Provisions are made for an evaluation and achievement of balance between the limits of capital investments allocated in the plan period by years and the construction-installation work as a whole throughout the national economy, and computed demand for capital expenditures and capacities of construction-installation organizations. Balance coordination of projections on capital construction indicators with material-technical resources was implemented in the process of computing indicators for the development of sectors and for intersectorial coordination of introduction of related capacities.

The USSR Gosplan performs preliminary computations on the work load of construction organizations by territories and on the balance coordination of their capacities with the work volumes. For these purposes, the following are determined: additional growth in capacities (in a cross-section of regions and ministries); the rational placement and development of construction-installation organizations and a production base for construction; the volumes of capital investments, new technology and labor resources.

Then computations are performed on the balance between projections for capital construction indicators and labor resources. Based on the available data, the number of industrial-production personnel (by regions) necessary for operation of the enterprises projected for planning and construction is determined, as is the degree of coordination with prospective regional balances in labor resources.

Taking into consideration the data on balance of capital construction indicator projections with production resources, the plan project is defined more precisely, as are the requirements for the technical-economic level of sector development.

Thus, after all these computations the USSR Gosplan will be able to provide the ministries and departments, as well as the union republic councils of ministers,

with balanced and coordinated projections on the introduction of production capacities and fixed capital and on their resource provision. Moreover, it will be possible to determine what the required level of production effectiveness in the sectors must be and what technical-economic characteristics the production capacities and fixed capital introduced into operation in the plan period must possess. These indicators must fulfill the role of target directives in the development of production plans by ministries and departments, in increasing production effectiveness, in planning and construction of enterprises, in introducing new technology, planning production costs and profits, etc.

Based on the preliminary projections submitted to them, the USSR ministries and departments and the union republic councils of ministers develop proposals for an outline of a five-year plan on capital construction. In doing so, guided by the quantitative and qualitative characteristics of sectorial development set by the USSR Gosplan, they identify reserves for improving the application of existing capacities with consideration for their technical retooling and reconstruction, identify the complement of outdated production subject to discontinuation, and define the volume and qualitative indicators of carryover and new start construction.

The USSR Gosplan, based on the submitted proposals and in coordination with the sectorial and republic YeSPKS subsystems of the ministries and departments and the union republic gosplans, the YeSSKS of the USSR Gosplan, the ASU of the USSR Stroybank, and the ASGS of the USSR TsSU, formulates mutually integrated projects for plans on capital construction, material balances, equipment distribution, and financial plan.

As a result, the state planning organs, with the aid of YeSPKS, will be able to significantly increase the level of centralized planning and management of the investment process and to improve the degree of coordination between the actions of participants in capital construction. It will thus be possible:

to direct capital investments primarily toward the implementation of measures associated with the introduction of the latest scientific-technical achievements into the national economy, toward technical retooling and reconstruction of existing enterprises, toward comprehensive development of the raw material and processing sectors, and toward the elimination of intersectorial and intra-sectorial disproportions;

to define the limits of capital investments for the development of sectors based on the need for planning existing production and new construction as an integral whole and to include the construction of new enterprises in the plan only under the condition that the capacities of existing enterprises are utilized to their fullest degree with consideration for technical retooling and reconstruction, while capital means are allocated for carryover facilities to ensure their timely operational introduction;

to achieve balance in the limits of capital investments and construction-installation work with the financial, material-technical and labor resources, as well as with the capacities of construction-installation organizations on the whole throughout the ministries and departments and in the territorial cross-section;

to implement control over the amount and estimated cost of new construction starts and simultaneously built facilities and over the volume of unfinished construction;

to apportion limits of capital investments, construction-installation and contract work, as well as to finance planning and construction, supply materials and equipment if the facility is specified in the state plan, and thereby to prevent dispersion of funds over numerous construction sites and diversion of resources to planning and construction not contained in the plan;

to plan the development of a network and capacities of construction-installation organizations and enterprises for the building materials industry in coordination with the plan for capital construction;

to ensure the realization of achievements in science and technology, leading and foreign experience in projects, as well as the improved quality of project documentation.

All this will facilitate the timely and qualitative fulfillment of plans for the introduction of capacities, the reduction in construction time for enterprises and facilities, and consequently the increased effectiveness of social production.

In order to realize the plan for creation of YeSPKS in full volume, it is necessary to implement a large complex of research, planning, experimental and introductory work. It will be necessary a number of very complex and principally new large-scale problems on organization, technology and methodology of planning capital construction. Considering the complexity and scope of the work and the very short time for its fulfillment, it is necessary first of all to identify the decisive section of the system so that its realization prior to 1986 will make it possible to basically formulate the YeSPKS and to create conditions for the planning, financial and supply organs, as well as for the customers and contractors, enabling them to improve the quality of planning capital construction.

Thus, an intensive program must be carried out. At the same time, practice has shown that the individual tasks of the plan are being slowly realized. One of the reasons for this is the understaffing in the collective of developers and their organizational dissociation. Consequently, it would be expedient to create within the USSR Gosplan system a specialized organization for planning the YeSPKS, for development of the methodological problems of integrated planning of capital construction, and for implementation of methodological management, author's supervision and control over the realization of the project. It is also necessary to improve the development of subsystems in the USSR ministries and departments and in the union republic gosplans. Here, more active efforts are needed on the part of workers within the gosplan and ministry apparatus for improving the organization, technology and methods of planning capital construction. It is important to identify those personally responsible for the development of this all-state system and for implementation of control over

the course of its development. All these measures will facilitate an improvement in the quality of work and in personnel training, as well as an acceleration in formulation and introduction of YeSPKS.

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INDUSTRIAL CONSTRUCTION

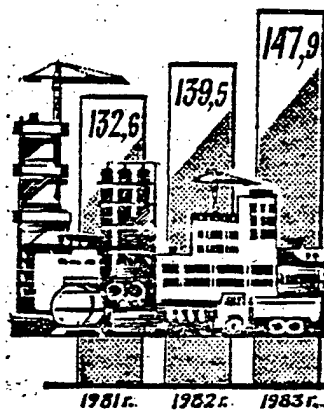
CAPITAL, PLANT CONSTRUCTION DATA PRESENTED

Moscow EKONOMICHESKAYA GAZETA in Russian No 45, Nov 84 p 12

[Article: "Facts and Figures"]

[Text] State, cooperative, and intereconomy contractor construction and installation organizations number 32,349 in the country. More than 8.5 million people work in construction.

FIXED ASSETS PUT INTO USE
(In comparison prices; billions of rubles)



As can be seen from this diagram, the fixed assets that were put into operation during 1983 amounted to 147.9 billion rubles which was 15.3 billion rubles more than in 1981. The amount of incomplete construction is declining. The CPSU Central Committee and USSR Council of Ministers' resolution directs that the number of projects under construction at the same time be reduced when drawing up plans, intending that in the next 3 to 4 years the volume of incomplete construction will reach the established standards.

More than 200 new state industrial enterprises came on line in 1983.

The most important production capacities became operational:

Power stations, millions of kilowatts.....9.5

Extraction capacities:

Coal, millions of tons per year.....16.9

Iron ore, millions of tons per year.....19.9

Production capacities:

Rolled ferrous metal (finished), millions of tons per year.....1.6

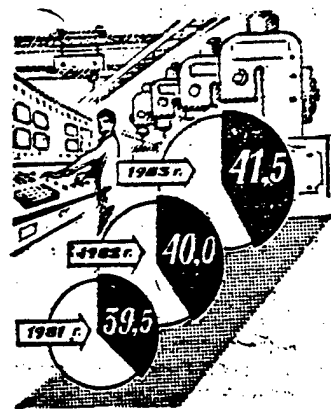
Mineral Fertilizers, (calculated based on 100 percent nutritional substances), millions of tons per year.....1.6

Tractors, thousands of units per year.....9.8

Leather shoes, thousands of pairs per year.....12.0

The plan for 1984 specifies the construction of almost 320,000 projects for production purposes.

PROPORTION OF EXPENSES FOR EQUIPMENT OF STATE CAPITAL INVESTMENTS
(In percent)



The technological structure of state capital investments is improving. The proportion of expenses for equipment--the active portion of fixed assets--is growing. As can be seen from the diagram, this proportion amounted to 41.5 percent in 1983. The proportion of expenses for equipment should increase to almost 42 percent in 1984.

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PLAN FIGURES FOR 1984 CAPITAL CONSTRUCTION

Moscow LENINGRADSKAYA PRAVDA in Russian 17 Feb 85 pp 1-2

[Excerpt from a report by the Statistical Administration under the heading: "Learn From Experience--Surpass What Has Been Achieved; Regarding the Results of Fulfilling the Plan for the Overall Economic and Social Development of Leningrad and Leningrad Oblast:" "V. Capital Construction"]

[Text] Fixed assets valued at 3.4 billion rubles were put into operation in 1984 by state and cooperative enterprises and organizations in Leningrad and Leningrad Oblast by means of all sources of financing.

The state plan for using capital investments was met at the rate of 105 percent including a rate of 103 percent for construction and installation work.

New large capacities in production associations became operational: the "Izhorskiy Plant" imeni A. A. Zhdanov, the "Nevskiy Machine Building Plant" imeni V. I. Lenin, the "Leningrad Metal Plant," "Elektrosila" imeni S. M. Kirov, the "Pargolovskiy Machine Building Plant," "Fosforit" imeni the 60th Anniversary of the USSR, "Sputnik," and others.

The yearly plan for building structures to protect Leningrad from floods was exceeded and a dry land connection was made with Kotlin Island.

In completing the Food Program, construction and agricultural enterprises in Leningrad Oblast put the following in operation in 1984: livestock facilities capable of handling 4,830 head of cattle and 1,700 head of swine, two phases of the poultry plant imeni the 50th Anniversary of the USSR with 548,000 laying hens, capacities for 260,000 head of fowl to be used for meat at the Russko-Vysotsk Poultry Plant, 6.0 hectares of winter hothouses and 7.6 hectares of summer hothouses at the "Vyborzhets" Hothouses Combine, a vegetable and potato warehouse with a storage capacity of 5,500 tons at one time, a root crop and fruit warehouse with a 10-ton storage capacity, a warehouse for hay, granulated and briquette feed with a 32,300-ton capacity, silage and hay structures with a volume of 117,000 cubic meters, warehouses for mineral fertilizers with a storage capacity of 25,000 tons at one time, technical service centers for machine and tractor fleets that can handle 775 machines, 93,800 km of intereconomy roads; 30,000 hectares of land were drained and 1,200 hectares were irrigated.

Labor productivity in contractor construction and installation organizations and in organizations that complete work by a method of operations that uses their own resources increased by 5 percent. The entire increase in the volume of construction and installation work was achieved by means of the growth in labor productivity.

Along with this, certain construction organizations did not meet the plan for construction commodity production and contract work volume, and permitted disruptions in the plans for putting production and non-production projects into operation.

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MATERIAL CONSERVATION MEASURES IN CONCRETE PRODUCTION

Moscow EKONOMIKA STROITEL'STVA in Russian No 9, Sep 84 pp 43-46

[Article by L. A. Malinina, doctor of engineering sciences, professor and manager of the Laboratory for Heavy Concretes of NIIZhB [Scientific-Research Institute for Concrete and Reinforced Concrete] of USSR Gosstroy, and M. I. Brusser, candidate of engineering sciences and senior scientific staff worker: "Some Areas for Saving Cement During the Production of Concrete and Reinforced Concrete"]

[Text] Checks have established that about 12.5 percent of all the cement produced is used irrationally. The causes of this are both direct losses and increases in cement consumption that are mandated for the purpose of insuring the required physical and mechanical properties of concrete in constructional structure under the various production technologies.

More than 3 million tons of cement are lost during transport, loading and unloading operations, 2.5 million tons are lost at ZhBI [reinforced-concrete products] plants because of unsatisfactory organization of storage and within-plant hauling, imperfections in and poor condition of concrete-mixing plant equipment, and so on, and as much as 4.4 million tons are lost at construction sites.

Increased cement consumption is ordered because of unsatisfactory quality of the aggregate, unfavorable conditions for hardening the concrete--shortened heat treatment or performing the work in winter or in a dry or hot climate, and increase in the required values for temper or transmission strength.

The latter especially must be dwelt on. As studies indicate, the "price" of the increase in the temper strength of concretes for prefabricated constructional structure is great. The data shown in table 1 on cement consumption, according to the Standard Norms of SNiP [Construction Norms and Regulations] 5.01.23-83 for the 200 and 400 grades of concrete that are produced on the basis of a 500-grade cement mix with a slump of 5-9 cm, can serve as an example. However, today, neither the designers nor the builders (as the customers for prefabricated reinforced-concrete products) are motivated to reduce the temper strength, which often leads to unjustified overstating of its values in the working drawings, in standard structure, and even in the state standards for some items. Obviously, the time has come to pose seriously the question of increasing the responsibility for designating the value of the temper strength of concrete and for considering it in the prices of the products. It would seem that each case of increasing the temper strength of concrete for various types of prefabricated reinforced-concrete products should have a technical and economic basis that takes into account the specific conditions of its use.

Table 1

Dispatch strength of concrete, for the designed grade	Cement consumption, kw/m ³ , for the concrete's designed grade	
	M 200	M 400
60	275	405
70	285	405
85	315	480
100	345	540

As much as 4 million tons of cement are overconsumed per year because of unsatisfactory aggregate quality. For example, using fine and very fine sand, excess cement consumption is as much as 10 percent, and when large aggregate of low

strength or contaminated aggregate is used, overconsumption is 5 percent. The use of hot cements and irrational deliveries of cement to the customer lead to a mandatory increase in cement consumption, which increases with rise in the grade of the concrete. As a result of this, builders are frequently compelled to produce concrete of higher grades based upon cements of moderate activeness, and to use high-strength cements for low-grade concretes and mortars.

Cement is a most energy-intensive material. For example, about 230 kg of u.t. [standard fuel equivalent] are used to produce 1 ton of 400-grade cement. A reduction in its consumption reduces correspondingly the cost and energy intensiveness of the concrete, since cement's share in the fuel required to obtain 1 m³ of concrete is 53 to 78 percent. Here the share of energy consumption increases as the grade of the concrete rises.

Work to save cement can proceed in various directions. One is that of setting correct norms for consuming it. In domestic construction practice, several types of norms operate: norms for consumption per 1 million rubles of estimated construction and installing work costs (the "millionik"), and averaged, standard and production norms. Each of these documents has its strictly determined purpose and application, although they are mutually coordinated with each other and serve a single cause--efficient cement consumption.

Despite the various types of norms for consuming cement in construction, the cement-consumption norms cited in the standard norms are the basic value. The first standard norms for prefabricated reinforced concrete, SN 386-68, were worked out and approved in 1968. They were the first to give scientifically substantiated norms for cement consumption, under which the prescribed physical and mechanical properties of concrete were provided for, with the rational use of cement, optimal methods for production, and the use of materials which were of average quality but which corresponded absolutely with the existing standards. According to evaluations by consultant specialists, the introduction of standard norms enabled a 5-10 percent reduction in cement consumption. These standard norms were revised in 1974. However, the values for cement consumption in the basic tables in both SN 386-68 and SN 386-74 were practically identical, since they used the very same methods for evaluating the strength of concrete under GOST [State All-Union Standard] 10180-78 and the strength of cement under GOST 10178-62.

In recent years important changes have been made in the methods for determining strength. Instead of the standard sample previously called for by GOST 10180-67--a cube with 20-cm edge, GOST 10180-74 and GOST 10180-78 call for a cube with a 15-cm edge for the sample. Because of this, during tests, the result of measuring the strength of concrete is increased on the average by

5 percent, while its actual strength in constructional structure is reduced by this same amount. But because of the fact that, in practice, especially during factory production of prefabricated-reinforced structure, a cube of nonstandard size with a 10-cm edge is used for monitoring concrete strength, the actual change in concrete strength through introduction of the new standard is not limited to the indicated 5 percent.

Table 2 shows the values of the minimal scale factor for cubes with 10-cm edge (α_{10}) according to various norm-setting documents.

Table 2

Title of the norm-setting document	Scale factor for α_{10} for the designed grade of the concrete				
	M 200	M 300	M 400	M 500	M 600
GOST 10180-67.....	0.85	0.83	0.81	0.7	0.77
GOST 10180-74 and GOST 10180-78 ..	0.91	0.91	0.91	0.9	0.91
USSR Gosstroy Letter Directives No 73-D of 17 Sep 81 and No DP 5021-1 of 7 Sep 82	0.95	0.95	0.95	0.95	0.95

As is apparent from the tables, the reduction in actual strength of the concretes with the establishment of a single scale factor of 0.91 was for grades 200-600, respectively, 6-14 percent, while, with conversion to the scale factor of 0.95 it was increased 4 percent more. Moreover, the actual strength of the concrete was reduced by 3.5

percent because it was evaluated in a series made up of three samples, according to the two maximal values that were introduced by the USSR Gosstroy letter directives. Thus, the reduction of actual concrete strength in prefabricated structure by introducing increased scale factors and by changing the methods for evaluating it in the series of samples for grades 200-600 was, respectively, 13-21 percent. Such a great removal of unsubstantiated reserves of strength should, naturally, have led to a reduction in cement consumption for those same grades by 8-14 percent, which did occur at a number of construction-industry enterprises. At the same time, USSR Gosstroy checks indicated that composition of the concrete had not been revised and cement savings had not been realized at many construction-industry enterprises.

Another important area for reducing unnecessary concrete-strength reserves, which is not considered at all during the design of structure, is increase in the quality of the molds for making the concrete-control samples by which the concrete's strength is determined. Numerous checks have established that an overwhelming majority of the vast number of molds that are in use at plants and at construction projects (according to expert evaluations there are more than 1.5 million of them) do not correspond with GOST 22685-77 requirements. This leads to the concrete-control samples that are made in these forms varying in their geometric characteristics, primarily in such a most important one as flatness of the reference edges of the samples, and failing to meet GOST 10180-78 requirements. Such samples are destroyed under loads 5, 10 and even 15 percent lower than samples of the same concrete made in the correct geometric shape. The underestimation of concrete strength during tests leads to an overstating of the actual strength of concrete structure, and, accordingly, to overconsumption of cement by as much as 3.7 or even 10 percent. Intensive steps taken in the last 2 years by USSR Gosstroy and a number of

construction ministries to organize the large-scale centralized manufacture of molds for rational structure, which are made of both steel and light alloys, have yielded definite results, since a number of territorial construction organizations have already been completely outfitted with the new high-quality molds.

The next extremely promising area for reducing the consumption of cement in concrete is a rise in its homogeneity as to strength, since the existing GOST 18105-80 establishes a direct relationship between the indicators for homogeneity and the required strength. Introduction of the state standard that has been in effect since 1972, which is based upon statistical monitoring of the strength of the concrete, has shown its high technical and economic effectiveness at a large number of the country's advanced enterprises: the required strength is reduced by 15 percent or more below the strength norms allowed by the standard. This corresponds to a reduction in cement consumption of up to 10 percent. Attention must be given here to two important principles. First, just like the introduction of an increased scale factor, the introduction of GOST 18105-80 does not require any capital expenditures, and, second, the reduced strength provides for the reliability of the structure adopted during design.

When the standard norms for cement consumption were revised, both the changed terms for testing concrete and experience in use of the old norms were considered.

The new "Standards for Cement Consumption in Preparing Precast and Poured Concrete and Reinforced Concrete Products and Structures" (SNiP 5.01.23-83), which USSR Gostroy approved and put into effect as of 1 July 1984, differ greatly from those in force up until this time.

The new standard norms were computed for concrete whose homogeneity allows it to have an average strength level equal to the strength set by the norms, which creates a real stimulus for increasing the homogeneity of the concrete under the existing practice for approving production and technical norms without taking into account the actual homogeneity of the concrete, that is, based upon the strength set by the norms.

The SNiP's cite standards not only for precast but also for poured concrete structures of both heavy and lightweight concrete. The SNiP tables of norms have been reduced by about 7 percent under those of the SN [Construction Norms], in connection with the methods used for determining strength of the concrete that were mentioned above. In order to establish the "standard norm," the table's value for cement consumption is multiplied by a number of corrective factors, with a view to approximating specific production conditions to the maximum. These coefficients consider the use of fine and very fine sand, aggregates with increased content of elutriated particles, and crushed rock and gravel of reduced strength; the activeness of cements under steaming; and the temperature of the concrete mix. The first three coefficients were used even earlier, while SNiP 5.01.23-83 just refined them and the rest were introduced for the first time.

The introduction of such basically new features of cements as their activeness during steaming into the structure of the standard norms is an important step in the matter of making rational use of cement.

In accordance with the current GOST 10178-76, cements are graded by the strength achieved by the concrete in 28 days under normal curing conditions. Therefore, for on-site construction, the concrete in which hardens under natural conditions, increases in the consumption of various kinds of cements of one standard grade are close to each other, varying basically as a function of their moisture requirement. For concretes for prefabricated structure, primarily low and medium grade concretes, and also for concretes of all grades with increased dispatch strength, cement consumption is determined not so much by its standard grade as by its activeness under steaming.

As research indicates, the activeness of cements of one standard grade at various plants varies greatly, often by a factor of two, while the activeness of certain cements of standard grades of 500 is lower than for grade 400. As a result of this, cement-consumption values for one standard grade can vary by 50 kg/m³.

Taking all these situations into account, SNiP 5.01.23-83 divides all cements into three groups, according to their activeness under steaming. In the Standard Norms, the norms in the table values are adopted as basic for group 2 cements, with a coefficient of 0.93 for cements with increased activeness under steaming (group 1) and with a coefficient of 1.07 for cements with reduced activeness under steaming (group 3). Such a division of cements into groups should help planning, supplying and consuming organizations to use cements more rationally in the various fields of construction.

Thus, it can be asserted that the structure of the new standard norms are greatly improved in the area of giving consideration to "nonstandard" production conditions. This is important from the points of view both of having them approximate the production and technical norms and of having the averaged norms and the "millioniki" rest on the standard norms in accordance with which the requirements for cement are determined and funds are allocated.

In order to consider specific construction conditions more completely when allocating cement among ministries and agencies, USSR Gosstroy has approved methods worked out by NIIZhB and VNIIZhelezobeton [All-Union Scientific-Research Institute for the Factory Technology of Prefabricated Reinforced-Concrete Structure and Articles] for considering differences in the quality and the properties of materials and production-technology peculiarities, based upon the norms for consuming cement in concrete per 1 million rubles of budget-estimated cost of construction and installing work. It is proposed that similar work be done on the relationship toward "averaged norms," which are now being reviewed.

Obviously, the problem of making rational use of cement and of saving it is much wider than the particular questions examined above, but the authors considered it desirable to dwell on norm-setting and on consideration of the quality of testing materials and methods, with a view to bringing the problem to the attention primarily of cement consumers, who can use the indicated reserves directly in their work.

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