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# USSR Report

CONSTRUCTION AND RELATED INDUSTRIES

BOOK: FOOD PROGRAM, RURAL

CAPITAL CONSTRUCTION DISCUSSED

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25 June 1985

# USSR REPORT

## CONSTRUCTION AND RELATED INDUSTRIES

### BOOK: FOOD PROGRAM, RURAL CAPITAL CONSTRUCTION DISCUSSED

Moscow PRODOVOL'STVENNAYA PROGRAMMA I SEL'SKOYE KAPITAL'NOYE STROITEL'STVO in Russian No 11, 1984 (signed to press 10 Sep 84) pp 1-63

[Book in the Znaniye Construction and Architecture Series "The Food Program and Rural Capital Construction" by Adil' Bakiyevich Belyayev, chief specialist at the USSR Ministry of Rural Construction's Giproorgsel'stroy [State Planning Institute for the Organization of Rural Construction and the Rendering of Technical Assistance]; Arkadiy Yur'yevich Lemke, senior scientific staff member at the USSR Ministry of Rural Construction's TsNIIEPsel'stroy [Central Scientific Research Institute of Experimental Rural Construction Planning] and Aleksandr Nikolayevich Romanov, deputy laboratory manager at the same institute. Reviewed by Grigoriy Nikolayevich Prozorovskiy, candidate of technical sciences, deputy chairman of the USSR Gosstroy and honored builder of the RSFSR, Znaniye, 22,270 copies, 64 pages]

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[Text] Annotation

Rural capital construction, one of the most important integral parts of the agro-industrial complex, plays an enormous role in fulfilling the Food Program. This brochure relates improvements in the construction of industrial enterprises, living accommodations and rural cultural-domestic buildings. The accent is on material-industrial and economical supply of rural capital construction. It is meant for lecturers, university students, and students and teachers at architectural-construction VUZes and tekhnikums.

#### THE DEVELOPMENT OF RURAL CONSTRUCTION AND THE FOOD PROGRAM

Since the 60's, the role of rural capital construction has been growing steadily. Called upon to provide conditions for agricultural production, to safeguard and process many types of agricultural products, and for the mode of life and leisure of rural workers, it rightly became one of the foundations for the development of the country's agro-industrial complex. On the strength of this, rural capital construction has constantly been at the center of the party's and the government's attention and concern. The general line of the rural economy's development, determined by the CPSU's agrarian policy, is the resolution of two interconnected tasks. One is to provide the population with food products and also a number of industrial sectors with raw materials and the second is to gradually overcome the socio-economic differences between the city and the village.

The CPSU Central Committee and USSR Council of Ministers 1968 resolution "On Regulating Construction In The Village" (3, pp. 90-95)<sup>1</sup> became the beginning of the present stage of village reconstruction. The resolution determined the development of general plans and designs for rayon planning in rural locals for all regions of the country as was necessary for the interrelated development of all components and links in the rural economy within the limits of each administrative rayon, oblast or republic; the development of the general plans (for planning and construction) of central settlements, sovkhozes and kolkhozes which since then have served as their own law within the framework of which their production and living zones and administrative-social center, transportation network, engineer facilities and others are formed; the creation of model settlements in each oblast, kray or republic as distinct laboratories for the development of methods for developing the best living conditions in the village and regular conduct of all-union contests for the best of these. This resolution was so vital that it has not lost its significance today, almost 20 years later.

And the CPSU Central Committee and the USSR Council of Ministers' 1971 resolution "On The Development Of Livestock Production On An Industrial Basis" (4, pages 140-150) was also a stepping stone. Its direction and consequences made it the first step toward the current Food Program and this resolution defined the transition to agricultural production using modern industrial methods by creating huge livestock and poultry complexes. This caused a fundamental revision in the sum total of methods and means for keeping animals, providing them with feed and also engineering support for building objectives which use construction sets and materials, for organizing construction and measures to protect the environment. Construction of various

types of huge complexes increased more than just the number of personnel working in agricultural production, for a new type of specialist-machine operator appeared. These included operators, milking machine specialists, technicians who serviced the complex units in the mechanisms and in other words, this changes the whole socio-professional composition of village workers. It was then necessary to develop the corresponding conditions for them, comfortable living accommodations and the necessary types of cultural-domestic services.

The results of the development of agricultural production and the branches associated with it served as a foundation for the fact that the June (1978) CPSU Central Committee Plenum, which was devoted to developing agriculture, defined it as a successfully developing industrial complex. On the whole, the organization of such specialized branches as land reclamation, the mixed-feed industry, livestock production machine building and rural construction were attributed to the number of achievements. The problems of the latter became a topic for special review and it was primarily then that the farmstead with economic structures which allowed personnel to conduct subsidiary farming was first deemed the most preferable. The plenum noted the slow pace of rural construction, the poor development of its material-technical base, the prevalence of inefficient, uneconomical methods for erecting structures and the unjustified use of "heavy" construction intended for industrial buildings.

The plenum called for rural construction's transition to a commercial, industrial basis, i.e., the introduction of progressive technology, economical materials and structures (specifically, the development of wood-panel building); particular attention was given to road construction and reinforcing rural construction organizations with highly qualified cadres.

The 26th CPSU Congress, which defined the Basic Directions for the Economic and Social Development of the Country for 1981-1985 and the Period Up to 1990 noted that the rural economy was acquiring "a more and more industrial appearance". In the 12th Five-Year Plan, 170 billion rubles of capital investment, more than 27 percent of the total capital investment in the country's economy (1, page 133) was invested in the rural economy. The congress's decision directed the further development of the entire agro-industrial complex toward the balanced interaction of all its branches with regard to meeting the strategic task of agriculture -- reliably providing the country with food and raw materials.

The problem of storing feed for agriculture's leading branch, livestock production, received special attention and expanded construction of storehouses for silage, haylage, hay, grassy meal, root crops and others was planned. Attention was turned to earlier undeveloped areas of livestock production (horse breeding, rabbit breeding and the breeding of fur-bearing animals which called for developing new types of livestock buildings) and to expanding construction of enterprises for the initial processing and storage of agricultural products. However, the proposal was made to concentrate efforts on reconstructing and expanding existing production buildings and complexes. At the same time a faster construction rate for comfortable living accommodations with economic structures, kindergartens, schools and other cultural-domestic service facilities was stressed. Capital investment in this

area was increased by 39 percent over the previous period. The plan for rural industrial development called for an increase in the production of fully factory-ready, light construction sets.

The May 1982 CPSU Central Committee Plenum approved the USSR Food Program for the period up to 1990 and the plenum called this the "party and the state's central mission for the 11th and 12th Five-Year Plans" (2, page 25). The program's primary goal was to reliably provide the country with food and the corresponding industrial spheres with raw materials and the measures for socially reconstructing the village is an integral part of this plan.

At the March 1984 All-Union Economic Conference on the Problems of the Agro-industrial Complex CPSU Central Committee General Secretary K.U. Chernenko said, "Our party is reviewing the responsibility for developing the rural economy not only as an economic mission but also as a socio-political one. We are basing this on the fact that a highly developed, effectively functioning agro-industrial complex is necessary for the further development of our people's material well-being and for the growth in the effectiveness of the whole country's national economy" (7, page 1).

Meeting the Food Program gives new crucial missions to rural construction. In the 11th Five-Year Plan 233 billion rubles of capital investment is being directed to the development of the whole agro-industrial complex and this includes 189.6 billion rubles into the rural economy itself (2, page 51). This is primarily aimed at developing yields that will produce food in the shortest timeframe, reconstructing existing farms and complexes and accelerating the completion of sites now under construction. At the same time it was decided to speed up the tempo of residential and cultural facility construction. Thus, the 11th Five-Year Plan calls for no less than 176 million square meters (and the 12th calls for 15-18 percent more) living accommodation construction, school construction for 2.3 million pupils and for the decade, the construction of 130,000 kilometers of general-use roads and 150,000 kilometers of internal farm roads (2, pages 57-59). The Minsel'stroi [Ministry of Rural Construction] alone must complete 7 billion rubles of construction work by the end of 1990. The complex of measures for improving rural construction in the village also includes developing the capacities for production of increased factory-ready light construction sets, increasing production of local construction materials and introducing the brigade contract.

In May 1984 the CPSU Central Committee and USSR Council of Ministers adopted a resolution on "Improving The Planning, Organization And Control Of Capital Construction". This has a direct affect on rural construction as well (PRAVDA, 1984, 27 May). The resolution stresses that the future increase in capacity will be accomplished by reconstructing and expanding existing enterprises through equipment modernization. This also applies to agro-industrial complexes and construction industry enterprises. Buildings that are not technically complicated are to be build basically according to typical and very economic, frequently used plans. Beginning in 1985, experimental construction and transfer of projects "under key" with a series of construction ministries, including all construction organizations in Belorussia SSR is planned. Recommendations from a number of departments,

including the USSR Ministry of Rural Construction state that it is expedient to select model organizations and enterprises which are developing the foremost construction methods and use them on model projects in the near future.

Thus the 26th CPSU Congress indicated that construction of rural residential and cultural-domestic service buildings must be accomplished at a faster pace. The May 1982 Plenum reinforced this for the future, for strengthening the cadre in the village and also the peoples' interest to stay on the land and farm was a necessary condition for successfully completing the Food Program. And this is not possible without a definite improvement in living accommodations and socio-domestic living conditions. However, the specific village and house where a man lives, the cow barn or workshop where he works, the school where he teaches his children and the club where he can rest, are the end result of the rural spatial and temporal construction strategy and tactic. And these can be roughly present as successive links inherently tied to one another: the complex system of scientific-technical progress in the agrarian sphere which includes the plan for allocating productive forces and the dispersal system; rayon planning (diagrams) which includes projects for individual objectives; and organizational construction measures for bringing all these links into reality.

It is possible to think that by now all of these links have received enough developed growth in the rural areas. Thus the basic situations in scientific-technical progress to the year 2000 have been developed and approved. Since the 60's, schematics and plans for rayon planning covering practically all of the country's territories have been developed and are basically completed. These serve as the foundation for the development of general designs in planning and constructing central sovkhoz and kolkhoz farmsteads. Regular all-union competition for model settlements have become a good school for developing the best architectural-construction decisions and they have become a tradition since 1966. At the same time, tremendous work is being done in the construction of model settlements which in many ways have become the prototype for life and a harmoniously sensible village environment for the future.

Basically the structure of rural construction, which of course cannot be understood once and for all as an iron-clad plan, has been approved and verified by reality. This plan changes with the demands of life. Whereas in the 70's the dominate trait was rural industrial construction (according to many USSR Minsel'stroy contract organizations, this included up to 70 percent of the construction sites and was associated with actively realizing the CPSU Central Committee and USSR Council of Minister's 1971 resolution on "The Development of Livestock Production On An Industrial Basis" and with the construction of huge livestock complexes, poultry plants and others), now in accordance with the Food Program, the structure of rural construction has been redistributed toward increasing the share of residential and cultural-domestic service buildings. According to many USSR Minsel'stroy, kolkhoz construction association and other department contract organizations involved

in village construction, this volume has reached 50 percent. And industrial rural construction has yet another mission, that of essentially reconstructing and expanding operating farms and complexes.

Residential construction has shown that it has its own major problems. The main one is orienting on the advantages of erecting farm-type buildings with economic structures. One of the key problems in constructing cultural-domestic-service buildings is increasing the level of prefabricated building construction and their level of factory readiness. These indicators are much lower here than in other areas of rural construction. But independent of the specific missions of each sphere of rural construction, there are general factors and principles characteristic to it. These are associated first with the economic and material-technical conditions of village construction, which are essentially different from city construction, and second, with the general set up, its own type of general line in the development of all our capital construction.

In discussing the peculiarities of village construction, for example, one can point to such things as the remoteness and separation of construction objectives and consequently to the dispersal of the construction work front. This causes problems such as difficulties in supplying construction sites with equipment and qualified cadre, the as-a-rule unsatisfactory road net condition, the fact that the capacity of construction enterprises and assembly organizations are significantly lower than those in the city, their low equipment level and the greater influence of weather and natural climactic conditions on construction. It is inconceivable not to consider all of these points. And while discussing the general trend in construction, we should remember that this includes unifying architectural-planning and construction decisions (at all levels) as much as possible, reducing the size of buildings as a whole and of their separate elements, increasing the level of prefabricated construction and the level of structural and detail factory readiness, reducing the time for on-site assembly, that is, doing as many of the operations as possible at the factory and, in short, doing everything possible to realize the principles of scientific-technical progress in construction. Certainly, these general conditions are realized differently both in every period of development and under the conditions of the specific region and they all apply to construction means and methods. We have one mission here and that is to create a village today and for the future that has a highly organized living environment corresponding to the socio-economic functions in the development of our society.

There has been a definite shift in the accent in this plan recently. This is based on an idea that is in no way new, but that is a virtue for a number of objective reasons, the "forgotten" idea that even with all of its specifics, the village is not isolated from the city, but together with it forms a single economic and cultural system. This is why during the planning, projection and creation of the village's objective-spatial environment, neighboring cities (excluding rayon and oblast cities) are seen as centers for service, cultural and other functions. Thus the central sovkhos and kolkhoz farmsteads are a fixed level of the various functions and communications. y reliable transporting the provisions of all the interrelated links in this system it is possible to determine the optimum displacement, capacity and composition of



the cultural-domestic service buildings, their areas of service and influence. The two rural regions, Donetsk Oblast's Volnovakhskiy Rayon and Lvov Oblast's Stryyskiy Rayon that were in the 1978 competition primarily followed this principle. And at the following competition in 1981, there were six such rayons: Leningrad Oblast's Tosnenskiy Rayon, Krasnodarskiy Kray's Temryukskiy and Gyul'kevichskiy Rayons, Transcarpathian Oblast's Vinogradovskiy Rayon, Gorkiy Oblast's Gorodetskiy Rayon and Dnepropetrovsk Oblast's Pokrovskiy Rayon. With this systemic approach, not only the service network but also the limits for the development of all aspects of separation in the rayon, and thus the overall strategy for village construction is determined. True, all of this primarily affects the formation of residential construction and the determination of the types of domestic-cultural buildings, their composition and capacity.

#### RECONSTRUCTION OF VILLAGES AND HAMLETS-- A COMPLEX TASK

The rural populated point (village or hamlet) as a complex and completed organism is the most important link in rural settlement and supplemental labor. Work in creating designs for planning and construction villages have been done on a country-wide scale and we are talking about the appearance of hundreds of thousands of hamlets and the fate of one-third of our country's population, more than 96 million people.

The basis for planning and constructing a socialist village is the idea of transforming the existing villages into modern populated points which have a complex of social and domestic services (a comfort level) that is inherently tied to the advantages of the rural life style. In every specific case, doing this runs into conflict with the unified principles and normative demands of construction on the one hand and the regional conditions and characteristics of a specific region on the other. Our best model settlements are on the forward edge of rural architectural-construction creativity. Thanks to the concentration of their architectural-construction efforts and material resources, their long experience has provided excellent examples in organizing the rural environment and completely planning and constructing villages. This allowed them to formulate the basic principles, test them in actuality and find the as yet unresolved problems.

The primary positive result of this work is the undeniable recognition of the fact that all the problems of an individual population center can be fundamentally resolved only at a level higher than the village itself. The idea of complete development must embrace the whole economy of several villages and even the whole administrative rayon or even the oblast. Thus the experience of developing the enormous, key rural associations in Belorussia are of interest. An oblast planning scheme that stipulates the future development of more than 2500 settlements covering the total territory of the republic was developed and of these 2500, nearly 450 are enormous. These include rayon centers and city-type settlements which are to be transformed into key settlements of agro-industrial associations. All of the capital investment for the near future will be concentrated on them and will include developing enterprises for processing agricultural products, repairing and storing agricultural equipment, airplanes for agricultural aviation, mixed feed factories, veterinarian services and others. In June 1984 the CPSU

Central Committee approved a resolution on organizing the Kuban' agro-industrial combine in Timashevskiy Rayon (Krasnodarsk Oblast). The goal of this experiment was to develop an economic-industrial complex which provides the full cycle of agricultural production. It includes sovkhozes and kolkhozes, enterprises and trade organizations which service the rural economy. Undoubtedly the experience of developing such a complex will become an example of agro-industrial cooperation in action and will allow them to work out all of its links and show its efficiency.

There is also an intensive experiment along this same vein in Moscow Oblast.

This new approach to rural planning which is overcoming the setbacks of priorities which we still unfortunately run into in our work is gradually making headway. However, returning to our own settlement, we note that the prevailing thing here is the combined approach, the simultaneous and proportional development within the time limits of the reconstruction of all rural residential components. This includes production projects, residences, service establishments, engineer facility systems, landscaping, irrigation and others. And there are still numerous examples where a creative architectural idea has not only been brilliantly formulated into the general plan but has also reached its worthy fruition. And with total justification we can say this about such settlements as Kashino, Sof'ino, Verkhnyaya Troitsa, Serkovo and others in RSFSR, Vuzlove, Kamenka and Yelizavetovka in the Ukraine, Sorochi, Malich and Myshkovichi in Belorussia and Yuknaychay and Kusachay in Lithuania.

Let us take Vuzlove, the central farmstead in the Kolkhoz imeni Ya. Galan in Lvov Oblast as an example. The basic specialty of this kolkhoz is growing beets and breeding livestock. The village is situated along the Lvov-Lutsk Railway and it has a population of 1300. The settlement's general plan was developed in three stages, all of which were totally completed in 1970, 1975 and 1981. The most significant part of the village is its center which was build around a club and school which were already in place. The center now includes a Culture Center, a music school, picture gallery, museum, the kolkhoz administration, rural council and a post office. The school has been expanded to accommodate up to 784 students and has both a sports and an assembly hall, workshops, a boarding school dormitory and a swimming pool. The new domestic trade-center has a Culture Center, hospital, store and restaurant. The fact that there are various types of projects allowed them to create a spacious, large, developed center structure and tie it in through organization and landscaping. The project's completion with the construction of the administration building gave the center a linking building along the main street. The residential section is composed of sectional garretted 12-apartment buildings and farmstead buildings with apartments on two levels and this varies the appearance of the settlement and creates comfortable and expressive apartments and plans.

The Yuknaychay settlement, the central farmstead of the Sovkhoz imeni 25th CPSU Congress in Lithuania's Shilutskiy Rayon is surprisingly esthetic and one could even say elegant. This is the latest example of the Lithuanian construction practice where the creative collaboration of architects, builders, artists, business executives and the settlement's population, their

vital affection for an entirely subdued Lithuanian nook, brought to life a miracle of the intrinsic blend of architecture and nature. Everything in the village has been developed in a thorough and externally humdrum manner. The first sequence of this construction, which was entered in an All-Union competition (the residential construction and the center complex) still did not have its sharply expressive architectural face, although it was evaluated in a worthy manner. The explosive development of the village has taken place in the last two years when a group of seven-apartment buildings and a water tower were built, the central greenery rest area was created and the decorative elements and a fountain appeared. All of these village components were so intrinsically combined and so ornately traced that they formed a single and very impressive composition with a dominating water tower (I must say that this is a unique case in village construction). Frescoes on the dining hall wall (painted by A. Banite), the stained glass panels in the club (by K. Shatunas), the rich ceramic (made by L. Kuzmene) and the decorative sculptures interpreted in the spirit of national traditions (by S. Kuzma) that are placed freely among the greenery all supplement and accent the settlement. The very esthetic level of Yuknaychay is linked with the ability characteristic of Lithuanian architects to feel and understand exactly the laws of architecture and to artistically use these laws in reality. Here we see the simple effect of a simple, laconic solution, in contrast to the verbosity of the architecture in most of our settlements and we also see active interaction with the natural surroundings and the ability to use it to create an expressive appearance for the village. People therefore come to Yuknaychay from afar to look at it and learn (nearly 400 excursions per year), but the main thing here is to live and work happily.

In its own way the experience of the building in the Sof'ino settlement at the Nara sovkhos in Moscow Oblast is also interesting. This is one of the first examples of Moscow Oblast's organization of rural residential construction cooperatives (the general plan for the settlement was developed by Mosgiproniisels'troy [Moscow Branch of the State Scientific Research Institute of Rural Construction]). Construction was integrally tied to the forest massif that adjoins it and it is situated along an existing street-alley leading to the sovkhos office. What is interesting is that during the construction six types of individually designed farm buildings were used, but their planning, spatial composition and area all conform both to the SNiP [Construction Norms and Regulations] and to the rural area conditions. Among these six buildings are a two-story building with apartments on both levels, a garretted building and a single-apartment building with built-in or attached garage. One of the buildings was developed along the lines of a prize-winning contest design which in itself is promising and worthy of attention. The designs provide for a large amount of extra space in the buildings, to include basements, garages and workshops. Near the buildings are farm structures for keeping cattle, birds and inventories. During construction the advisability of using brick, gas silicate, gypsum concrete, various experimental methods, a number of stories, various means of architectural expression, variations in arranging the farm construction and garages in farmstead construction were checked out. The settlement is also an example of engineering facilities, as the two-story buildings are heated from a central boiler room and the one-story buildings use automatic gas water heaters. Vertical planning, road construction and marking the external net were all done before construction

began and the construction was the center of attention not only for the sovkhos management but also for the oblast party and soviet organizations. They developed a favorable system for paying for the cost of the apartments based on the work experience of the sovkhos inhabitants. Such rural ZhSK [housing construction cooperatives] have also been created and have successfully evolved for example in Uzbekistan and in Estonia.

Recently it has become the norm to include a reservoir in the village with group construction around it. The villages of Malech and Sorochi in Belorussia and Verkhnyaya Troitsa in Kalinin Oblast are examples of this.

Some problems have appeared during the long experiment in planning and constructing model villages and in both a qualitative and quantitative sense they deal with the displacement of model construction to the Baltic Region, Belorussia and the Center. Regions of Siberia, Central Asia and the Virgin Lands were literally "opened up" using this plan and we must aim at getting the model rural settlement in every oblast, autonomous republic or kray as was initially proposed. Because of small and uneven assignment, construction has stretched over 10-15 years. This significantly reduces the effect of this innovation and the very effect of the experiment. And the question of who must finance construction is not always clear. Therefore very often "experiment piles up on experiment" in the model village and people try to immediately solve several comprehensive tasks which causes the experimental goals to become diffused and its completion unrealistic.

It is now also time to seriously approach the problem of preserving the existing construction fund, i.e., to begin village reconstruction (as we rebuilt historically developed cities). We must put special attention on preserving, using and including architectural, historical and cultural landmarks in the village structure. Industrial projects are seldom included in the overall village structure and these are a major and significant component of its spatial environment. Engineer support remains a weak point in village reconstruction while at the same time the proper selection of heating, water and sewer systems have a major effect on the volume of materials dispersed, on the possibility of realistically realizing the project and, primarily, on village comfort. Village organization, and especially road construction, is also seriously lagging. However, architectural designs that have been done successfully have always included a high level of engineer organization, as in the settlement of Sof'ino in Moscow Oblast, Serkovo in Gorkiy Oblast, Kudinovo in Kaluga Oblast, Rassvet in Rostov Oblast and others. They use both centralized and local heating systems, have water supplies and sewers. Their positive experience confirms that even with all the specific difficulties in constructing engineer structures in a village, this problem can certainly be solved. Construction experiments that allow the whole process to be completed, including the preparation of structure and building components, their transportation and the organization of assembly means and construction are rare and pure.

#### RURAL INDUSTRIAL OBJECTIVES -- THE FOUNDATION FOR MEETING THE FOOD PROGRAM

Livestock and poultry complexes, enterprises that store and process agricultural products, hot-house farms, various warehouses and others are

rural industrial projects. Agricultural industrial construction creates a material-technical base for the rural economy, i.e., is directly tied to providing the population with food and industry with raw materials. About 50 percent of the total volume of rural construction being done is on agricultural projects.

The Food Program provides for high tempo production of milk, meat, eggs and other agricultural products. Their volume growth is possible only under intense production conditions and a specialized and enlarged economy, i.e., the transition of agricultural production to an industrial foundation. Large specialized agricultural enterprises with advanced equipment and labor organizations promote the growth of labor productivity and reduce operational labor costs, create favorable conditions for the labor of workers and the necessary local environment for raising animals. From a construction point of view, labor and material resources can be concentrated on such projects and machinery and rational construction sets that are very factory ready can be used very efficiently, i.e., used to reduce building labor costs and construction times. Scientific-technical progress in the country's national economy and in the rural economy itself give us the possibility of comprehensively organizing commercial livestock breeding and construction of large state, kolkhoz and interkolkhoz complexes.

In the early 60's the volume and technical level of agricultural industrial construction significantly lagged behind the level of industrial and civilian residential construction. Livestock and poultry farms of those times were basically independent buildings with widths up to 10 meters, buildings that were insufficiently equipped with technological and engineering equipment and had a maximum capacity of 200 head of stock and up to 5-10,000 birds. Non-industrial materials such as brick, timber and other low-efficient materials or heavy ferroconcrete columns, joists and slabs used for cover in urban industrial buildings were used in constructing such buildings. Enormous amounts were also spent on building repairs.

The CPSU Central Committee and USSR Council of Ministers resolution "On Organizing Poultry Egg And Meat Production On An Commercial Basis", adopted in September 1964 was the beginning of agricultural production's transition to an industrial foundation. In accordance with this resolution 513 poultry plants and specialized poultry farms were build in six years (1965-1971). The positive experience of industrialized poultry farms and their earning capacity served as an example for switching livestock to a commercial basis as well. The CPSU Central Committee and the USSR Council of Ministers resolution "On The Development Of Livestock Production On A Commercial Basis" called for the construction of 1170 huge state complexes (near large cities) for the production of 1.3 million tons of pork and beef and 2.1 million tons of milk a year (4, page 141). New progressive complex design projects were developed for pork production for 108, 54, 24 and 12,000 head of pigs; for the annual production of 10- and 5- ,000 head of cattle; for feeding and fattening pens for 5, 10 and 20 ,000 head of cattle annually; milk complexes for 400, 800, 1200 and 2000 cows; for raising three and six thousand heifers; for poultry plants for 200-600,000 laying hens and 1-3 million broilers. These complexes

were designed as enterprises with a totally mechanize technological cycle and in a number of cases, they have automated agricultural work and have all the necessary equipment for energy and engineering support.

In the 9th and 10th Five-Year Plans the following buildings were built for basic industry: one-story pavilion, multi-span wide dimension and multi-story buildings. Complexes with pavilion construction were built for raising 10,000 head of young cattle at the Voronovo Sovkhoz in Moscow Oblast, for raising and fattening 108,000 pigs a year at the Kalityanskiy Sovkhoz in Kiev Oblast and fattening pens for 30,000 cattle at the Armavirskiy Sovkhoz in Krasnodarsk Kray. Complexes with modular one-story buildings were built in Poltava Oblast's Lokhvitskiy interkolkhoz complex for 18,000 head of cattle, the experimental Shchapovo diary farm for 2000 cattle in Moscow and the 250,000 laying fowl farm at the Krasnyy Klyuch Sovkhoz in Tartar ASSR. Multi-story building complexes were built at the Sovkhoz-tekhnikum imeni Yu.A. Gagarin in Estonia SSR and at the Kiev poultry plant's 160,000 layer poultry house. The combined approach to solving commercial livestock raising was tried for the first time in this country and construction organization and enterprises of various ministries and agro-industrial complexes concentrated their efforts. This allowed us to erect a significant number of agricultural complexes in a short time and to develop a material-technical and construction base for the further product growth on a commercial basis, to develop buildings with a high modular level by using advanced light prefabricated construction with metal, wood, asbestos cement slabs, fiberglass, polystyrene foam, inflated perlite and others and to select the most rational volume planning and construction solutions in developing model designs for agricultural production buildings for the 11th Five-Year Plan.

To lower construction costs, increase capital investment efficiency and provide a single technical policy for planning agricultural buildings, the number of standard-size plans was reduced from 120 to 22. There are existing model designs for buildings with spans of from six to 21 meters, the average column spacing is three and six meters and the story height is from 3.4 to six meters. The rural construction parts list was determined by providing uniform span plans with a set of bearing and security elements of ferroconcrete, glued timber, metal and asbestos cement. Perspective factory-made elements entered the new rural-series parts list: ferroconcrete castings and the foundations under them (including piling supports), various ferroconcrete wall panels, three-ply with window blocks, foundation bases (which eliminates foundation joists), bulkhead facing panels, slabs and others.

However, various ministries and departments work on the construction of agricultural projects and they have their own industrial construction base which primarily produces elements for urban industrial construction. Only USSR Minsel'stroy enterprises and Kolkhozstroyob'yedineniye [kolkhoz construction associations] in union republics produced elements for rural construction. The transition from livestock and poultry buildings made with industrial construction to agricultural (conversion to the rural inventory) has a significant economic effect (per 1 square meters of building without considering the walls). Concrete use is reduced up to 32 percent, steel up to 19 percent, construction costs up to 20 percent and project labor assembly costs up to 13 percent. To regulate interdepartmental differences, "Common

Technical Conditions For Agricultural Project Construction Planning" was developed and approved for 27 planning-construction zones in the country. This defined the list of items required for use in all zones and all of this led to an increase in agricultural production industrialization, reduced construction site labor costs and reduced building material and energy consumption.

Livestock complexes that were built in the 70's became the base for milk and meat production. At the present time, they sell 36 percent of the pork, 9 percent of the beef (by live weight) and 6 percent of the milk of the total kolkhoz, sovkhoz and inter-economic enterprise production. But whereas in the 9th and 10th Five-Year Plans, production capacity growth was achieved through new construction, in the 11th Five-Year Plan expansion and reconstruction of existing farms and kolkhozes based on model construction took on great significance. Today and in the near future pavilion-type buildings with 18 and 21 meter widths and frame and prop-and-girder frames are the basic types of production projects in the village. Further improvement in industrial building construction will be attained by increasing the modular level, reducing labor construction costs, introducing new, efficient materials and reducing material consumption.

In addition to expanding and rebuilding existing agricultural enterprises in the 11th Five-Year Plan, a number of huge complexes that were developed jointly with GDR [German Democratic Republic] design organizations were built. These included a milk production complex with an annual yield of 21.4 tons at the Naro-Osanovskiy Breeding Sovkhoz in Moscow Oblast, the Kostromskiy complex for raising 6000 breeding calves and heifers (the initial output was 3000) and the Vladimirskiy complex for raising and fattening 18,000 head of young cattle. Construction of the Povolzhskiy Swine Breeding Complex with a capacity for raising and fattening 216 ,000 head of pigs annually is being completed in Kuybyshev Oblast.

In the future the efforts of scientific-technical and design organizations must be directed toward developing complexes where the construction of various types of buildings has a minimum number of elements. This primarily applies to modernizing framework construction designs. Specialists in a number of institutes have discovered the possibility of using existing ferroconcrete metal forms to construct buildings with a span of 18-21 meters and with the levels from 2.4 to 7.2 meters high. This height increase is attained by using a supplemental stanchion for the casing or a built-up cleat. Experimental construction of a grain storage building with a six meter ferroconcrete casing was completed at the Sovkhoz imeni 50 Years Of The USSR at Podmoskov'ye and this building's completion will allow us to totally eliminate industrial construction from agricultural building construction.

The level of industrialization in rural economic projects is determined by the level of a building's prefabricated construction. At present, this is 70-75 percent of the basic industrial buildings in livestock and poultry complexes and on the average, no more than 40 percent of the industrial utility, auxiliary and warehouse buildings. However, all of the utility buildings make up 25-40 percent of livestock complexes and for example in an 800-cow milk production complex (project models 801-315 and 801-02-1) they make up even

more than 40 percent. And these are the buildings that as a rule are built in numerous projects that do not stipulate the possibility of making them modular. At the same time domestic and foreign practice indicates that building them with internally interlocking reinforced blocks reduces the estimated construction cost by 10-15 percent, labor costs by 15-20 percent, the external wall area by 30-35 percent and the internal area lines by 30-40 percent. In addition, land is used more rational and construction organization and the over-all architectural appearance are improved.

The "Basic Position On Planning and Constructing Fully Prefabricated Agricultural Projects" was developed in 1982 to regulate construction of fully prefabricated buildings (basically industrial utility, auxiliary and warehouse buildings). The prefabrication level of livestock projects directly depends on the approved technological system, the cost of which makes up to 30 percent of the building costs (the system is partially made of prefabricated ferroconcrete). This system includes troughs and canals, manure removal troughs, feed boxes and gratings, prefabricated skirts and guard rails in stalls and bays. Until now there have been a large number of elements in this inventory, including individual elements that really complicated preparation and assembly. Now fully prefabricated agricultural buildings of many different types are planned, including for enterprises that store and process agricultural products, vegetable-, potato- and hay storage facilities, green houses, buildings for storing agricultural equipment, boiler rooms and transformer substations. Their planning volume decisions are being combined and small-unit industrial products are being replaced with a higher level of factory readiness and modular assembly of technological equipment is being used. We are developing a new area -- assembly without welding. This is based on fixing detents from one element into caters in the other during structural assembly. Such an assembly was tested during the construction of fully prefabricated cowbarns and transformer substations and the man-hours in assembling roof and wall panels was reduced by 10-12 percent.

Enterprises involved in processing agricultural products such as meat processing plants and also cheese and milk processing, canning, wine, linseed and grain processing plants have a special role in the Food Program. However operating model designs in this area as a rule do not meet the construction industrialization conditions and there are many technological problems. They are basically built by rural construction organizations, but the structures that make up the design do not correspond to the product series offered by rural construction enterprises. Because of this TsNIIEPsel's'troy [Central Scientific Research Institute of Experimental Rural Construction Planning] and other organizations have worked on unifying construction solutions for such buildings and this has allowed a 3.5-fold reduction in the number of standard designs and a 35 percent reduction in the construction inventory. As a result, the "Standard Designs and Combined Construction Inventory For Enterprises Involved In Processing Agricultural Products" was approved in 1979. This reduces on-site labor costs and increases the prefabricated construction level to 70 percent. Now more than 40 projects for processing agricultural products are planned in line with the approved standard designs.

Warehouses for mineral fertilizers, fruit and vegetable storage, cultivation structures and enterprises for repairing and storing agricultural equipment



are also important rural industrial projects. The active project list includes a 1000- and 3000-ton storage facilities for eating potatoes, 100- to 1000-ton combined potato, vegetable and fruit storage sites, 50-ton vegetable storage sites and storage facilities for various vegetables. These projects have active ventilation systems with a high degree of automation throughout the whole production process and also have automated temperature-humidity control. The new storage facilities have capacities ranging from 50-5000 tons and they consider specialized and non-specialized farming. Such storage facilities are an aggregate of buildings and structures that are all associated with the technological process of storing, processing and completing production. The sectional principle lies at the base of volume planning decisions. Sections (of 6, 12, and 18X36 meters) are connected with corresponding capacities of 500-1000, 1500, 3000 and 5000 tons for potatoes and 250, 500, 750, 1000 and 2000 tons for cabbage. Refrigerators with 500- and 1000-ton capacities to store fruit have been developed and these include refrigerators for storage in regulated gaseous environments.

Mineral enrichment use holds a leading place in increasing agricultural crop yields. One kilogram of fertilizer spread at the optimum mixture increases millet yield 6-8 kilograms, potato yields by 28-30 kilograms and sugar beets by 30-40 kilograms. Nearly one-half of the yield increases in our country is from mineral fertilizers use. In the last three five-year plans, the amount of fertilizer per field hectare has increased three-fold. The May 1982 CPSU Central Committee Plenum assigned the mission of providing the rural economy with 26.5 million tons of mineral fertilizer in 1985 and 30-32 million tons in 1990 (2, page 48), as opposed to the 18.8 million tons in 1980. However the rural economy has only 50 percent of the necessary mineral fertilizer warehouses and only a small part of these are mechanized. Therefore during this five-year plan we intent to put warehouses for storing chemical products with a total capacity of more than 10 ,000 tons of simultaneous storage, i.e, significantly more than the 10th Five-Year Plan, into operation. And these are designed to have highly productive equipment. Mineral fertilizer warehouse construction will significantly reduce mineral fertilizer losses during transport.

The plan for this Five-Year Plan also includes constructing and putting into operation rail line and subsurface mechanized warehouses in the Sel'khoztekhnika [republic associations for the sale of agricultural equipment, spare parts and other material-technical means] System and also sovkhoz and intersovkhoz warehouses. The experience of building and operating mineral fertilizer warehouses in Moscow Oblast and in Belorussia and Ukraine SSR's confirmed the high operational indicators of glued wood construction. Warehouse load-bearing elements made from ferroconcrete and metal require expensive measures to protect them against the effects of most chemical products (never mind that steel and concrete outlay is increasing the construction costs and man-hours because of the reduced time in service). At the present load-bearing, glued wooden pointed arches and curved glued frames (with a 24 meter span and six meter spacings) are being used in the construction of pavilion rail line warehouses. Arched elements are being used in 5000- and 5300-ton warehouses and frames are used in 5, 10, 15 and 20 ,000 ton warehouses. Safety devices including facings are made from reinforced curved asbestos cement sheets and these are placed along the glued wooden

spans. Model designs for 625- to 2505-ton mineral fertilizer warehouses with pointed arches and 12 and 18 meter spans were developed for individual farms. The use of wooden frames with 24-meter spans in warehouses is reducing the outlay of glued wood by 10 percent and simplifies the layout of roofs (as opposed to the use of pointed arches). We are developing a variation of a load-bearing frame with 12, 18 and 24 meter spans that is made from straight elements held with pins or bolts at the cornices.

At the present time model designs for modular wintergreen houses having three- and five-hectare areas and metallic-frame bearing elements with 18 and 6.4 meter spans and also factory-made modular film greenhouses with one-hectare areas have been developed for greenhouse farms. All greenhouse designs are in set construction along with utility buildings and mass construction of modular greenhouses instead of the hanger-type with curved elements has reduced greenhouse metal content from 220-240 to 125 tons per hectare. Replacing the steel pipe with plastic (in the subsoil heating system) has reduced its demand by 35 percent (in each six-hectare area module).

Enterprises and establishment auxiliary farms and civilian personal subsidiary farms are making an important contribution to meeting the Food Program. The CPSU Central committee and Council of Ministers 1978 resolution "On Additional Rural Farms For Enterprises, Organizations And Establishments" started the supplemental farm development. On 1 January 1983 there were 20,000 such farms in the country and 98 percent of the industrial associations and enterprises have subsidiary farms which has put more than 3.8 million hectares of agricultural land into operation. In the areas where these farms operate they satisfy up to 40 percent of the demands in the public food network in meat, milk, vegetables and other products. Model designs for attached cow barns for 25, 50, 100 and 200 head with accommodations for calves and breeding stock, pig sties for fattening 100, 300 and 500 pigs annually and others have been developed for these auxiliary farms. Their construction solutions are primarily based on the use of local construction materials. The future development includes a fully prefabricated version for these buildings and we must equip these enterprise auxiliary farms with normative-technical documentation and the necessary means for mechanization so that they are developed successfully.

#### Construction of Silos                      and Enterprises For Storing and Processing Grain

The volume of the grain economy is the foundation for solving the Food Program, for grain is more than just bread. It is also fodder and mixed feed for livestock and poultry. At the present time the demand for food grain is being totally satisfied, but there is still a shortage of feed grain. Futures for the development of grain production were established by the 26th CPSU Congress and the May 1982 CPSU Central Committee Plenum: "The mission is to supply the country's growing demand for high quality industrial fodder grain in the very near future and to have the necessary state grain reserves and resources to export it" (2, page 32). Whereas in the 10th Five-Year Program on the average more than 205 million tons of grain were harvested annually, in the 11th Five-Year plan we intend to increase average grain production to 238-243 million tons and in the 12th Five-Year Plan to 250-255 million tons (2, page 33).

Grain production growth requires new storage capacities and today silo construction is becoming a specialized branch of construction. There are 26 combines employing 32,000 workers in the USSR Minsel'stroy alone. In the 10th Five-Year Plan there were basic changes in the structure of silo construction. Whereas simple silos were built in the 9th Five-Year Plan, beginning in 1978 plants with increased-yield grain production and mixed feed enterprises were in operation. These included 50- to 100,000 ton capacity silos, mixed feed factories with yields up to 735 tons per day and mills that produced 300 and 500 tons per day. Construction of closed cycle enterprises allowed us to concentrate highly productive equipment with all technological process automated and also allowed us to lower the estimated cost of auxiliary engineering communications.

Thanks to the construction of new factories, we plan to increase the production of mixed feeds in this five-year plan. However, despite the fact that labor costs in mill construction is 2.6 times that of the silos, the improvement of volume planning and construction solutions for these enterprises is being made on the basis of the existing production base of silo construction. A modern mixed feed plant or mill includes 10-15 free-standing production and auxiliary buildings. From an economic point of view it is expedient to build a grain silo, mixed feed plant and a mill at each enterprise in an area. The basic production buildings in a mixed feed plant include the production framework, field warehouses which are made from prefabricated ferroconcrete construction and multi-story industrial buildings of the 1.420-6 and 1.420-12 series which have better indicators than the earlier II-20 series. The cost per square meter of area was reduced by 5.8 percent, steel by 10.4 percent, concrete by 3.5 percent and man-hours in structure production and assembly by 15-25 percent. Silo warehouses in mixed feed plants are built from ferroconcrete elevator modules. There are no fundamental differences in the construction solutions of mixed feed plants and mills and the latter are constructed in a multi-story variation. TsNIIEPsel'stroy and TsNIIpromzernoproekt [Central Scientific Research Institute for Industrial Grain Design] combined volume planning and construction solutions for structures involved in processing and storing grain and as a result the number of designs used dropped from 340 to 111, the number of ferroconcrete items dropped from 640 to 256 and woodworking items from 150 to 55. This helped lower man-hours, raised labor productivity and increased the prefabrication level of basic industrial buildings to 90 percent.

One of the main trends in silo construction progress is the transition to prefabricated, enlarged, pre-stressed wall elements for the silos which make up about 70 percent of storage facility volume. Compared to unstressed wall elements this is a 30 percent savings in reinforcements and reduces reinforcement labor costs by 12 percent, increases construction stability and operational qualities. We plan to make a total transition to prefabricated silo construction with these walls in 1985. An experimental 18,000-ton-capacity complex has been built from these 3x6x1.2 meter blocks in a combine in the city of Skopin (Ryazan Oblast). Enlarging the blocks by a factor of two reduced labor costs in silo construction by 34 percent and the concrete outlay by 9 percent. The development of a new coupling element with construction cover also succeeded in lowering metal outlay by more than 10 percent.

The cost and man-hours in constructing grain storage and processing enterprises are reduced when modular auxiliary buildings are used and when the non-standard elements (compartment walls, silos, stair casings, roofs, partitions and others) are replaced with prefabricated elements. These buildings make up 15-20 percent of the cost and 40 percent of the total complex construction man-hours. Changing to interlocking construction will reduce man-hours by 20-25 percent, communication line length by 30-35 percent, the volume of excavation and earth moving by 15-17 percent and the construction area by 20-25 percent. Also installing enlarged block assemblies which are already produced by Siberian and Rostov installation and set-up directorates has a significant effect.

Two model designs for interlocking utility buildings for 75,000-ton-capacity elevators and also for 500-ton-per-day capacity mills have been developed. These are based on using unified sections. This type building has already been built in Kazakhstan at the elevators in the towns of Zholoman, Zhangiztob and others. Scientific research and design work is being conducted to improve the individual construction elements in silo frames (foundations, wall elements and platforms) and to replace the weld-joints with pins. Thus, silo construction already has the opportunity to complete its missions of storing and processing grain as required by the Food Program.

The future for developing rural industrial project and complex construction is being determined by the need for concentrating a major part of capital investment on expanding the production of basic types of agricultural products and on equipment that guarantees this expansion. From this requirement come measures to support rural industrial construction at the contemporary level and measures for expanding, reconstructing and modernizing it. At the same time we have the goal of doing everything we can to economize the means, materials and resources that are basically used to erect buildings, their supports and enclosure elements. This goal is supported by two fundamental trends in rural construction that apparently will decide its development until the year 2000:

1. Construction of basic and auxiliary industrial buildings with an increased prefabrication level.
2. Construction of universal (multi-purpose) agricultural buildings which are assembled with the minimum number of effective elements.

Both of these trends are a continuation and development of the general trend in building rural industrial projects and are associated with increased construction labor productivity, the effective use of the rural construction base, unifying volume-planning decisions for buildings and also easing the mass of construction elements, increasing the level of product factory readiness and developing a variation-exchange series of elements which consider the real construction conditions in rural areas.

Measures that support the first trend call for developing building variations with an increased prefabrication level based on the actual inventory of model designs for various projects in rural industrial complexes and zones. The concept of these measures is to replace non-industrialized building elements as much as possible with prefabricated elements with increased factory

readiness (to include trap doors, partitions, industrial elements in basic and auxiliary projects and also unifying the volume-planning and design solutions). Scientific and design developments by TsNIIEPsel'sstroy, Mosgiproniisel'sstroy [Moscow State Planning and Scientific Research Institute for Rural Construction], Belgiprosel'sstroy [Belorussian State Institute for Planning of Kolkhoz Construction], Belorussian SSR Minisel'sstroy PKB [design-construction buro] and other organizations and also the experimental construction of projects having increased prefabrication levels that are being erected in Moscow, Novosibirsk and other RSFSR oblasts, in Belorussia and Kazakhstan are used in this. Variations of model projects for building attached complexes for 800 and 400 head of cattle have already been developed and the use of these projects will increase the prefabrication level of buildings by a factor of 1.5-1.8 compared to the models used earlier. It will also reduce the outlay of materials per unit of basic building: cement by 10-15 percent and lumber by 15-20 percent while preserving the estimated cost of the projects). Construction of industrial buildings with increased prefabrication levels in the USSR Minisel'sstroy was organized by the Slutsk and Novosibirsk SSK's [rural construction combines], the Orelsel'sstroy [Orel rural construction] Combine, the Irkutsk Rural Construction Directorate, the Omsk Tselinstroy [could not find an expansion] and others. The future development of the first trend in rural industrial construction is being done by developing variations of fully prefabricated buildings for various zones and regions in the country, through a maintained inventory of designs and through a plan for model and experimental design. We plan to expand the volume of fully prefabricated construction in all spheres on the average of almost three-fold to increase its relative significance to 80-85 percent.

The second trend in rural construction will be experimentally tested at the Korobovo Training Farm in Smolensk Oblast. Its goal is to put up various type projects using a limited number of active elements and also to use prefabricated interlocking technological equipment sets. Basic construction is of the frame variety, basic frames with supplemental uprights and cross members with allow both the frame and final elements to be manufactured in one time. The framework for various types of buildings with spans of 12, 18 and 21 meters, lateral spacings of 6 meters and heights of 3.6 to 7.2 meters are formed from these frames. During the selection of enclosure materials they considered the most favorable combination with a limited amount and standard sizes, maximum weight reduction and a high level of factory readiness. One-ply polystyrene foam concrete panels, three-ply ferroconcrete panels (made in the standard series 1.832-5 panel forms), flat panels for unheated buildings and curved asbestos cement slabs will be used for the walls. The wall variation is because of the variety of building types. A garage, repair workshops, grain warehouses, storage facilities for potatoes and also mineral fertilizer will be built first. The foundations under the frames of all these buildings were adopted from T-beam driven piles with an overhang (series 1.811-1) and foundations under the columns and frame-butt uprights (series 1.020-1 footplates and GOST [All-Union State Standard] 24022-80). In addition to the basic frames, the framework uses series 1.823.1-2 columns and three-hinge, curved, glued frames. The building roofs use complex 3x6 meter slabs developed by TsNIIEPsel'sstroy. At the present time the general plan, project recommendations, and worker construction plans are being developed and construction is to be completed in 1985-86.

Preliminary calculations indicate that during construction of test projects at the Korobovo Training Farm the basic material outlay (cement, steel and lumber) will be reduced by 15-25 percent as compared to model solutions. Qualitatively the new feature has expanded the spheres of fully prefabricated construction in a whole series of projects which until now were built in slab design or using the industrial series "heavy" construction, projects designed to serve not only an individual complex, but also the economy as a whole.

The development of this future trend will undoubtedly serve to successfully solve Food Program missions and justify the hopes in their viability.

#### THE RESIDENCE -- THE MAIN OBJECTIVE OF VILLAGE CONSTRUCTION

The most typical and at the same time the most massive project in rural construction is housing. It is enough to say that from 1966 to 1980 500 million square meters of rural housing was built (2, page 29). And this is more than the total residential space in the USSR in 1940. In accordance with the Food Program in the 11th Five-Year Plan construction of residential buildings with a total area of 178 million square meters, 1.4 times more than in the 10th Five-Year Plan is planned.

The development of rural residential construction (primarily farmstead) and the increase in rural residential comfort is solving an important national economic and social mission, strengthening the cadre in the rural economy, which thus provides the country with all the necessary food products. At the same time, and this is not less essential, the fact that there are agricultural plots near the houses allows rural workers to have their own auxiliary farms and produce supplemental agricultural products.

Realizing the vast and complicated program of rural residential construction is impossible without its industrialization, the manufacture of construction elements and details in factory conditions. This is why for many years the basic direction in projecting buildings for mass construction has become the development of model pre-fabricated buildings made from various materials. This is why houses are being developed basically out of light concrete or out of wood, veneer, glued wooden sheets and also out of large blocks together with bulk elements and concrete slabs. Architectural-planning parameters for rural residences are being improved along with the search for the most effective construction decisions. This has found its own legislative support in the improvement (while considering the characteristics of the rural life style) of normative documents (SNIIP P-L [paragraph and line] 1-71). Then supplements to SNIIP Paragraphs 60-75 were added for this same reason.

We will look chiefly at industrial-type buildings since they primarily determine technical progress in construction. The series set of large-panel residences and cultural service projects and in particular series-25 and -135 which were developed by the Design Office for Ferroconcrete imeni A.A. Yakushev are the most wide-spread in the RSFSR and in Kazakhstan. These residential and cultural-service buildings (kindergartens, schools, trade and medical establishments and clubs of various capacities) are build from a unit construction kit. The series includes farmstead buildings and sectional

buildings with various assemblies of block-sections and apartments. This allows them to provide houses for families of various sizes and to diversify construction. Lateral wall element spacings are 6.3, 6.4 and 7.2 meters with supplemental spacings of three and 3.2 meters. External panels are at story height made of claydite-concrete, honeycomb concrete and also three-ply panels with effective thermal containers and internal walls are made from ferroconcrete or claydite-concrete. Ceilings are made of hollow ferroconcrete slabs and roofs are combined truss (a variation was developed to complete the basic construction from claydite-concrete). Articles for the series-25 and -135 are produced at more than 60 large-panel building construction factories with a total yield of more than 5 million square meters per year and approximately 30 of them are in the Non-chernozem regions. In the near future we plan to introduce new capacities. The series continues to be improved and pile-foundation variations, acoustical homogeneous slabs for ceilings that are ready to use, roomy maintenance-engineering booths and ferroconcrete roof trusses have been developed.

At the same time, mass construction of industrial buildings has shown some problem areas. In the opinion of architects and clients, the primary problem is that they have a number of architectural shortcomings which primarily affect farmstead homes. At the project authors' initiatives corrections to these projects were recommended on location, taking into account the local conditions. Central and zonal institutes took part in this process. The correction was in the external appearance of the buildings (without changing their basic construction design) and variations in porches, verandas, roof completion and others were developed. Buildings with these altered appearances have been built in Kostroma, Kalinin and Saratov Oblasts and in Krasnodarskiy and Krasnoyarskiy Krays. The development of locally modified series-25 and -135 buildings involved 78 design organizations from various oblasts, krays and autonomous RSFSR republics and as a result there are approximately 50 facade variations for Pskov, Kirov, Ivanovo and other oblasts based on the 8-16 building designs in these series. And we should not judge this very severely since this experiment succeeded on a purely formal plane, but the methodologically such an approach for today is not logical nor effective. Actually, with strict centralization the development of model designs cannot possibly consider the natural conditions, the specific construction situation and all the possible nuances for example in the Urals and in Siberia. This is why it is totally rational to develop a basic, almost draft product at the "center" which the zonal institutes then modify, conforming to the local conditions.

This is the principle that is the foundation for the architectural-construction technological system (AKTS) that was developed by TsNIIEPzhilishcha [Central Scientific Research and Planning Institute of Standard and Experimental Planning of Housing] and is being propagandized today. Ideally it will lead to the fact that we can develop a number of architectural-planning variations for residences in the different regions of the country based on a determined number of model sizes (between 20 and 30). Certainly people can say that there are such diverse local rural conditions that this is hardly possible. But remember that it was possible to find the necessary harmonious unity between individual and standardized buildings in the sufficiently complicated conditions of our capital based on the Moscow

Unified Catalogue of Standardized Industrial Products. A powerful base for the production of products from the Unified Catalogue has been developed and in particular DSK-3 [House Building Combine] has developed mass construction of multi-story buildings in Troparev, Kuntsev and Severniy Chertanov. Workers from MNIITEP and Prokatdetal' NPO [Rolled Component Scientific Production Association] received USSR Council of Minister prizes for experimental construction from the products of the Unified Catalogue.

The designs for 115-, 209- and 139-series wood panel houses are being very widely used. Under contemporary conditions they most closely approximate the traditional rural house and are made out of logs. And the details, the frames, shutters and knobs, in these houses are totally realistic. Therefore rural inhabitants willingly move into them for they prefer living in a wooden house than in a concrete one. These houses can be built in all regions of the country but the selection of the specific design depends on the local climatic, construction and economic conditions.

Series 115 was developed by Giprolesprom [State Institute for the Planning of Establishments of the Woodworking Industry]. It includes one- and two-story residential farmsteads, block and sectional homes. Its plan is based on 1.2 meter modules. The kitchen and sanitation blocks cannot be repositioned but the rest of the room can be. The wall panels which go from floor to ceiling are 1.2 meters wide and the panels in the rooms are made from wooden frames and facings (glued veneer or wood filament sheets). Variations of the house have also been developed and include frame-fiberboard systems, those made from light concrete panels and blocks and those made with beams. Minlesprom [Ministry of the Lumber Industry] enterprises produce elements for series-115.

Series-209 was developed by TsNIIEPgrazhdansel'stroy [Central Scientific Research and Planning Institute for Civilian Rural Construction] and was approved for mass construction by the USSR Minsel'stroy. This series includes one-story mansard, interlocking and sectional houses and a number of cultural-domestic service projects. The construction peculiarities of this series are its supplemental facing of asbestos concrete sheeting along the edging. There are two variations of panel cutting, those with a 1.5 meter width and room length.

Series 139 was also developed by TsNIIEPgrazhdansel'stroy and was intended for the northern regions with permafrost. An open underground air vent is built under the house. The panels are room width and the series has been assimilated in Yakutian ASSR.

Prefabricated wooden houses with paneled facades up to 10 meters in length have been approved for mass production in Penza Oblast, in Latvia SSR and in the Altay Kray. Splint-slab sheets are used as facing and FRP foam plastic is used as a insulation. All the houses are farmstead type with mansard and apartments consisting of three or four rooms. A domestic series of panelboard houses that are fully factory ready are used in Lithuania SSR. This series includes farmstead houses with apartments of two, three, four and five rooms which are noted for their comfort and high level of finishing work. The assembly set to build them is produced by the Alituskiy Combine which has a 2000 house per year capacity.



However wooden house construction also has its characteristic problems. The selection of materials that can be used, to include primarily beams, boards, veneer, splint-slabs, wood fiber and mineralized slabs is still limited. Because of this situation it is difficult to vary construction. And yet there is a way out of this situation. For this reason the experience of constructing wooden industrial buildings in the settlement of SEL'SKAYA NOV' near Moscow is of interest. Several types of wooden industrial buildings were used in domestic mass construction here for the first time. All the buildings are of the farmstead variety with apartments of two to four rooms and closets for clothing and accessories, storage rooms, verandas, farming structures and garages. This housing project was developed by Giprolesprom as a development of series-115 and by TsNIIEPgrazhdansel'stroy (mansard houses). All told, 34 houses were build, of which 8 are two-room, 18 are three-room, eight are four-room apartments and six of them are mansard. Houses in the 115 series were developed on the basis of planned 1.2 meter modules with a single span of 3.6 meters. The mansard houses are based on an enlarged 1.5 meter module. The wall and ceiling panels are made of wooden frames with an external facing of 13mm thick planed boards or water-resistant veneer with an internal facing of two glued, 4mm-thick DVP sheets or veneer. All of the wooden sheets are impregnated with bitumen and have good operational characteristics. Wooden supports on serrated platelets were used in the roof construction. Roof covering was green or red asbestos cement slabs produced by the Asbestotsement NPO in the city of Voskresensk. Structural attractiveness was achieved primarily through the good proportions of the basic elements and the active use of color (azure or orange walls combined with white window, porch and other trim). Parts for these houses were manufactured at Minsel'stroy enterprises and construction was done by Glavmosoblctroy [Main Administration for Construction in Moscow Oblast] organizations. The address for the experiment is: Moscow Oblast, Minsk Highway, 37 kilometers, SEL'SKAYA NOV' Poultry factory, Kuntsevskiy Settlement.

Such elements as the roof, veranda, porch, flooring, built-in cupboards and inside stairs are not very industrialized in both wooden and brick rural houses and up to 65 percent of the man-hours in constructing the above-ground part of houses is spent on them. All of these elements have to be "sculpted" at the construction site at the cost of a loss in quality, time and labor. Therefore developments by USSR Minsel'stroy's TsNIIEPsel'stroy and other organizations to decrease some variations of industrial roofs, verandas and spacious bathrooms out of various materials for the farmstead houses is remarkable. Standard size, incomplete examples of these can be seen at the TsNIIEPsel'stroy area in Aprelevki near Moscow.

We will quickly look at modular rural construction. It is undoubtedly competitive and foreign practices thoroughly confirm this in a variety of ways. And in our country rural modular construction in particular is used in the Ukraine, Belorussia and Kirghizia, near Moscow and in Kalinin Oblast. The experience of Mosnechernozemindustrproekt [Moscow Branch of Non-chernozem Industrial Design] in developing houses from single-modules is remarkable. One should not think that a house must made from one type module when the whole complex of its vital processes is refined into a rigid construction

plan. The modules can be made from individual design modules joined with panels or slab inserts (spacious bathrooms are an example of this) and staircases and entrance modules can also be planned.

Model houses of large concrete blocks are also finding wide use. These include series 24 by UkrNIIgrazhdansel'stroy [Ukrainian Scientific Research Institute of Civilian Construction] for the Ukraine SSR, series 17 by TsNIIEPgraxhdansel'stroy [Central Scientific Research Institute of Experimental Civilian Construction Planning] for RSFSR rayons and Kazakhstan, series 126 by LenZNIIEP [Leningran Zonal Scientific Research and Design Institute of Standard and Experimental Designs for Residential and Social Service Buildings] for the northern rayons and series PK-72 for Lithuania SSR. These have various types of residential and cultural-social service buildings. The advantages of modular construction is that they can be manufactured at any operating ferroconcrete plant, heavy claydite-concrete (1100-1200 kilograms per cubic meter) can be used and they can be erected without any special accessories.

The Food Program views the construction of farm structures near farmstead houses as being critical. Series 25, 115 and 209 farm structures have assemblies for keeping cattle and poultry, accessories, feed warehouses, summer kitchens, garages, etc. Barns are of very diverse construction, to include those from wood (paneling, frame and block) and concrete panels and blocks. These barns allow both developed and limited subsidiary farming and the selection of various plans is based on the materials available. And yet there are problems here also. With the sharp growth in the scale of barn construction it is impossible to use wood. The use of major construction elements is also not the answer, as they are material consuming and expensive. For example, imagine a barn foundation 1.5 meters deep. And yet, alas, such a thing exists. And there is still the question of what is better -- to put the barn far away on the land parcel or as close as possible to the house, under a common roof (which, by the way, is traditional for rural residences)? Auxiliary structures (garages and others) are in or under houses in the Baltic Region or in Sof'ine near Moscow. And this also is the case with some classes of barns. Must barns be so sharply divided for chickens, pigs and equipment? It seems that one of the variations could be organizing cellars and underground vaults under houses, with a trap door from the kitchen or an outside entrance.

It would seem that there have been enough designs developed for rural residential buildings (there are more than one thousand), but the major part of them need to be reviewed in light of Food Program requirements. This applies primarily to reorienting to farmstead houses. True, it would be expedient to rework a number of wooden construction houses (series 115, 209 and others), but the concrete and ferroconcrete house situation is still not satisfactory. And one thing that is especially eye-catching is that house construction enterprises as a rule master a total of two or three types of houses (which creates the danger of architectural monotony in the village's appearance), and in general until recently they have produced articles basically for sectional houses. Reorienting enterprises to farmstead housing is far from a simple process.

Moreover, the majority of farmstead houses are still planned and built with simplified amenities and this applies primarily to sewer and water systems. And because of this it is still too early to talk about comforts in all our villages. The Food Program urges all of us to solve this problem as soon as possible.

The development of farmstead construction has sharply raised the issue of rural land economy and indeed this is much more necessary than earlier. This is why many people say that the modular house, one-story or with apartments on two levels, which is more economic than the farmstead house, is the preferred type of residence.

In finishing this conversation on rural houses, we report that the album OUR HOUSE (8) which shows actual rural house designs for the majority of the country's rayons and zones and designs that were developed by both centralized and local design organizations, has been published. This album contains details of houses and normative documents which determine farmstead construction conditions. In short, it has high-quality material and provides information for wide consumption which, we hope, will serve to improve our villages and hamlets.

#### IMPROVING CULTURAL AND SERVICE FACILITIES IN THE RURAL COMPLEX

The Food Program, continuing the earlier strategic line of social village transformation, eliminating existing differences between urban and rural living conditions, is putting a lot of emphasis on improving the organization of and increasing rural communal and cultural-household services construction. Expanding the network of children's institutions, hospitals, stores and clubs is one of the basic ways of strengthening the rural cadre. However, at the present time, with the exception of individual, widely-known settlements (Daynava, Vertilishki, Kodaki and Sel'tso), the social-domestic services system for the rural population is still far from perfect.

In particular, it is unwarranted to divide villages into long-term and short-term and then concentrate basic services in long-term villages. For inhabitants of the remaining villages, access to schools, stores and hospitals is difficult (if you remember the poor condition of rural roads).

The existing rural capital cultural-domestic service buildings were basically developed 20-30 years ago and need to be expanded, rebuild or replaced. This supply is far from meeting contemporary needs in both location and equipment level.

The conventional "for appearance only" method of constructing a village center with the club or farm offices dispersed along the center line and the remaining household service buildings along the perimeter of the square, a system borrowed from the practice of building cities in the early post-war years, does not meet the requirements of small populated centers. The very scale of the village dictates that such projects as the club, trade center or administration building be concentrated in one complex. However, just the opposite, child care centers and hospitals can be moved out of the village center to quieter locations.

A significant shortcoming in our villages is the development of clubs, stores and offices from the same standard plans. This leads to uniformity and lack of identity at a time when the village appearance should reflect the characteristic features of industrial activity, the way of life and the natural surroundings. Moreover, with few exceptions, the majority of model village building projects lack appearance appeal. Facades are worked up schematically, components are, as the saying goes, "mass produced" and the decor is haphazard and unoriginal. Characteristically, such carelessness is usually not allowed in designing projects for cities or model settlements.

And construction times for rural domestic service buildings drag out intolerably. They lag far behind the tempo for putting residences into operation. The quality of the projects that are turned over also leaves a lot to be desired. The industrialization level of these buildings is lower than for any other type of rural construction, whereas at the same time the complexity and scale of work on clubs, schools and trade centers is equal to the most serious and significant projects in any construction organization plan. Frequently the qualitative level of rural construction, the habits and care necessary to develop such projects are low. The CPSU Central Committee and USSR Council of Ministers resolution on "Measures For Further Improving Residential, Communal-domestic Service and Social-Cultural Living Conditions for the Rural Population" that was approved in May 1982 recommended to a whole group of ministries and departments, including USSR Minsel'stroy, comprehensive measures for rural socio-economic development for the 1982-1990 timeframe. These measures included: continuing the transformation of rural population points into well-organized settlements; significantly increasing residential, communal and cultural-domestic service construction and developing cooperative and individual residential construction; creating conditions to strengthen the rural cadre; significantly improving cultural-domestic service, medical and trade services for the rural population; accelerating the tempo of road construction in kolkhozes and also of the roads connecting them to rayon centers;

During the 11th Five-Year Plan we intend to construct general education schools with a capacity for 2,315,000 students, build preschool child care centers for 1,182,000, clubs and cultural centers for 1,365,000 (and in the 12th Five-Year Plan to increase school construction by 14-17 percent, preschool child care centers by a factor of 1.5 and cultural centers by a factor of 1.7) to put 54,000 kilometers of roads connecting central farmsteads with rayon centers and 57,000 kilometers of hard surface internal farm roads (and to increase road construction in the 12th Five-Year Plan correspondingly 1.4- and 1.6-fold). Tsentrosoyuz [USSR Central Union of Consumer Societies] adopted a resolution covering construction in the 1982-1990 timeframe of consumer cooperatives with stores having an trade area of 4.9 million square meters, bakeries with a daily capacity of 17,000 tons of bread products, public eating establishments for 417,000 people and refrigeration facilities able to handle 196,000 tons and so forth (2, pages 101, 106).

USSR Gosstroy and councils of ministers in union republics must adequately adjust the existing construction norms and develop new norms and project models for domestic service buildings and also norms for per-unit capital

investment when calculating their expanded construction. Councils of ministers for union and autonomous republics, kray ispolkoms and oblast ispolkoms are responsible for improving social services for the rural population and to do this they must create in rural centers plants to launder and dry clean clothing, combined enterprises to repair radios and televisions, refrigerators and washing machines. They must also build bath houses, self-service laundries and combined reception points for light repairs and services in settlements. The USSR Ministry of Culture, USSR Goskomitets [State Committees] for Cinematography, for Publishing Houses, Printing Plants and the Book Trade and for Television and Radio Broadcasting were commissioned to improve cultural services for the rural population, to strengthen their cadre qualifications and to allocate the necessary material and technical resources for this.

More than two years have elapsed since the Food Program was adopted. During this time definite steps have been taken toward realizing this program. The basic conceptions of rural settlements have been reviewed, studied and refined and plans and schematics for rural planning and prospective designs for cultural conditions are being refined from these results. A number of fundamental conditions have developed, the primary one of which is that the set of problems in an agrarian industrial complex (including services for the rural population) must be reviewed not in isolation but along with its common ties with the development of leading industries of the national economy and, as is especially important, the solutions to these problems must involve the economic potential of large cities. The city now will to a large degree play the role of the highest link in the rural cultural-domestic services system and will directly participate in the construction of rural residential and domestic service buildings, using the urban industrial base for this. Along with road constructions, missions will be resolved that involve transportation support for villages. This includes on the one hand taking the population to service points and on the other hand, creating a counterflow of goods and services through mobile means in the remote rural areas. Each of these types of services has its specifications and its own sphere of influence. Superimposing them on top of one another will give the total picture of the service system within the limits of a region or its area of operation.

Correcting the existing cultural-domestic service buildings and developing new ones are based on the new approach to the rural system of population services. The earlier-justified methods for planning, such as the development of various types of buildings within the combined series on the basis of a unified construction system are being further developed. Blocking individual project groups (trade, cultural and pageant center projects) and consolidating various types of accommodations in one building (multifunction centers in small settlements) are being done in formulating complete complexes. Typological peculiarities of various buildings, i.e. school, medical, trade and other buildings are being considered. For example, a school complex which serves several settlements can consist of a training-industrial combine, sports hall for senior and secondary school pupils, a swimming pool and others. When assembling projects for a village, there is the possibility of constructing centers for settlements with 250-500 populations. This series includes nursery and kindergarten buildings combined with a primary school, a cooperative social services-trade center and basic or key settlements

(complete, developed social service complexes). Thus the populations of the basic and near-by settlements will equally have the necessary types of social-domestic services.

Improving for rural project planning calls for a gradual change-over from specialized planning to the development of project series for one project organization's area or region but with several variations. In this way the following missions are resolved at the same time: selecting the primary project and subordinating the remainder to that one, correlating the buildings in the plan, determining the means and methods for a single scale and rhythmic cycle of architectural components and also the construction sets and materials. Until now we have succeeded in doing this only when constructing model settlement centers which as a rule have been build from individual designs. This does not mean that we should reject the practice of model designs, for a growth in the scale of rural construction suggests that this is useful. However we must find the ways and means for creating original architectural solutions within the framework of model designs. For example, combining model volume planning modules with individual compositions shows promise. TsNIIEPgrazhdansel'stroy used this approach in developing a social service center design for a village of 2000 inhabitants. It had varied configurations which included six functional modules. These included the vestibule (connecting element) and also a school, cultural-administration, sports, store-dining facility and communal-domestic services module. There were also innovations in a design sense, such as combining hall spaces and cells with accomodations for small groups (class and society rooms, auxiliary rooms near the dining facility and stores). The latter are clearly inscribed in the model panel or frame panel design and the original arched or vaulted constructions, long beams or supports are fully justified in hall spaces.

Social service buildings and settlement centers formed around them serve as the focal point for the most important vital processes in a village (social-administrative activities, trade-domestic services, cultural life, pedestrian and transportation nets) and at the same time they are the most expressive objectives in an architectural-artistic and ideological sense. These are the qualities that are conclusively shown in our best model settlements, a large part of which have already been completed.

The Sel'tso settlement social center in Leningrad Oblast's Agrotekhnika sovkhoz was planned as a major, spacially developed complex with a club, sports hall, swimming pool, school, library and studio for creative work. The complex is also designed in a combined and separate modular form and the vestibule and sports hall serve as a connecting link between them. If necessary the school can also be isolated from the other modules. The building was built of measured monument forms and the motif of columns, vertical windows, the curved plane wall sections and the original tract of the club performance area's sloped surface give unity to all of its area.

The center of the Malpils sovkhoz-tekhnikum in Latvia SSR is extended along the main street of a molded architectural group. Its club performance area is isolated by an add-on area and the theater hall and the mass-actions area serve as replicas. A small open yard between the performance area and the last module is a unique "break" in this composition. The main building has

been accented with supplementary structures on the opposite side of the main street and with a flanking group of residential sections. A green park massif serves as a background for the entire structure. The severity, simplicity and elegance of the detail lines only underscores the representation and social significance of the group.

The Kiviliyay kolkhoz center in Lithuania SSR is composed of two independent, but identically interpreted buildings -- a club and a service complex. The center's dominate motif is simplicity, intimacy and comfort. It was designed so that the social service buildings would have developed roofs, galleries, bays and lodges that are reminiscent of Lithuanian residential building traditions.

The Padize center in Estonia SSR's Kolkhoz imeni Kaydula is an interesting example of using a remodeled group of architectural monuments for the social needs of a modern village. The whole center is in an old park and the buildings are arranged around a small, inner courtyard with columns and arches in the intervals and with restored window and door motifs.

Each of the cited examples has solved the problems of a fundamentally centralized building or group of buildings, has created an expressive, memorable group, organically tied it in with the landscape and included architectural-artistic details, public service elements and amenities and greenery in the composition. Moreover, all of them are noted for their high quality of the completed work and their self-supporting style, taste and building environment.

#### RURAL INDUSTRIAL DEVELOPMENT

The basic rural construction contractual organization is the USSR Ministry of Rural Construction [Minsel'stroy]. Its industrial construction base is 110 enterprises with a capacity for 3.5 million square meters of residential construction (including 2.9 million square meters of large-panel construction) and 800,000 square meters of social-domestic service building construction. Arraying a rather developed net of construction enterprises and organizations, USSR Minsel'stroy together with the interkolkhoz construction subelements is doing more than 50 percent of the rural construction and installation work. In the three years of the 11th Five-Year Plan Minsel'stroy has put residential buildings with a total area of 18.4 million square meters, schools and professional technical schools for 923,000 students and nearly 40,000 assorted agricultural projects into operation and each of these is already working toward meeting the Food Program.

The primary task of rural builders is to increase labor productivity and the volume of work without a significant growth in the number of workers. This is being done by transferring labor intensive construction work and processes to factories for rural construction and by transforming construction sites into assembly areas.

The rhythmic cycle for supplying rural sites with construction sets depends greatly on the capacity of rural construction industrial enterprises. The USSR Minsel'stroy production system for prefabricated ferroconcrete elements

and products exceeds 1.4 million cubic meters, that for light ready aggregate -- three million cubic meters, carpentry products -- six million cubic meters and glued wooden elements -- 132,000 cubic meters. In the last ten years nearly 4.5 billion rubles of capital investment have been put into developing the rural construction industry.

Prefabricated ferroconcrete and concrete are still the basic materials for making construction sets for rural industrial, residential and social service buildings and construction industry enterprises have master mass production of effective construction sets made from these materials. Foundation foot plates and pile columns are produced for support girder and framework buildings. Bedding and conventional foundation construction make up 5-15 percent of the total cost, 12-15 percent of the labor costs and 20-30 percent of the total construction time. With this in mind, we recommend the use of supports and support columns in rural construction for replacing pile foundations and columns with support columns reduces assembly labor costs by a factor of four, doubles the foundation life, and reduces concrete outlay by 10-40 percent, earth works by 60-80 percent and cost by 10-30 percent.

Lightweight, single-ended ferroconcrete beam production with 7.5 and nine meter spans has also been mastered. In combination with six and nine meter triangular frames they can cover 18, 21 and 27 meter buildings and where there are no internal crossbar supports, they can use two-slope frames with 12 and 18 meter spans. Three-hinged ferroconcrete frames with 12, 18 and 21 meter spans in combination with T-piles are widely used. Pre-stressed ferroconcrete (3x6 and 1.5x6 meter) ribbed slabs are used primarily as industrial building roofing. The 3x6 meter slabs are especially efficient as the assembly labor costs are reduced by 40 percent and concrete and steel outlay are reduced by 10 and 30 percent each (as compared to the 1.5x6 meter slabs). Combined roof slabs made from support and heat insulation layers are widely used. The basic type of wall cover is two-ply, fine-cut claydite concrete paneling made from light and heavy concrete. Two-ply light concrete panels with increased factory readiness and with window and door apertures set at the factory have been developed. The use of these panels cuts assembly labor costs in half and reduces cement use by 40 percent and cost by 20-25 percent.

In order to extend the lifetime of agricultural buildings and to improve the [indoor] microclimate TsNIIEPsel'stroy and Giproniisel'stroy have developed experimental one-ply flat-cut wall paneling with increased factory readiness. Their thickness for many climatic regions has been reduced to 5-10cm which has a major economic effect. Panel cost on the average is reduced by 5-6 rubles per square meter, manufacturing labor costs are reduced by 10 percent, the mass by 20-30 percent and cement outlay by 25-30 kilograms per cubic meter.

Further improvements of prefabricated ferroconcrete articles are tied to the construction development of efficient sizes from higher grade concrete and efficient types of steel. Construction using glued wood, asbestos cement and metallic elements along with the use of lightened ferroconcrete elements has been introduced into industrial projects.

Lightweight (with a high enough strength), resistance to harmful effects and technological effectiveness during element manufacturing are some of the



positive qualities of wood as a construction material. Glued wooden arches and frames are made from curved and straight elements with serrated or pegged connections. They have the most economic effect in the construction of mineral fertilizer warehouses. The Glamosoblstroyaterial [Main Administration for Construction Material in Moscow Oblast] Volokolamskiy experimental construction element factory is mass producing gabled arches with 24 meter spans for warehouse construction in Moscow Oblast and has 5-, 6.3-, 10- and 12-thousand ton capacities. The USSR Minsel'sstroy systems has nine enterprises producing wooden glued elements, although in Arkhangelsk, Vologda, Kirov and Novgorod Oblasts more than half of the livestock enclosures that are built using farming means are still constructed with their support elements made from unmilled timber.

Recently extrusion asbestos cement slabs and panels have begun to be used as enclosure elements. The use of the extrusion method has expanded the asbestos cement inventory, allowed a significant increase in its length (to six meters) and most of all, has saved wood and metal. And labor costs in manufacturing extrusion panels are less than for frame asbestos cement panels. The experimental-industrial line in the city of Voskresensk (Moscow Oblast) has an annual capacity of 200,000 square meters and produces extrusion panels with lengths up to six meters, widths of 60cm and heights of 60, 120 and 140mm. We plan to build new enterprises for extrusion panel production with 500,000 square meter capacities in Sverdlovsk, Leningrad, Gorkiy and other oblasts. A poultry house with extrusion panel enclosure construction has been built in Moscow Oblast's Tomilinsk Poultry Plant and a dairy complex with cow barns using these panels has been built in Lithuania SSR's Litovskiy sovkhoz.

In some regions of the country metallic elements are used as support elements in frames. The USSR Minsel'sstroy system has 24 factories that produce 1000 to 12,000 tons annually. Rural industrial construction is using metallic arches of developed I-beams and open-profile girders. We can consider the low alloy, wide-flange I-beam arches developed by TsNIIEPsel'sstroy and TsNIISK [Central Scientific Research Institute of Structural Parts] as an innovation. These arches were designed for hard-to-reach and northern areas with temperatures to -65°. Steel columns and wall panels have also joined the construction inventory list. They were used for the first time in Yakutian ASSR. TsNIIEPsel'sstroy and other organizations have developed an experimental poultry house project (a 18x9 meter layout) to hold 54,000 broiler chickens. This is to be made from light steel construction set and one such poultry house has been built at the Kindgask Poultry Plant in Georgia SSR. The construction set is manufactured by USSR Minmintazhspetsstroy [Ministry of Installation and Special Construction Work]. Their use has increased construction quality, shortened construction time, reduced the mass of support and enclosure material by a factor of five and reduced assembly labor costs by 35 percent.

Light metallic aluminum alloy elements are even more efficient. Wall panel and slab cover frame assembly time is reduced 20-25 percent compared to prefabricated ferroconcrete. The reduction in building weight and the increased speed in putting these into operation has saved 8-9 percent of the estimated project costs.

The plan for realizing the Food Program includes measures for industrial production and construction in 1986-1990 of fully prefabricated storage facilities "under key" from light metallic elements. Construction of these walls will reduce vegetable and fruit losses where they are grown and stored.

The use of plastic in agricultural construction is of interest. The Zaporozhye branch of Ukrkolkhozproekt [Ukrainian kolkhoz project] and Stroyplastik Experimental Planning and Design Bureau developed a 720-head calf pen with polymer enclosure material and recommended it for experimental construction. Its support construction is steel three-hinged frames with a 21-meter span made from developed I-beams with varying cross sections. The frames are on the outside to protect them from the harmful effects of the calf pen's internal environment. Walls are of vertical-cut pressed fiberglass panels and the insulation is poured foam plastic. The weight is 14 kilograms per square meter of panel. They have also developed designs for 180-head cow barns and a shed for storing and repairing agricultural equipment. Their supports are metallic three-hinged gabled arches (with a 12 meter span and three meter spacings) and the walls are reinforced polymer aluminized film. The roof is light, insulated casing (3 meter x 11 meter x 80mm) made of support and insulation layers. The former is reinforced polyvinyl chloride waterproof fiberglass and the latter is rolled fiberglass insulation. The cow barn (the 12x81 meter design) has already been built on a number of farms and the hanger (12x51 meters) has been built in the Bakhmachsk section of Raysel'kolkhoztekhnika.

Along with construction of fully prefabricated sets we plan to develop construction using local materials, to include arbolite, gypsum, slab concrete and others. Arbolite is light concrete made with a mineral binding, aggregate (wastes from wood processing, saw dust, shavings and other), chemical additives and water. Its per volume weight depends on the grade and type of aggregate and varies from 400 to 800 kilograms per cubic meter. Arbolite has good temperature and sound insulation properties and is easy to saw and nail into. Arbolite with a higher than 400 kilogram per cubic meter mass is fire resistant and is biologically stable when protected from moisture. Panels and blocks for external and internal walls, roofing slabs and roofs, panels for partitions and heat and noise insulation sheets are made from arbolite. It is widely used in Gorkiy, Vologda, Sverdlovsk and Arkhangelsk Oblasts. Experiments with this construction have shown its significant advantages over conventional materials. These include its low unit capital investment, the 35-55 kilogram per square meter savings in cement (compared to claydite concrete) and a 1.5-2 fold cost reduction over light wooden paneling. The USSR MinSel'stroy system has seven factories that produce arbolite and the Poskolkhozstroyob"edineniya [RSFSR Republic Agricultural Construction Association] has five plants producing it.

Another trend in the use of local raw materials is the production of construction materials from gypsum. Gypsum concrete products are widely used in agricultural industrial construction and this reduces the net cost by 20-25 percent, lowers the demand for workers during its manufacturing and assembly 3-4 fold, halves transportation costs and increase use time. An important advantage of gypsum concrete construction is that no cement is required during the construction of the building elements and the articles themselves. Gypsum

is used not only in wall panels and blocks but also in roofing slabs and overhead cover, large sanitation-engineering rooms, and so forth. Production of light wall panels and large panels and blocks with high factory readiness is being carried out in many of the country's cities and in particular in Krasnoufimsk (Sverdlovsk Oblast). They annually produce 60,000 tons of gypsum concrete products.

Slab building construction is beginning to be incorporated into rural construction. While not contrasting it to industrial construction, we note the advantages of this method in rural construction, to include the use of local construction materials, reduced energy and transportation costs, diversity in architectural-planning solutions and reduced capital investment in developing the industrial base. Slab house construction is used in regions with a developed base for the production of porous aggregate (RSFSR, Ukraine, Belorussia and Kirghizia) and in the southern republics soil cement concrete is being used effectively. At the end of the 11th Five-Year Plan USSR Minsel'stroy construction organizations plan to build nearly 1000 farmstead homes with two-, three- and four-room apartments using slab concrete.

To better organize the construction industry and more fully use its capacity we have taken the combined construction route. The June 1978 CPSU Central Committee Plenum discussed creating huge rural construction combines which would depend on the production of light industrial sets that are very factory ready for use in industrial buildings, creating subelements to complete special construction and installation work, developing measures to strengthen residential construction and organizing nets of rural residential building combines. The earlier rural construction organization form was based on splitting article manufacturing and assembly work. This way both of the subelements in the construction process were interested in completing only their own plan. The goal for creating rural construction combines (SSK) and rural house construction combines (SDSK) was to combine the enterprises that produce construction sets and details and the construction organizations and mechanization directorates into one element and force them to focus on the end product, and to bring on line finished facilities that are ready for acceptance.

Today more than 63 percent of large-panel house construction and 37 percent of rural industrial construction is concentrated in the SSK's. With these labor sources in the SSK's, the volume of the work they produce has increased by 20-30 percent.

The first SSK's were developed in the USSR Minsel'stroy system more than 10 years ago. Since then they have acquired a lot of positive experience which shows their effectiveness. In 1983 there were more than 150 different types of SSK's and SDSK's operating in the country. They have been widely developed in the USSR Minsel'stroy, USSR Ministroy, Mezhholkhozstroyob"edineniye [Interkolkhoz Construction Organization Association], Glavmosoblstroy and Glavleningradstroy. Whereas in the first years of SSK's they produced only individual sets for walls, frames, roofs and woodworking products for industrial buildings, now there are construction set for residential, social service and industrial buildings for both basic and auxiliary types, including elements for technological equipping. Five SSK's (Slutsk, Novosibirsk,

Kapchagay, Soldato-Aleksandrov and Mirgorod) have changed to producing support elements with six meter spacings. Along with the savings in concrete and steel and the construction cost reduction, this also reduces the total labor cost by 1.5 fold. The activities of 59 SSK's and SDSK's in USSR Minsel'stroy are confirming their effectiveness: labor productivity in these enterprises is 30 percent higher than the average in rural construction. The CPSU Central Committee 1983 resolution on "Measures To Guarantee Meeting The Residential And Social-Domestic Service Project Construction Plan" assigned the missions of increasing the SSK volume of construction, to include farmstead houses. We plan to double the introduction of houses (more than double the farmstead type and increase their prefabricated level to 80 percent).

SSK effectiveness depends a lot on unifying volume-planning and design decisions and on reducing product inventories as this directly effects their jobs, the flexibility of equipment and the production of construction sets that are fully factory ready. Therefore, further SSK development must lead to the creation of full-cycle operations: project design, manufacture of construction elements, construction and "turnover" of the project ready for acceptance.

#### IMPLEMENTATION OF NEW CONSTRUCTION ORGANIZATION FORMS

The search for construction organization forms for dispersed rural projects led to the creation of Mobile Mechanized Columns (PMK) and then the Rural Construction Combine (SSK). However, to master the enormous capital investment aimed at the rural economy, to satisfy the growing volume and time demands in rural construction it was necessary to constantly improve labor organizations into brigades and to instill advanced methods and forms of work organization. The CPSU Central Committee and USSR Council of Ministers 1984 resolution "On Improving Planning, Organization and Control Of Capital Construction" was devoted primarily to these issues. The resolution was aimed at fundamentally improving capital construction, at significantly increasing labor productivity through eliminating the losses in work time and also violations in labor and production discipline, developing the brigade contract, improving work and living conditions for workers, developing permanently qualified cadres and strengthening the role of worker collectives in completing worker missions.

As is known, the most progressive organizational form for construction work is the production line method which creates not only an uninterrupted line for the production of construction elements and their assembly but also provides the most effective use of material-technical resources and, the main thing, speeds up putting projects into operation. This is especially important with the dispersed construction in the agro-industrial integration conditions.

Success in using line production construction is directly dependent on correct planning. Practice shows that planning for only one year is ineffective as it does not provide the necessary engineer preparation for work production which in the end result has a negative effect on the results of construction organization operations. A more improved planning form is planning for Orlovskiy "continuation" during which the time schedule for line production of agricultural projects, residential and cultural-domestic services centers for

two-year development becomes the builders' basic work document. The schedule for the first year is a working document and is not subject to essential changes. The schedule for the second work year must include projects from the first year's schedule. This allows the builder to improve engineer preparation for the production work, to avoid wasting state resources and to significantly reduce the volume of uncompleted construction, improve its quality and on the whole to increase the number of projects put into operation.

Construction work is organized on the basis of combined production lines which rely on the capacity of construction organizations or combines. For example, in the Kalininsel'stroy directorate three independent, complete production lines were developed into a SSK. Each of the three is composed of four parallel, specialized production lines: construction of the subsurface sections of a building; compartment installation, roofing layouts and carpentry product installation; finishing work; and assembly of interior networks of engineering facilities. Each of the special production lines has the following: a unified rhythmic cycle for completing work and an abbreviated rhythmic cycle for completing the main effort, the assembly of construction elements for the above-ground section of the building; the optimum composition of specialized detachments; departments for the physical volume of construction-installation work; requirements for the basic construction materials and prefabricated sets; lists of the machinery, accessories, inventory and equipment.

Planning for production line construction which relies on the capacity of a specific SSK and not on a program established for the builder by directives guarantees that the work of both the industrial enterprise and the construction organization is effective. This gives the oblast ispolkom, rural economic directorate, construction directorate and combine the possibility to know exactly how much of what construction sets the SSK will deliver in a year and how many of which designs to order from design organizations. This sharply reduces the design documentation volume since the SSK and the general contractor will know ahead of time which material and technical resources they need and which will be allotted to the appropriate organizations.

Based on the construction production line schedule, schedules are developed for production line delivery of construction elements per check-point, floor and the building as a whole; a schedule for brigade movement in the production line and a schedule for the basic equipment; number of personnel and the number of special detachments and the necessary instruments, machinery, and so forth, and documents for implementing the brigade contract are prepared. Combining the method of production line construction with the brigade contract decisively increases worker labor productivity and helps put projects into operation in a timely manner.

The brigade contract was used as a new, more improved form of brigade cost accounting for the first time in 1970 by the combined brigade of Hero of Socialist Labor N.A. Zlobin. The goal of the brigade contract is to increase labor productivity, speed up putting project into operation, guarantee the high quality of construction products and save material and technical resources.

The essence of the brigade contract is as follows: a brigade signs a contract with a construction-assembly organization and according to this contract they are obligated in a set time to construct a cow barn or poultry house or complete a major stage or complex of operations on an elevator or mill complex and turn it over in good condition, without exceeding the calculated cost of the construction-installation work. To do this the brigade must expend construction materials in an economic manner, carefully safeguard construction sites, use equipment and transportation in a rational manner and observe accident prevention rules for both labor and equipment. In turn the construction-installation organization is obligated to provide to the construction project, stage or work complex that is handed over to the brigade the project-estimate and organizational-technical documentation, all the necessary materials, construction sets, details, construction machinery, tools and accessories, to introduce progressive equipment and scientifically organized production and labor, to provide engineer-technical construction management, to take measures to protect labor and to create conditions on the site that guarantee safeguarding of everything that is handed over to the brigade.

An analysis conducted by USSR Gosstroy's VNIPI [All-Union Scientific Research and Planning Institute] for construction labor into the work of brigades working under contract shows that in the three years of the 11th Five-Year Plan their labor productivity has increased by 25.3 percent (and for the 10th Five-Year Plan it increased by 31.5 percent) whereas at the same time conventional brigade labor productivity increased only by 5.1 percent. In the last ten years contract brigades have saved more than three billion rubles (thanks to reducing estimated work costs) and have reduced construction time by almost 10 percent. The labor prowess of many brigades and workers has been noted by prestigious awards from the Motherland. M.B. Koblov, brigade leader of combined PMK-908 brigade from the Astrakhansel'stroy combine, A.A. Lozovskoy, brigade leader of ferroconcrete construction set assemblers PMK-147 from Slutskiy SSK and many others have received state prizes in 1983 for outstanding achievements in labor and for major personal contributions to the work of instilling through production line brigade contracts into construction. All of this convincingly shows what large reserves each work collective has that has mastered the foremost experiences of construction production. Hero of Socialist Labor B.B. Chukanov upon meeting with General Secretary of the CPSU Central Committee K.U. Chernenko at Moscow's Serp and Molot metallurgical factory correctly noted that in brigade understanding "my" and "our" and also "personal" and "social" are merging into an ingot of class consciousness, patriotic duty and collective skill.

Practice shows that the effect of brigade contracts is increased in those construction organizations where necessary attention is put on improving material-technical supply and industrial-technical sets (PTK) for projects and where this does not happen, the brigade contract has no affect. The prime requirement in the complete engineer-technical preparation of production and industrial-technical sets for a project is their reality. Therefore during the development of monthly and daily plans, those resources which the the combine and PTK directorate do not have must not be included in those plans. The functions and structures of these directorates (UPTK) at the present time

have changed. A UPTK has become a production subelement that works in cost accounting and includes prefabricated ferroconcrete factories and workshops which produce other construction sets and articles. UPTK workshops partially rework materials (they prepare spackling and painting compounds, saw boards to the required room sizes, prepare wallpaper and linoleum) and then break these products up into sets, pack them, store them in containers and deliver them to the brigades according to the daily schedules.

Since 1976 the Belorussian branch of the Giproorgsel'stroy institute has been introducing a unified system of engineer-technical preparation for construction production [ITPP] in the Belorussian Minsel'stroy. Its basic missions are to systematically deploy and regularly complete construction-installation work, reduce construction times, put projects into operation with high technical-economic indicators and high quality. ITPP project documents are very labor consuming during their development for they include the design of production work (PPR), assembly of the the work by special production line and performing organization, a limiting-construction set department and the calculation of the expenses for labor and salaries by special production line. Thanks to the introduction of the ITPP system, labor productivity is annually increasing by 2-3 percent, internal systemic work-time losses are falling (from 2.95 percent in 1976 to 1.80 percent in 1982) and transitional supplies of materials is also being reduced (from 47.6 million rubles in 1976 to 45.32 million rubles in 1982).

The introduction of mechanization into rural construction is a necessary requirement for growth in labor productivity and also to change its character, reduce the expenses of manual labor and create the most beneficial conditions for construction laborers. There are three types of mechanization at this time:

-- partial mechanization -- at this level basic construction work is done with the help of machines and includes the use of minor mechanization means such as low-powered mobile machines, hand power tools and accessories. This is prevalent in many areas and especially in interkolkhoz construction organizations (MSO). An example of this could be the development and introduction by USSR Minsel'stroy's Giproorgsel'stroy Institute of power tool equipment sets for the normative-sets in finishing, masonry, roofing and other work;

-- complete mechanization -- this stipulates that basic and auxiliary building are completed using sets of interchanging machines and equipment; this has been introduced into some PMK, SMU and advanced MSO. The foremost experience of introducing complete mechanization of the basic construction-installation processes in the key model construction USSR Minsel'stroy organization (rural construction directorates of Kaluga, Voronezha, Orel and Mogilev) deserve attention;

-- automation -- at this level all types of work are completed by a machine-automated position and instrument systems without direct worker participation and this is still almost not used in rural construction. Partial automation is being done in factories that manufacture concrete and mortar. USSR Minsel'stroy has accumulated a lot of experience in using automated fast-production lines in the production of fixtures; fixture steel rejection in being reduced and at times totally eliminated and labor productivity is significantly increased.

As the foremost experience shows, with the significantly dispersal of rural projects it is expedient to create combined brigades whose members have three to five specialties. When the normal material-technical resource supply is disrupted they can do preparatory work that is stipulated by the brigade movement schedule. This reduces downtime, uses equipment better and thus improves the work of the construction organization as a whole.

Decisions by the 26th Party Congress stipulated that rural buildings and structures be erected with the help of mobile construction organizations. This is a new form of construction organization and is based on the use of mobile inventory production buildings and also mobile administration-cultural and residential-social service buildings. These are especially useful in the construction of silo complexes, buildings and structures located in remote areas, far from construction industry production bases and also during land reclamation projects. The capacity of mobile organizations, their composition and specialty is determined by the program of construction-installation work and project construction time. They are based on the watch method of production and as a rule a watch lasts two week, 10-12 hours per day. The other two weeks the brigade rests at its base city or settlement where are all the conditions for normal life and rest for the builders are available.

Scientific research has confirmed there is a relationship constant between the organization of builders' production conditions and their labor productivity, cadre turnover, morbidity rate and the general socio-psychological climate in a collective. Specifically, under normal conditions labor productivity in 76 percent of worker-builders increases after the lunch break, but under minimal comfort conditions it falls for 40 percent of the workers. Annual losses only because of unsatisfactory production conditions and on-site sick-rate is a minimum of 530-580 rubles per worker. This is why the USSR Minsel'stroy is intently looking at near-site and watch settlements for rural builders. To do this USSR Minsel'stroy's Gipproorgsel'stroy has developed unified, mobile container-type buildings (there are 17 designations that make up the Komfort series). All of these buildings are based on a single container that the USSR Gosstroy has recommended for factory preparation until 1990 as the best basic inventory solution. USSR Minsel'stroy's Starokonstantinovskiy Metallist factory is producing these as the primary enterprise for container construction. Safonovskiy Assembly Purchases and the RSFSR Minsel'stroy's Tartar Mechanized factories are producing these for non-chernozem projects, as are USSR Minbodzov [Ministry of Land Reclamation and Water Resources] and USSR Minstroy.

The dimensions of the basic container are 9x3x3 meters and it is manufactured on a metallic frame. The wall panels and the roofing panels (for the whole length of the building) have a frame of curved elements which are filled with an effective insulation and they are faced with crimped metallic sheathing on the outside. The inside is finished with wood fiber wall board. The building construction decisions stipulate a minimal use of metal, less than 70 kilograms per square meter of usable space which is almost half of that in other such buildings. Both protective metallic sheathing for panels and also wooden elements were considered in calculating the structure's bearing capacity. Buildings used for various purposes were developed from this basic



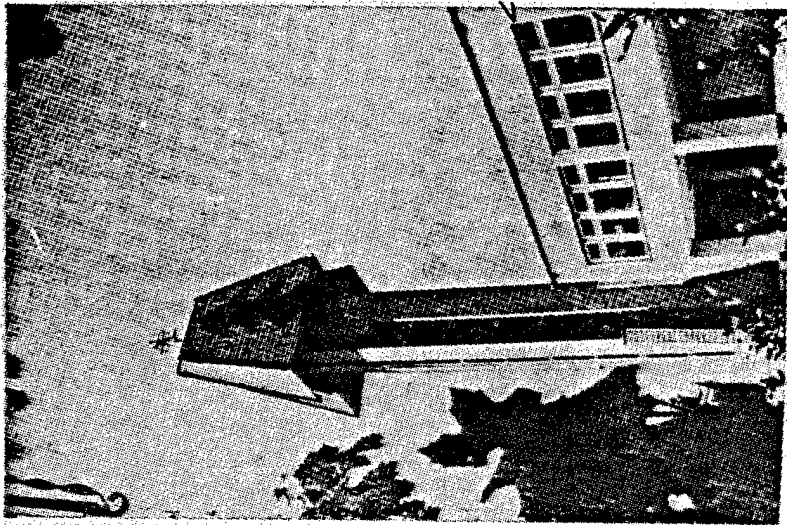
container and include a dormitory, store, aid station, dining hall, snack bar, club, reading and recreation room, foreman's office, domestic services center, cloak room, shower, bath and toilet, a total of 17 designations. A building is made up of one or two interlocked containers that are equipped with all types of engineering facilities and also built-in furniture, a refrigerator, television, radio and special equipment for drying and protecting special clothing. On-site settlements for rural builders in various regions of the country are developed from these inventory buildings. In 1984 19 on-site settlements were organized for USSR Minzag [Ministry of Procurement] alone and in 1985 this number will increase by 25. USSR Minsel'stroy has developed and approved a parametric series, sets of buildings and designs for plans of on-site complete and day settlements for builders. Complete settlements (which includes residential buildings and dormitories) have been designed for 30, 60, 90, 120, 135 and 270 builders and there are day settlements for 25, 50, 75, 100, 150, 200, 400 and 500 people.

Let us look at an on-site complete settlement for 75 builders and 15 service personnel. The settlement is composed of two areas, production and living. In the middle of the area near the main entrance is a group of industrial and cultural buildings, including the foreman's office with a dispatcher, a dining hall, club, reading and recreation room, store and domestic service center. Blocks of cloakrooms with showers, an aid station and bath-laundries are dispersed in the second series and around them are dormitories. In the center of the area are the rest, sports and mass-gathering areas with small areas equipped with tinted screens for resting, a summer production area, dance floor and sports complex. Along the edge of this area are personal buildings, stands for vehicles for personal use and also refuse containers. There are circular passages that allow fire vehicles to have access. The area of such a settlement is 16,200 square meters and the building area is 1414 square meters (48 buildings with 1175 square meters of usable space). The most economic complete settlements are those for 90 and 120 people and the most economic day settlements are those for 100 and 200 people. In smaller settlements the cultural and domestic service centers are not utilized enough and in settlements for 135 to 500 people there is a need to have developed nets for traffic and also sports and rest areas.

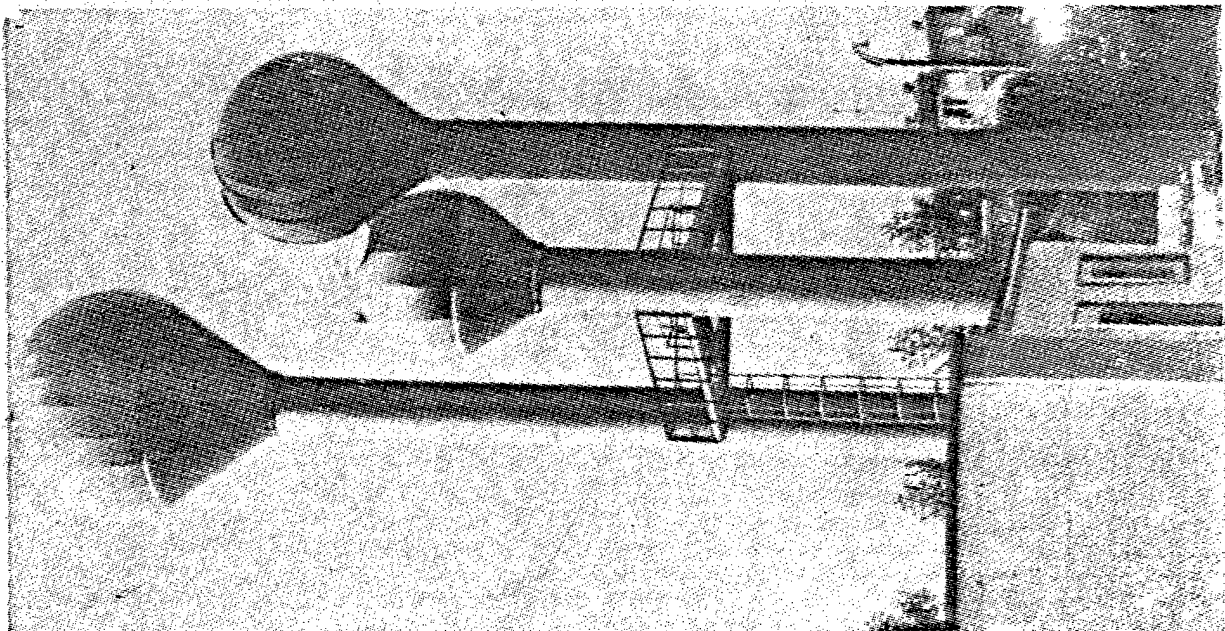
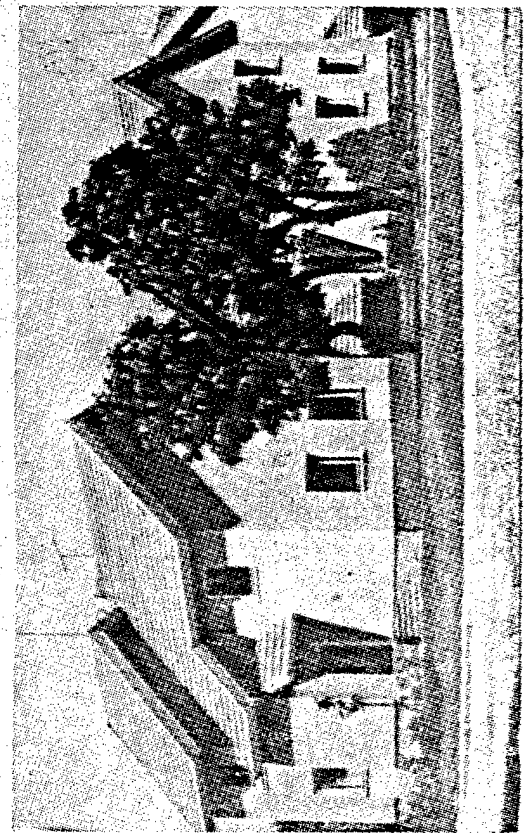
These on-site settlements are also built by mobile organizations, one of the mobile mechanized departments (PMU) which are included in the mobile construction territorial organization. Such PMU's are creating cantonments for geological prospectors, oil industry workers and others. They have brigades for the following work:

- setting up buildings, construction sets and transportation;
- constructing subsurface portions of buildings and engineer work;
- assembling and disassembling of construction set and container buildings;
- finishing and repair work.

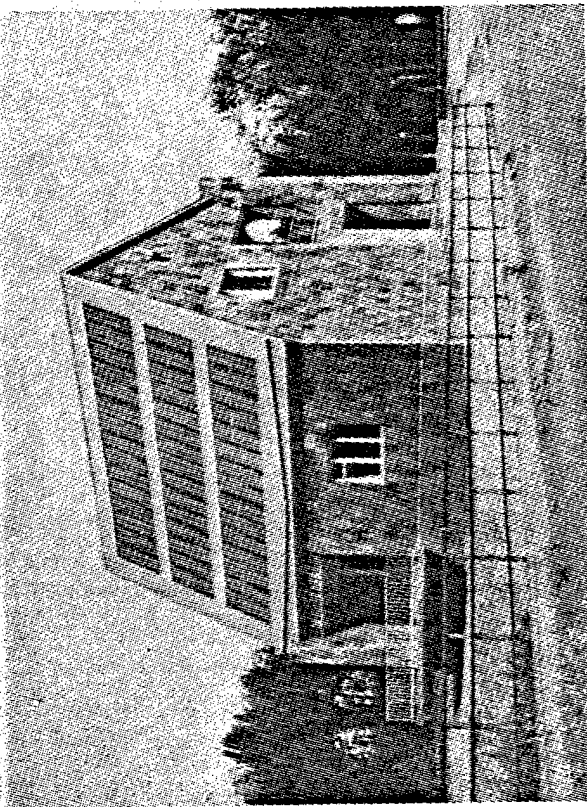
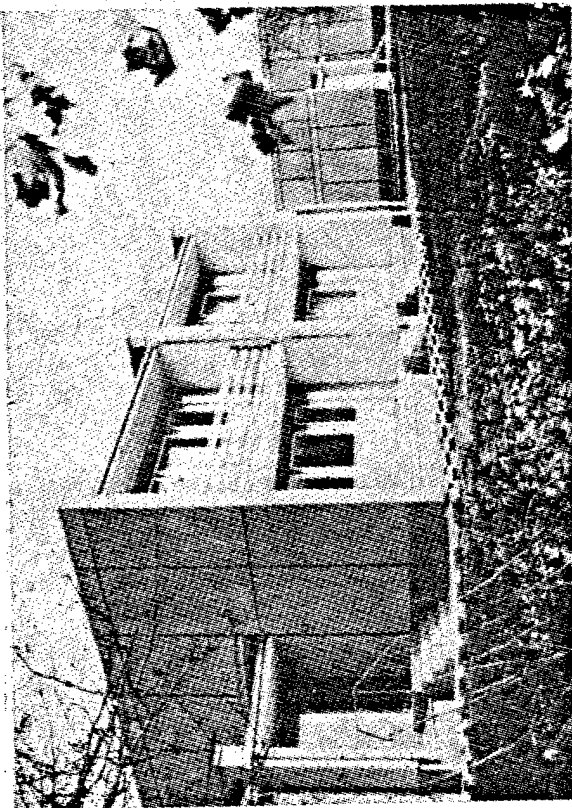
A PMU signs subcontracting agreements with the general contracting construction organization that is doing the village construction or rural industrial project. A PMU can also transfer specialized installation work, including work on subsurface building sections to specialized organizations



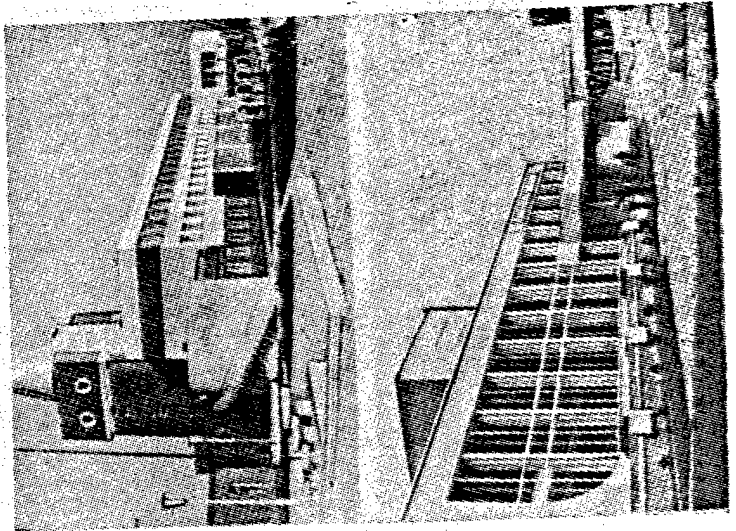
The settlement of  
Yuknatchay in the  
sovkhos imeni 25th  
CPSU Congress in  
the Lithuanian SSR.  
Water tower and 7-  
apartment residential  
building.



Water towers with thin-walled metallic reservoirs.



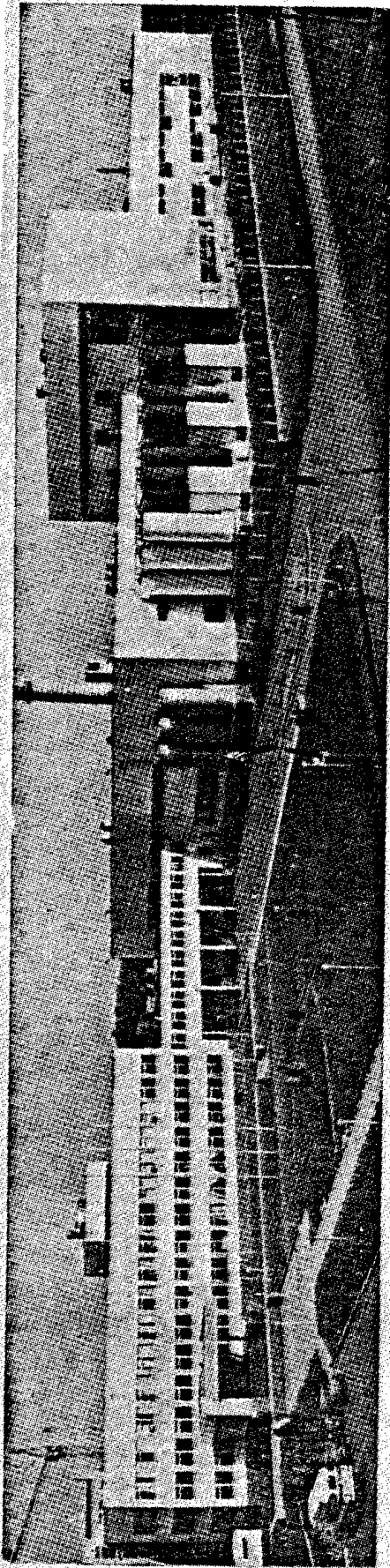
The settlement of Sartay in Lithuanian SSR. A prefabricated block house with apartments on two levels. The settlement of Mertsvan in Armenian SSR. An experimental residence with a solar heat-exchanger.



An equestrian riding hall made from glued wooden construction. These buildings are being built in Lithuania and Belorussia.

The village of Sloboda in Minsk Oblast. A school for 504 students at the Mir sovkhos-combine in Minsk Oblast. A Cultural Center.



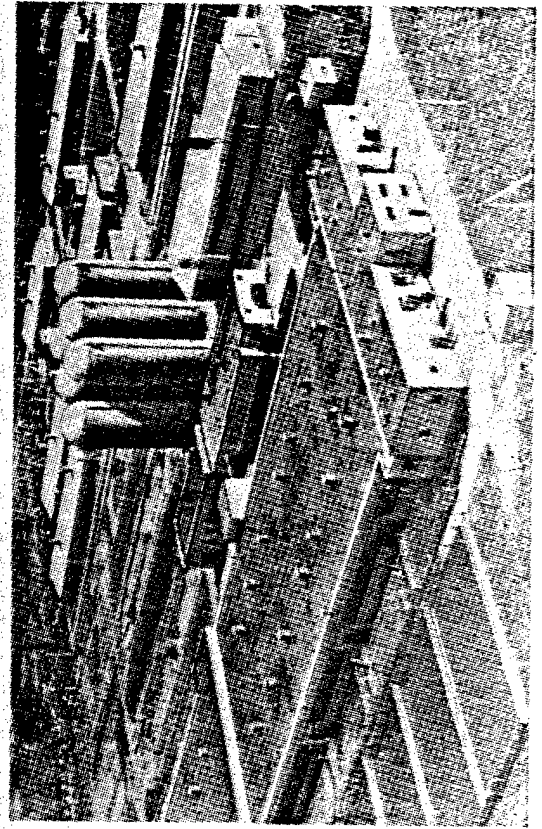
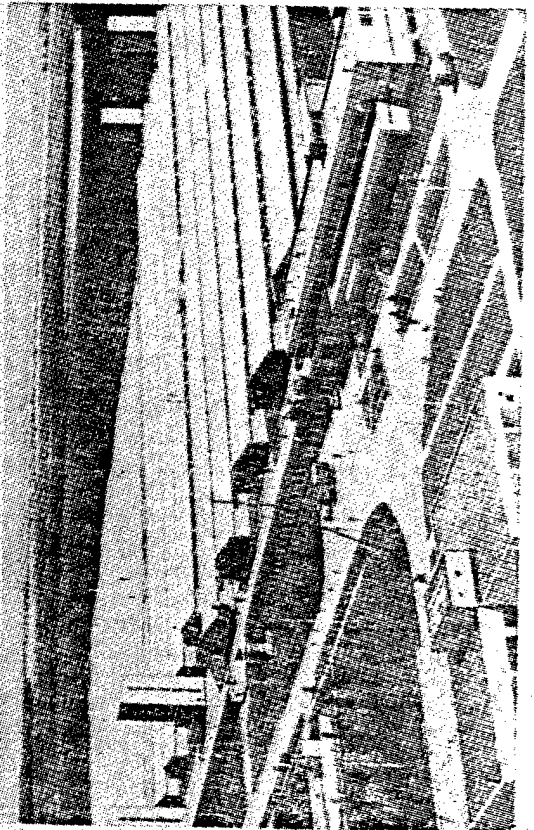
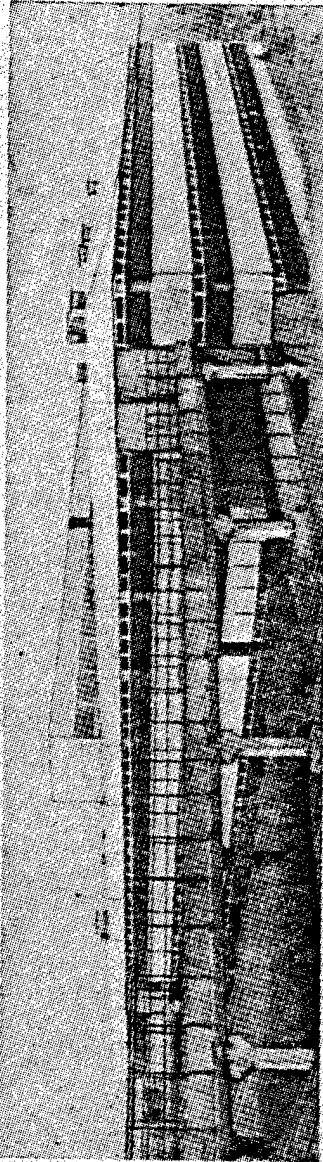


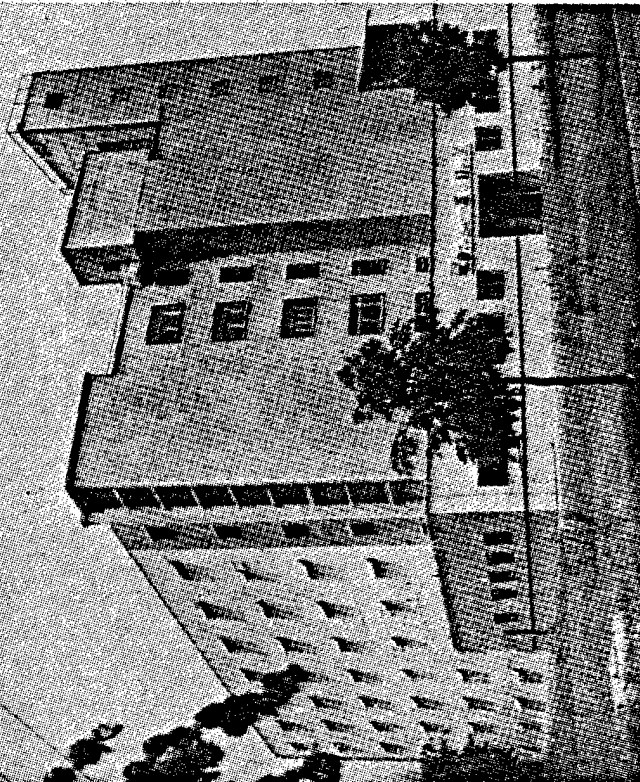
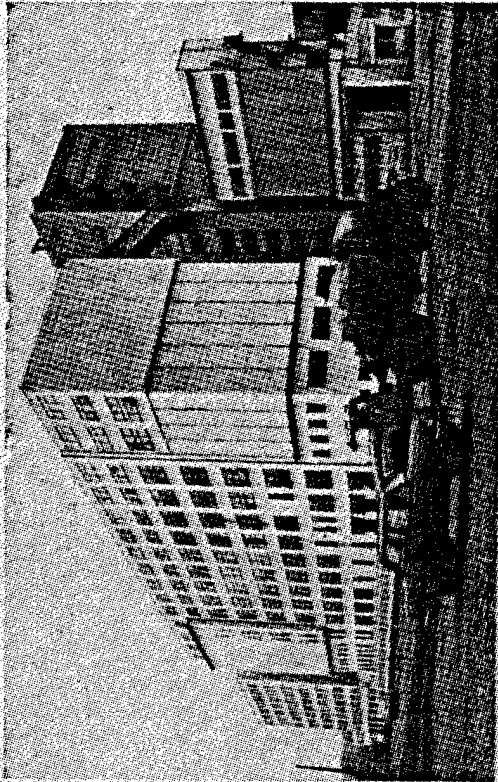
The city of Balta in Odessa Oblast.  
A milk cannery.

The Sovkhoz imeni V.I. Lenin in  
Lenin Rayon, Moscow Oblast. A  
three-story cow barn for 1200  
head.

The Novoe Poles'ye Sovkhoz in Minek  
Oblast. A milk processing plant  
for 1100 cows.

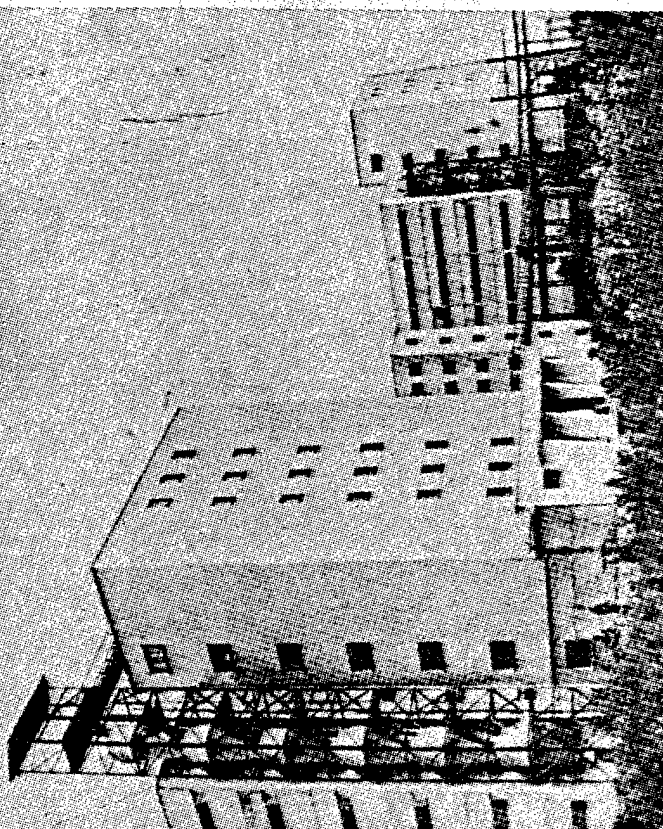
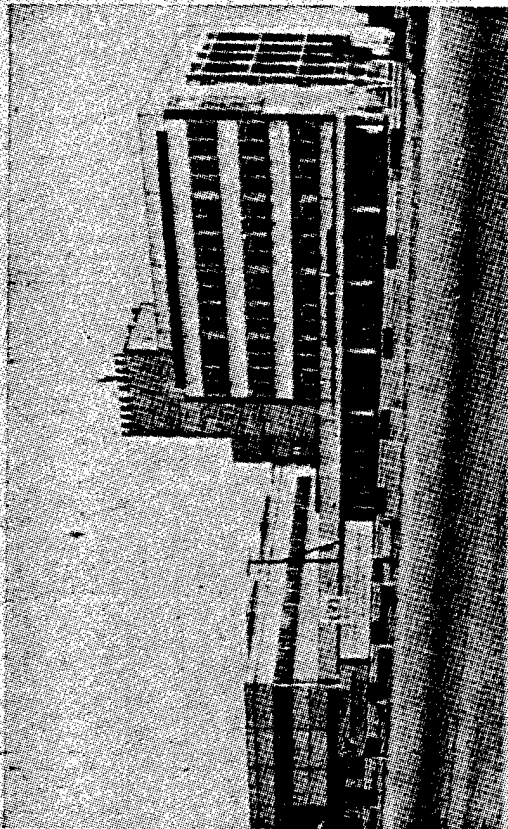
The settlement of Kalita in Kiev  
Oblast. A pork processing complex  
for 108,000 head.





Alma-Ata Oblast. The fully-prefabricated Kapchagay grain products plant.

The Kiev poultry plant. A six-story poultry coop for 160,000 layers.



The Kapchagay Rural Construction Combine near Alma-Ata. A Kapchagay poultry plant in Kalinin Oblast. A six-story poultry coop.

through subcontracts. When a mobile residential settlement must be relocated the PMU disassembles the buildings and engineer nets, makes the necessary repairs and assemble them at the new location.

The use of mobile, well-organized buildings is lowering the worker sick-rate and worker time-loss, increasing the production climate, stabilizing the industrial collective, guaranteeing their efficiency and effectiveness and as a result (according to calculations by VNIPI Institute for construction labor) it is increasing builder labor productivity by up to 9 percent. Calculations indicate that the expenses associated with creating good sanitary-domestic conditions are on the average 4 times less than the losses incurred because of releasing workers from sites because of unsatisfactory sanitary-domestic conditions.

#### STATISTICAL INFORMATION

By 1983 there were 96.6 million rural inhabitants in the country, i.e. approximately 35 percent of the total population.

At the present time there are 26,300 kolkhozes, 21,600 sovkhoses, 9,600 inter-economic enterprises and more than 500 industrial associations.

At the present time, compared to 1960 the per capita demand has increased in the following amounts: for meat -- 242 percent; for vegetables -- 211 percent; for milk -- 122 percent; for eggs -- 211 percent and for sugar -- 157 percent.

During the 11th Five-Year Plan housing with a total area of 378 million square meters, 1.4 times greater than in the 10th Five-Year Plan, will be built in rural areas.

In the 1981-1983 time frame 92.1 tons of milk were produced, 1.5 million tons more than in 1966-1970; almost twice as many eggs and granulated sugar, up 2.2 million tons, was produced.

As compared to the 1970 levels, by 1990 the per capita demand for food products will increase in the following amounts: meat -- by 22 kilograms; milk -- by 23-33 kilograms; eggs -- 101-105 eggs; vegetables -- by 44-53 kilograms.

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