APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

JPRS L/10346

22 February 1982

Translation

AIRFIELD CONSTRUCTION

By

B.I. Demin, V.P. Yegozov and Yu.A. Ratyuk

FBIS FOREIGN BROADCAST INFORMATION SERVICE

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

COPYRIGHT LAWS AND REGULATIONS GOVERNING OWNERSHIP OF MATERIALS REPRODUCED HEREIN REQUIRE THAT DISSEMINATION OF THIS PUBLICATION BE RESTRICTED FOR OFFICIAL USE ONLY.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

JPRS L/10346

22 February 1982

AIRFIELD CONSTRUCTION

Moscow STROITEL'STVO AERODROMOV in Russian 1981 (signed to press 4 Nov 80) pp 1-248

[Handbook "Airfield Construction" by Boris Ivanovich Demin, Vladimir Petrovich Yegozov and Yuriy Alekseyevich Ratyuk, Izdatel'stvo "Transport", 4,600 copies]

CONTENTS

Annotation 1

Preface 1

Chapter 1. Organization of Airfield Construction Work 3
- 1.1. General principles for organization of airfield construction work 3
- 1.2. Main normative documents for airfield construction 4
- 1.3. Industrialization of construction and complex mechanization and automation 5
- 1.4. Planning the organization of construction and work production 7
- 1.5. Periods and organizational and engineering preparation of construction 10
- 1.6. Duration of airfield construction and sequence of work 11
- 1.7. Continuous method of organizing work 13
- 1.8. Organization of material and technical supply of construction 15
- 1.9. Organization of labor, operational planning and management of construction 16

Chapter 2. Materials 19
- 2.1. Soils 19
- 2.2. Soils strengthened with binder materials 22
- 2.3. Stone materials 34
- 2.4. Mixtures of stone materials treated with inorganic binders 43
- 2.5. Asphalt concrete and asphalt concrete mixtures 44
- 2.6. Organic binder materials 54
- 2.7. Concrete 58
- 2.8. Materials for sealing deformation joints of rigid pavement 84

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Chapter 3.	Preparatory and Excavation Work to Construct Flying Field	88
3.1.	Preparatory work and work with vegetation-laden soil	88
3.2.	Excavation of channels	88
3.3.	Construction of fills	104
3.4.	Grading and agrotechnical operations	105
3.5.	Conducting excavation work under special conditions	114
3.6.	Organization of excavation work	125
Chapter 4.	Construction of Drain-Runoff System	127
4.1.	General data	127
4.2.	Organization of work to construct drain-runoff system	127
Chapter 5.	Construction of Flexible Pavement	139
5.1.	Construction of pavement and beds from strengthened soils	139
5.2.	Construction of pavement and beds from crushed stone materials treated with organic binders	150
5.3.	Construction of asphalt concrete pavement	154
5.4.	Construction of metal sectional-removable pavement	163
Chapter 6.	Construction of Rigid Airfield Pavement	174
6.1.	General data on rigid pavement	174
6.2.	Installation of master cords and rail-forms	177
6.3.	Final grading of soil bed	184
6.4.	Installation of artificial beds	188
6.5.	Shaping of pavement	199
6.6.	Maintenance of hardening concrete	208
6.7.	Installation of deformation joints	212
6.8.	Characteristic features of constructing monolithic pavement at negative temperatures	226
6.9.	Characteristic features of constructing pavement with top layer of high-strength concrete	229
6.10.	Construction of precast pavement from reinforced concrete slabs	230
Chapter 7.	Production Enterprises in Airfield Construction	238
7.1.	Organic binder materials bases	238
7.2.	Asphalt concrete plants	239
7.3.	Cement-concrete plants	252
7.4.	Proving grounds and shops for manufacture of concrete and reinforced concrete articles	255
Chapter 8.	Machines Used in Airfield Construction	266
8.1.	Machines for preparatory and excavation work	266
8.2.	Machines for installation of beds and flexible pavement	276
8.3.	Machines for installation of rigid pavement	282
8.4.	Cranes	290
Chapter 9.	Quality Control and Acceptance of Airfield Construction Work	292
9.1.	General propositions	292
9.2.	Quality control and acceptance of preparatory and excavation work	294

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

9.3. Quality control and acceptance of work to install runoff-drain systems 298
9.4. Quality control and acceptance of work to install beds and construction of flexible pavement 302
9.5. Quality control and acceptance of work to construct rigid pavement 306

Chapter 10. Safety Procedures in Airfield Construction Work 313
10.1. General propositions 313
10.2. Safety regulations during preparatory and excavation work 315
10.3. Safety regulations during construction of drain-runoff system 318
10.4. Safety regulations during construction of beds and flexible pavement 318
10.5. Safety regulations during construction of rigid pavement 320
10.6. Safety regulations at production enterprises 321

Bibliography 324

Subject Index 327

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

ANNOTATION

This handbook contains reference data on modern methods of organization and production of airfield construction work, data applicable to construction materials, machines and mechanisms. Rules and standards for monitoring and accepting the work, as well as safety procedures, are examined. The latest production esperience and the latest recommendations of scientific research organizations have been included. The handbook is intended for airfield engineers and construction technicians and for students of airfield construction.

PREFACE

[Text] The increase in the capacity and work quality of the entire transportation system and also improvement of transport communications between economic regions of our country are the basis for more complete and modern satisfaction of the needs of the national economy and of the populace for freight shipments and movement of passengers.

Air transport is being developed at high rates. The continuous growth of shipments by air transport, especially over long distances and to difficultly accessible regions, requires development of an extensive airport network for ground support of aviation.

The main integral part of an airport is the airfield--a specially prepared land section that includes the building and equipment complex to support takeoffs, landing, taxiing, storage and maintenance of air liners. One of the main and expensive engineering structures of a modern airfield is the pavement of takeoff and landing strips, taxiways, ramps and aircraft parking areas. Modern aviation places very high requirements on the strength, evenness and operating stability of the surface layer of airfield pavement. The safety and regularity of flights is largely determined by their quality.

The high operating qualities of airfield structures are dependent to a considerable degree on the methods used and the quality of performing construction and installation work. Soviet and foreign experience shows that more than 50 percent of the defects that appear in operation of airfield pavement are the result of inadequate construction.

In this regard improvement of the methods of organizing airfield construction work and the technique of conducting it and also introduction of progressive structures and materials acquire special significance.

The problem of airfield builders is, along with high operating qualities and durability of airfield structures, to continuously achieve an increase of the rates of construction and labor productivity with a simultaneous reduction of its cost.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

This can be achieved on the basis of using highly productive machines, complex mechanization and automation of production processes, leading methods of organizing construction and raising the level of industrialization of construction.

A considerable reduction of the deadlines for construction of airfield pavement and an increase of labor productivity are achieved when using highly productive complexes of railless concrete-laying machines and precast pavement from pre-stressed concrete slabs. The quality of airfield structures depends to a considerable degree on the quality of the materials used to construct them.

Sectional pavement from pre-stressed concrete slabs of the PAG type, serially produced by plants of the reinforced concrete industry, have gained wide introduction in the practice of airfield construction. Highly productive railless complexes of Soviet machines are used to construct rigid one-piece sections and introduction of high-strength airfield concrete with tensile bending strength of 60 kgf/cm^2 or more has begun. All this will contribute to a further increase of the efficiency and quality of airfield construction.

Support of builders with the necessary technical literature is also important.

A large amount of normative, recommendation, information, academic and scientific-engineering literature has been developed and published on the basis of the results of scientific research and study of leading experience of airfield construction organizations.

At the same time no handbook has been published until now in which the basic data required by airfield builders for operational solution of many problems could be concentrated. The first attempt to fulfill this task is made in the present handbook.

The main purpose of the handbook is to assist engineers and technicians in solving practical problems in support of airfield construction at the modern level with high quality.

Candidate of Technical Sciences B. I. Demin wrote the preface, Chapters 2 and 6 and sections 5.1 and 5.4 of Chapter 5, Engineer V. P. Yegozov wrote Chapters 3, 4, 7, 8 and 10 and sections 5.2-5.3 of Chapter 5 and Candidate of Technical Sciences Yu. A. Ratyuk wrote Chapters 1 and 9 for the handbook.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER ONE. ORGANIZATION OF AIRFIELD CONSTRUCTION WORK

[Text] 1.1. General Principles of Organizing Airfield Construction Work

The general principles of organizing airfield construction work provide:

1. Performance of airfield construction work is usually the more progressive contract method from a construction organization plan (POS) and work production plan (PPR) previously worked out and confirmed.

2. Compulsory performance of organizational and engineering preparation for it prior to the beginning of construction.

3. Conformity during construction to the requirements of construction norms and regulations (SNiP), existing construction norms (SN), specifications (TU) and standards (GOST) and also rules and regulations on labor protection, production sanitation, safety techniques and fire safety.

4. Performance of airfield construction work by industrial methods with maximum introduction of complex mechanization and automation, application of the latest advances of scientific and technical progress and production processes that ensure the required level of work quality.

5. Production of work by the most progressive methods of construction organization and specifically by the continuous method of organizing the work and different varieties that ensure an increase of labor productivity, reduction of cost and reduction of construction deadlines.

6. Maximum possible surmounting of construction seasonality and conversion to year-round production of work.

7. Clear and continuous complete supply of construction with material and technical resources within deadlines provided by calendar plans and work production schedules.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

8. Use of progressive forms of organization of labor, operational planning and management of production that ensure an increase of labor productivity and reduction of construction deadlines.

9. Implementation of measures during construction for environmental protection and recultivation of agricultural lands and forest lands disturbed during construction.

10. Extensive introduction of the advances of science and leading experience into construction practice.

11. Organization of a socialist competition among builders, which is a mighty moving force for development of productive forces of a socialist state that ensures an increase of labor productivity and improvement of construction.

1.2. Main Normative Documents for Airfield Construction

The general regulations of construction legislation related to all types of construction should be observed during airfield construction. The main directive and normative documents in which these regulations are outlined are as follows*:

1. Construction norms and regulations.

2. All-Union instructions on production and reception of materials and articles.

3. State All-Union standards for materials and articles.

4. All-Union normative documents on consumption of materials in construction, mechanization of work and operation of construction machines, problems of labor and wages in construction.

5. Regulations on contract agreements for capital construction.

6. Regulations for financing of construction.

7. Regulations on the relationships of organizations--general contractors with subcontracting organizations.

8. Finishing norms for construction of enterprises, buildings and structures.

9. Norms for the length of construction of enterprises, buildings and structures (SN 440-72).

10. Instructions on the procedure for compilation and confirmation of plans for organization of construction and work production plans (SN 47-74).

---

*See the "List of Existing All-Union Normative Documents on Construction," published annually by Stroyizdat.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

One should be guided by existing regulations on protection of labor of Gosgortekhnadzor [State Committee of the Council of Ministers for Supervision of Industrial Safety and for Mining Inspection] of the USSR, Gosenergonadzor [State Inspection for Industrial Power Engineering and for Power Engineering Supervision], Minenergo SSR [USSR Ministry of Power and Electrification] and other regulations and norms confirmed in established procedure by bodies of state inspection and the corresponding ministries and agencies of the USSR in problems of protection of labor and safety techniques, along with norms of SNiP III-a.II-70.

The basic normative documents related directly to airfield construction are the following.

Construction norms and regulations:

Part 2. Design norms, Chapter 2-47, Airfields;

Part 3. Work production and acceptance regulations, Chapter 46, Airfields;

Part 4. Estimation norms, Volume 5, Chapter 4-47, Airfields.

Instructions on the use of soils reinforced by binding materials to construct foundations and highway and airfield pavement (SN 25-74).

Common regional unit estimates (YeRER), 1968, collection No 33, Airfields.

The construction organization plan (POS) and work production plan (PPR) on airfield construction are worked out on the basis of the enumerated normative documents and also orders, directives and regulations of superior organizations.

1.3. Industrialization of Construction, Complex Mechanization and Automation

Industrialization of the construction is the basic and most important principle of modern construction. Methods of industrialization of airfield construction work are as follows:

extensive use of section structures and articles (unit construction) in construction;

complex mechanization and automation of production processes, conversion of construction to a mechanized process of unit construction and installation of structures from finished sections;

introduction of leading organization and techniques of work (the continuous method of work organization and year-round production cycle.

The use of unit structures is related to implementation of procurement processes for enterprises, as a result of which cost expenditures for manufacture are reduced and the quality of manufactured structures is increased and the capabilities of year-round construction increase.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Work in airfield construction is industrialized by the following methods:

by extensive use of airfield surfaces from sectional pre-stressed concrete slabs;

by use of sectional reinforced concrete pipe and the foundations under it, sectional components of manholes, rain-collecting wells and block and tackle pits in construction of drain-runoff systems;

the use of stock metal, glass-reinforced plastic and other slabs in construction of sectional-precast surfaces.

The unit structure of construction is characterized by the unit construction factor, which is the ratio of the cost of sectional components to the total cost of materials, semifinished products, structures and parts.

Mechanization of construction and installation work can be partial, complex and brought up to automation of production.

Individual construction and installation processes are mechanized in partial mechanization.

Its use does not fully resolve the problem of industrialization of construction since manual labor is retained to a significant degree in this case.

Complex mechanization of construction and installation work envisions the performance of all (or mainly all) production processes included in each work complex using a complete set of different, but mutually supplementary machines and mechanisms. There is a drive machine in each complete set that determines the rate of work production. The types and number of remaining machines and mechanisms are selected according to its productivity.

Thus, for example, when constructing one-piece concrete surfaces, complex mechanization of concrete work is suppored by an automated concrete plant, dump trucks, concrete distributing and concrete finishing machines and joint cutters. The use of complex mechanization has a great advantage over partial mechanization since manual labor is excluded to a significant degree and labor productivity is increased.

Automation of construction and installation processes is a higher form of complex mechanization and permits the elmination not only of manual labor but of the function of machine control as well.

In this case the worker performs only functions of monitoring the operation of construction and installation machines.

Complex mechanization is usually employed in airfield construction work. The types and dimensions of the leading and complementing machines are determined on the basis of the characteristics of the planned facility and local conditions, the volumes of work, progressive technology and the established construction deadlines.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The operating modes of the machines should ensure complete use of the characteristics of machines and the established production norms and shift factor.

Final selection of the means of mechanization is made on the basis of comparing the economic effectiveness of possible versions of mechanized performance of work within given deadlines. The composition of the fleet and number of machines are determined on the basis of volumes in physical measures and the operational productivity of the machines.

The degree of equipping the construction organizations with machines should be estimated by indicators of its machinery and power available per worker, while the degree of mechanization of work should be estimated by indicators of the level of mechanization of work and labor mechanization.

The level of construction mechanization is the ratio of the volume of work in full-scale and cost indicators performed by means of mechanization to the total volume of work of a specific type expressed in percent.

The machinery available per worker in construction is the ratio of the cost of construction machines, mechanisms and transport equipment used in construction to the estimated cost of construction and installation work for a given year.

The energy available per worker in construction is the output of the engines (in kW) used in construction per million rubles' worth of construction and installation work.

The following indicators should be used to estimate the effectiveness of utilizing the machine fleet: the calendar time utilization factor, the indicator of time utilization of machines, the utilization factor of intrashift time and the indicator of fulfilling the machine output norms.

1.4. Planning the Organization of Construction and Work Production

Modern airfield construction is a complex production process. Therefore, successful performance of it is possible only if there is timely development of work organization plans that determine the deadline, sequence, methods and means of fulfilling the tasks in airfield construction.

It was established by instruction SN 47-74 that the construction organization and work production plans should be worked out prior to the beginning of construction.

The construction organization plan (POS) is worked out to ensure timely introduction of capacities and basic funds with the least expenditures and with high quality by increasing the organizational level of construction. It is an inseparable part of the contract-detail or contract design. The POS is developed by the planning organization.

The initial materials for working out the construction organization plan are: engineering and economic substantiations (TEO) for airfield construction, survey materials, decisions on the use of construction materials and structures, methods of organizing construction and means of mechanization of work coordinated with the

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

construction ministry (or main administrative board or trust), data on the possibility of supporting construction with local work personnel and buildings for their disposition and maintenance and data on the capacity of the construction organization and the presence of a production base.

The construction organization plan includes a calendar schedule of construction, a general construction plan, organizational and production schemes for erecting the main structures, instructions on the composition and accuracy of the geodetic layout base, information about the volumes of work, schedules of the need for materials and articles, construction machines and work personnel and explanatory notes.

When selecting the construction site, the planning organization is obligated to coordinate with the contracting construction organization decisions on the use of local materials, the use of means of mechanization in performing the work with regard to their availability and selection of the transportation layout with provision with local construction materials.

The construction organization plan worked out by the planning organization should be coordinated with the construction ministry or upon his commission with the construction organization.

The work production plan (PPR) is worked out to determine the most efficient methods of performing the construction and installation work that contribute to a reduction of cost and labor, reduction of the length of construction, an increase in the degree of using construction machines and equipment and improvement of work quality. It is forbidden to perform construction without a PPR.

Work production plans are worked out by the general construction organizations. The PPR is worked out by the organization performing this work for individual types of general construction, installation and special work.

The work production plans can be worked out by the Orgtekhstroy [expansion unknown] or by planning organization upon order of the construction organizations with payment from overhead expenses in construction for construction of objects erected under complex geological and severe climatic conditions.

The initial materials for working out the PPR are the summary estimate, construction organization plan, detail plans, information on the deadlines and procedure for delivery of material and technical resources, about the number and types of machines and mechanisms planned for use and also about work personnel and the assignment for working out the PPR.

Work production plans are worked out for individual elements of the landing strip of an airfield, individual buildings and structures or for a group of objects and also for work of the preparatory period.

The work production plan includes a complex network schedule or calendar plan for production of work as a function of the complexity of the object, a general construction plan, delivery schedules of materials, semifinished materials and articles to the facility, the needs for work personnel and basic construction machines,

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

process flow charts for complex work and work performed by new methods (standard process flow charts tied into the facility and to local conditions are used for the remaining work), diagrams of the layout of symbols to perform geodetic ties and geodetic control, solutions on labor protection and safety regulations, documentation to monitor and analyze the quality of construction and installation work, measures on organization of work by the brigade cross-accounting method and explanatory notes.

The work production plan for the prepatory period contains a calendar schedule of work production, a general construction plan for the entire construction site, diagrams of symbol layout for geodetic ties and monitoring the position of airfield components and communications lines, detail plans or diagrams for installation of air traffic control hardware and brief explanatory notes.

To monitor and analyze the quality of airfield construction work the PPR should include:

instructions on tolerances according to the requirements of SNiP and detail plans;

diagrams (charts) of operational quality control of work performed;

a list of reports for certification and intermediate acceptance of latent work;

instructions on the deadlines for checking work quality that require laboratory tests of materials and structural components;

instructions on estimating the quality of individual types of completed facilities.

The work production plan is confirmed by the chief engineer of the contracting construction organization while sections of the plan on installation and special construction work are confirmed by the chief engineers of the corresponding subcontracting organizations upon coordination with the general contracting organization. The confirmed PPR should be transferred to the construction site two months prior to the beginning of work.

One proceeds from normative deadlines when working out the airfield construction organization plan. Based on "Norms for duration of construction" (SN 440-72), the total length of construction of a facility, starting complex and individual structures (roads, pavement and three-dimensional structures) is established. The sequence of erecting structures is then established. The norms for distribution of capital investments and the volumes of construction and installation work should then be maintained according to the construction periods. A calendar plan in which the priority and deadlines for construction of the main and auxiliary buildings and structures, starting complexes and work of the preparatory period with distribution of capital investments and the volumes of construction and installation work in monetary terms by time is then compiled.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The remaining documents of the POS are then worked out using consolidated norms to determine the volumes of work and the need for material and technical resources compiled from calculation per million rubles of cost of construction and installation work.

The work production plan for airfield construction or individual structures of it is worked out on the basis of the planning volumes calculated from detail plans using production norms. Compilation of the calendar plan for work production should be preceded by work organization planning by the continuous method.

1.5. Periods and Organizational and Engineering Preparation of Construction

The process of creating basic funds of the national economy by construction and reconstruction of facilities is divided into the following periods:

preplanning period in which the problem of the feasibility of planning and construction of an object is solved, the section for construction is selected and the assignment for planning is worked out;

the planning process in which surveys and design of a facility are made;

the period of organizational and engineering preparation of construction;

the main process when the main construction and installation work is performed;

the concluding process in which the facility is turned over for operation.

A complex of measures in organizational and engineering preparation for production, including organizational measures and performance of preparatory work, should be fulfilled according to the requirements of the chapter of SNiP 3-1-76 to ensure successful fulfillment of the main work and turnover of the facility for operation within established deadlines.

Organizational measures include:

study of the planning-estimate documentation and local construction conditions by engineering and technical personnel of the construction and installation organization;

designation of organizations (participants of construction): the contracting organization and specialized subcontracting organizations to perform specific types of work, solution of problems of the need to relocate them or to increase production capacities;

formulation of earth removal;

resettling of persons living on the section allocated for construction;

solving problems of the capability and conditions of use of existing roads, engineering networks, enterprises of the construction industry, apartment buildings, warehouse buildings and so on for the needs of construction;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

conclusion of contract and subcontract agreements for capital construction;

disclosure of construction financing and organization of material and technical support of construction.

Preparatory work includes:

work on assimilation and engineering preparation of the terrain for construction;

creation of a geodetic layout base for construction;

performance of preparatory work outside the site: construction of external access routes, communications lines and electric power transmission lines with transformer substations, water conduit networks with intake structures and sewer networks with purification plants;

organization of water drainage and drainage of the construction territory;

relaying of existing engineering communications lines, installation of permanent and temporary roads within the site and laying water and energy supply networks and telephone and radio communications networks;

creation of general site warehouse facilities;

installation of temporary stock buildings, mechanized installations and structures and with corresponding substantiation--erection of permanent buildings and structures used temporarily for construction needs;

support of the construction site with firefighting water supply and inventory, means of communications and signalling equipment.

The volume of preparatory work subject to completion prior to the beginning of the main work should be reflected in the calendar plans and should be refined during construction by the general contractor upon coordination with the customer and the planning organization.

The main types of preparatory work include work on development and engineering preparation of the terrain, including clearing the territory of trees, small trees and bushes, stumps and stones, organization of temporary drainage and drying of the construction territory, removal and transfer of structures and engineering networks and so on.

1.6. Length of Airfield Construction and Sequence of Work

Airfield construction should usually be carried out year-round. In this case individual types of work should be performed as a function of natural climatic conditions of the construction regions during the most favorable times of the year. Airfield construction work, with the exception of individual types of work (for example, agrotechnical and layout of sites with zero datums) can be carried out during the entire year. However, the scope of additional expenditures related to

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

production during the winter should be taken into account when planning airfield construction and individual types of work should be postponed to the summer season.

The season of the year when the average daily ambient air temperature is not below +5°C and the minimum daily temperature is not below 0°C is most favorable in airfield construction to perform one of the basic types of work--construction of pavement from monolithic concrete and reinforced concrete.

Under these conditions monolithic concrete and reinforced concrete surfaces can be laid usually without additional measures related to negative temperatures.

The country's territory is divided into four zones according to the length of the period with average daily temperature of +5°C and above: zone 1 (northern) with length up to 100 working days per year, zone 2 with 125 working days, zone 3 with 150 working days and zone 4 (southern) with working days above 150.

The duration of constructing airfields, starting complexes and airfield surfaces is established by the "Norms for the length of construction of enterprises, buildings and structures" [SN 440-72) depending on the zone to which the construction region is related.

The duration of construction has been established from 27 months for zones 3 and 4 to 30 months for zone 1 for airports of class 3-C with a total complex of buildings and structures and it has been established from 19 months for zone 4 to 30 months for zone 1 for cement surfaces on airfields of this class.

The normative length of construction has been established at 21 months for all zones for airports of class 4-D and from 17 months for zone 4 to 20 months for zone 1 for cement surfaces on airfields of this class.

The preparatory period, the duration of which is three months for all zones for the classes of airports indicated above, is included in the total deadline for construction of airports and pavements.

The duration of construction of airports of classes 1-A, 2-B and 5-E has not been established by SN 440-72 and should be determined by the construction organization plan.

Many years of airfield construction practice indicates that a number of jobs whose volume comprises up to 50 percent of the total volume of work planned for the year can be performed during the spring-winter season at negative temperatures. This work includes clearing the construction territory of timber, small trees and bushes, uprooting and removal of stumps, creation of the production and engineering base (PTB) for construction, manufacture of sectional reinforced concrete articles and structures at production enterprises and other types of work. Construction of buildings and structures from precast structures and brick and production of work of the zero cycle using pile foundations and footings are most effective during this season. Universal introduction of sectional reinforced concrete pavement for airfields and access roads expands the year-round nature of construction to a significant degree.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Performance primarily of work of the preparatory period is provided in airfield construction when establishing the sequence of work production.

Excavation work on sections for construction of VPP [Take-off-landing strips], RD [Taxiways], MS [Parking areas] and ramps with subsequent excavation work on the soil part of the landing field.

Drain-runoff networks are usually laid prior to the beginning of pavement installation.

Construction of the bed under pavement and construction of the pavement itself are performed after completion of work on laying the communications lines, installation of drain systems, rain collecting wells, bypasses and so on has been completed.

Temporary strips and final finishing of the surface of a dirt landing field are completed after construction of the pavement is completed.

Agrotechnical work is carried out after completion of all excavation and grading work with seeding of the landing field with sod-forming grasses within deadlines dependent on the climatic conditions of the airfield construction region.

1.7. Continuous Method of Organizing Work

Under modern conditions the main method of construction organization is the continuous method. It is based on separation of the total production process into constituent construction processes and combinations of performing them in time, which also predetermines its main advantages.

The continuous method of work organization in construction of airfield pavement of VPP, RD and MS provides uniformity and continuity of work production, reduction of the construction deadlines due to combination of individual types of work in the flow, minimum requirement for machines and mechanisms and efficient use of them and stable specialization and stability of the composition of brigades and sections.

Formation of complex and specialized brigades with stable composition contributes to an increase of the qualifications of building with the continuous method, improvement of their work and product quality and in the final analysis leads to an increase of labor productivity.

The main components that characterize the flow are the rhythm and rate of the flow.

The rhythm of the flow is understood as the duration of work of brigades (sections) during each individual job.

The flow rate is the volume of production performed by the flow per unit time (per day or shift) in full-scale indicators--linear or square meters and so on.

Three stages are distinguished in development of the construction flow:

the organization period characterized by sequential inclusion of the brigades into the flow;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

the period of the organized course of work when all brigades work in the flow and when all work cycles are completed;

the curtailment period characterized by sequential exclusion of brigades from the flow.

The development and curtailment periods do not ensure efficient use of the forces and equipment of the construction and installation organization. Therefore, they must be reduced if possible in work organization planning so that work on jobs with lesser volume should first be begun.

The priority of work organization planning by the continuous method depends to a considerable degree on the calculated versions. Two main versions of calculation are possible.

Version 1. The construction deadline is given. Efficient organization of work must be planned, i.e., the efficient flow parameters (intensity of work, number of work cycles, jobs and flow rhythms) and the requirement for labor and material and technical resources are determined.

Version 2. The capacity of the construction organization, i.e., its labor and material and technical resources, is given. Efficient organization of work must be planned and the construction deadlines must be determined.

The first version is most frequently found in airfield construction practice. The following planning procedure corresponds to it.

1. A list of specialized flows for airfield construction is established on the basis of analysis of planning data. This list usually contains the preparatory work, excavation work, installation of the drain system, construction of pavement and agrotechnical work.

2. The number of working days within which each specialized flow should be completed is determined. Weekends and holidays and if necessary days off due to natural climatic conditions are excluded from the normative deadline provided by existing norms of the duration of construction or by the plan of the construction organization.

3. The list and volumes of work and also methods of completing it are established for each specialized flow. Individual construction processes are combined into work cycles and the leading work cycle is selected. The leading cycle in construction of pavement from monolithic concrete is usually concrete work and laying of slabs is usual in construction of sectional pavement.

4. The production scheme of work is selected and the number and scope of jobs and the priority of organizing them are designated. The scope of the jobs should ensure effective use of machines and mechanisms and the work of brigades without conversion to another job not less than during one shift.

5. The intensities of partial flows (work cycles) within the specialized flow are established by dividing the corresponding volumes of work by the duration of performing them with regard to the period of development and curtailment of each partial flow.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

6. The required number of executors (workers, machines and mechanisms) is determined for each partial flow and the possibility of their disposition on jobs is checked.

7. The flow schedule during which the final tie-in of partial flows with each other is made is constructed.

A calendar plan of work production is organized in linear form or in network schedule form on the basis of planned specialized flows, during which individual specialized flows and also auxiliary and miscellaneous work not contained in the flows are tied in.

1.8. Organization of Material and Technical Supply of Construction

The most important condition of planned and rhythmic work production in airfield construction is timely and complete support of construction with material and technical resources, the need for which should be satisfied in complete accord with the summary calendar plan of deliveries and the schedule for delivery of material resources to the facility. The priority of supporting construction with material resources is established by the "Regulations on the priority of supporting construction with materials, articles and equipment."

According to the "Regulations," the contract and subcontract construction and installation organizations should themselves support the work performed by them with all types of construction materials, articles and structures and also with construction machines, mechanisms and transport equipment, with the exception of materials and equipment related to deliveries of the customer. The customers deliver the production, power engineering, electrical engineering and other equipment, including nonstandard equipment.

The material and technical resources are divided into the following groups depending on the nature of planning and distribution:

funded or centrally distributed from stocks of USSR Gosplan and Gossnab;

decentralized planned distributed by ministries, agencies and territorial supply organizations of Gossnab, Oblispolkom and so on.

self-procured, i.e., procured by the construction organizations themselves.

The material and technical supply of construction is planned during the preplanning year in two phases with presentation of orders for funded and planned materials within established deadlines. Orders for material resources are compiled and submitted during the first phase (in May-June) to the corresponding planning organizations in combined nomenclature. The final composition of the plan for material and technical supply is compiled during the second phase (in September-October of the preplanning year) after funds have been received from the planning organizations.

The needs for material and technical resources are calculated on the basis of the planned volumes of work in full-scale expression and on the basis of

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

engineering-substantiated norms of consumption and norms of production reserves. The consumption of materials for jobs performed due to overhead expenses and jobs performed under winter conditions and also the consumption of materials that takes into account their losses according to the norms of standard losses should be additionally determined.

Delivery agreements are concluded after requisitions have been received from the planning organizations and after the construction organizations have been registered with the delivery organizations. The requisitions are implemented by the corresponding supply organizations--offices of material and technical supply or administrations of production and technological supply, which are divisions of the construction and installation organizations. The most effective and promising is the form of supplying construction directly through organizations of USSR Gossnab.

The main principle of material and technical supply of airfield construction is that of continuous complete delivery of resources and maintenance of the level of production reserves according to existing norms.

Materials are delivered by transit and warehouse methods. The most widespread form of supply with basic materials and articles in airfield construction is the transit method that provides for delivery of materials, articles and so on directly from the suppliers, doing away with intermediate warehouses.

According to the existing "Regulstions on contract agreements for capital construction," delivery agreements are concluded for the entire construction period, for the year or for the deadline of manufacture or delivery of a block of products.

If the consumer receives products directly from the manufacturing enterprise, the parties conclude a direct agreement. Agreements on delivery of products in non-transit quantities are usually concluded by the consumers with the supply-service organizations which in turn conclude agreements with the manufacturing enterprises.

One should be guided in acceptance of material and technical resources by the conditions of the agreements concluded between suppliers and consumers, by the "Regulations on deliveries of products of production-engineering designation," by GOSTs, specifications and other normative documents.

1.9. Organization of Labor, Operational Planning and Management of Construction

Organization of labor in construction should provide a system of measures for efficient use of the work force, normalization and stimulation of labor, creation of safe work conditions and should ensure an increase of labor productivity, improvement of construction quality and a reduction of construction cost.

The main form of labor cooperation in construction is the brigade. Specialized brigades should be organized in performing jobs of the same type.

Complex brigades should be formed when performing several types of interrelated jobs with common final product.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The numerical, occupational and qualification composition of workers in brigades and sections should be established as a function of the planned volumes of work and the deadlines for completing it with regard to the production technology and the achieved level of production norms.

Job sites should be made available on a timely basis to brigades and assignment details should be made on time.

The work of brigades should be usually planned for a prolonged time period (up to a year).

Safe working conditions must be provided and production sanitation requirements must be adhered to in organization of job sites.

The piecework-bonus system of wages with issuance of piecework orders should be used to create material incentives of workers in increasing labor productivity, improving work quality and reducing the deadlines of completing jobs.

The most progressive form of labor organization is the brigade contract on a cost-accounting basis. Both the brigades of the contracting and subcontracting organizations performing work in construction of a given specific facility are converted to the brigade contract.

Extensive introduction of scientific organization of labor (NOT) into construction practice should play an important role in achieving high labor productivity.

Implementation of NOT includes:

establishment of the actual state of labor organization on job sites;

working out proposals on scientific organization of labor and compilation of the NOT plan;

introduction of the NOT plan into construction practice, determination of the effectiveness of implementing it and application of NOT in all work sections.

The main documents for scientific organization of labor of workers should be production flow charts contained in the work production plan, charts of labor processes and also charts for operational control of work quality.

Operational planning has the purpose of ensuring rhythmic work and clear interaction of production subdivisions and their maintenance enterprises and facilities.

It includes quarterly and monthly plans, weekly-daily and hourly work production schedules for sections of work superintendents, foremen and auxiliary production.

The production program, work production plan and data on the state of work and the capability of supporting it with labor and material and technical resources are used as the input data for working out operational plans.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Fulfillment of operational plans should be monitored systematically with summarizing of the results of production activity of subdivisions during the corresponding period.

Operational management of work production should usually be carried out through the dispatcher service. Its main functions are operational monitoring and regulation of construction and installation work and tying in the work of production subdivisions, material and technical support subdivisions and enterprises of the production base.

A general work log on construction of airfield pavement and other airfield components is maintained during construction. It is filled in monthly, beginning with the first day of work on the facility, by the person responsible for its construction (the work superintendent or senior work superintendent). Special work logs for individual types of work (concrete work log, welding work log and so on) are maintained along with the general work log.

The network planning and management method (SPU), which provides for planning and performance of construction and also monitoring the course of construction, operational supervision and management of it by network schedules (SG) and executive network schedules (ISG), should be universally introduced into construction practice to improve operational planning and management of airfield construction.

A special service--network planning and management department (division) (OSPU)--should be created in construction organizations for work according to network schedules.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 2. MATERIALS

[Text] 2.1. Soils

The soils in airfield construction are used in excavation work (installation of the earth bed under pavement, the soil part of the landing field, the drain-runoff system and so on) and in installation of foundations and surfaces of reinforced soils.

Soils are divided into rocky and nonrocky.

Rocky soils include igneous, metamorphic and sedamentary rock with rigid bonds between grains, deposited in the form of a solid or cracked mass. Rocky soils have various forms depending on the compressive resistance, softening factor and degree of weathering.

Nonrocky soils include large-fragment, sandy and clay soils. Nonrocky soils are usually employed in airfield construction.

Large-fragment and sandy soils are divided into types by granular composition (content of different soil fractions by mass expressed in percent) according to Table 2.1.

To establish the type of soil according to Table 2.1, the particle content is added sequentially: larger than 200 mm initially, then larger than 10 mm and so on. The type of soil is used in the order of arrangement of the names in the table according to the first satisfactory indicator.

Gravelly coarse and medium-coarse sands are one-size and consertal depending on the coefficient of irregularity, determined by the formula

$$K_{60/10} = \frac{d_{60}}{d_{10}},$$

where d_{60} and d_{10} are the particle diameters less than which 60 and 10 percent of the particles, respectively, are contained by mass in the given soil.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.1. Types of Large-Fragment and Sandy Soils

Виды грунтов (1)	Распределение частиц по крупности, % от массы сухого грунта (2)
Крупнообломочные (3)	
Валунный грунт при преобладании неокатанных частиц глыбовый (4)	Крупнее 200 мм (5) более 50% (6)
Галечниковый грунт при преобладании неокатанных частиц щебенистый (7)	Крупнее 10 мм более 50%
Гравелистый грунт при преобладании неокатанных частиц дресвяный (8)	Крупнее 2 мм более 50%
Песчаные (9)	
Песок гравелистый (10)	Крупнее 2 мм (5) более 25% (6)
» крупный (11)	Крупнее 0,5 мм более 50%
» средней крупности (12)	Крупнее 0,25 мм не менее 50% (15)
» мелкий (13)	Крупнее 0,1 мм не менее 75%
» пылеватый (14)	Крупнее 0,1 мм менее 75%

Key:
1. Types of soils
2. Particle distribution by coarseness, percent of dry soil mass
3. Large-fragment
4. Rubbly soil with predominance of unrolled block particles
5. Larger than
6. More than
7. Pebbly soil with predominance of unrolled crushed stone particles
8. Gravelly soil with predominance of unrolled pebble particles
9. Sandy
10. Gravelly sand
11. Coarse sand
12. Medium coarse sand
13. Fine sand
14. Dusty sand
15. Not less than

Sands with coefficient of irregularity not greater than 3 and also fine sands with content of not less than 90 percent particles by mass measuring 0.10-0.25 mm are regarded as single-size. Sands with coefficient of irregularity greater than 3 are regarded as consertal.

Sandy soils are divided by the density of their texture determined by the porosity coefficient in laboratory tests or by cone submergence resistance in sounding into dense, medium-coarse and brittle (Table 2.2).

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.2. Classification of Sands by Textural Density

Виды песков (1)	(2) Плотность сложения песков		
	плотные (3)	средней плотности (4)	рыхлые (5)
А. По коэффициенту пористости ε (6)			
Гравелистые, крупные и средние (7)	<0,55	0,55—0,7	>0,7
Мелкие (8)	<0,6	0,6—0,75	>0,75
Пылеватые (9)	<0,6	0,6—0,8	>0,8
Б. По сопротивлению погружению конуса P_g, кгс/см², при статическом зондировании (10)			
Крупные и средней крупности (11)	>150	150—50	<50
Мелкие (8)	>120	120—40	<40
Пылеватые, маловлажные и влажные (12)	>100	100—30	<30
Пылеватые водонасыщенные (13)	> 70	70—20	<20
В. По условному динамическому сопротивлению погружению конуса P_g, кгс/см², при динамическом зондировании (14)			
Крупные и средней крупности (11)	>125	125—35	<35
Мелкие маловлажные и влажные (15)	>100	100—30	<30
Мелкие водонасыщенные, пылеватые маловлажные и влажные (16)	> 85	85—20	<20

Note. A cone with angle at the vertex of 60° and diameter of 36 mm with static probing and 74 mm with dynamic probing is used in probing soils.

Key:
1. Types of sand
2. Density of sand texture
3. Dense
4. Medium-density
5. Brittle
6. A. According to coefficient of porosity ε
7. Gravelly, coarse and medium
8. Fine
9. Dusty
10. B. According to cone emersion resistance P_g, kgf/cm^2, during static probing
11. Coarse and medium-coarse
12. Dusty, low-moisture and wet
13. Dusty, water-saturated
14. C. By specific dynamic cone emersion resistance P_g, kgf/cm^2 during dynamic probing
15. Fine low-moisture and wet
16. Fine water-saturated, dusty low-moisture and wet

Clay soils are divided into types depending on plasticity number (Table 2.3) and consistency index (Table 2.4). The plasticity number expresses the difference between the moisture content of soil at flowability and rolling boundaries. The consistency index is determined by the formula

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

$$B = \frac{W - W_p}{W_p},$$

where W and W_r is the natural moisture content and the moisture content on the rolling boundary, respectively and W_p is the plasticity number.

Table 2.3. Types of Clay Soils Depending on Plasticity Number

(1) Виды глинистых грунтов	(2) Число пластичности W_p
Супесь (3)	$0{,}01 \leq W_p \leq 0{,}07$
Суглинок (4)	$0{,}07 < W_p \leq 0{,}17$
Глина (5)	$W_p > 0{,}17$

Key:
1. Types of clay soils
2. Plasticity number W_p
3. Sandy loam
4. Loam
5. Clay

Table 2.4. Varieties of Clay Soils According to Consistency Index

Виды грунтов (1)	(2) Показатель консистенции B
Супеси: (3)	
твердые (4)	$B < 0$
пластичные (5)	$0 \leq B \leq 1$
текучие (6)	$B > 1$
Суглинки и глины: (7)	
твердые (4)	$B < 0$
полутвердые (8)	$0 \leq B \leq 0{,}25$
тугопластичные (9)	$0{,}25 < B \leq 0{,}5$
мягкопластичные (10)	$0{,}5 < B \leq 0{,}75$
текучепластичные (11)	$0{,}75 < B \leq 1$
текучие (6)	$B > 1$

Key:
1. Types of soils
2. Consistency index B
3. Sandy loams
4. Hard
5. Elastic
6. Flowing
7. Loams and clays
8. Semi-hard
9. Hard-elastic
10. Soft-elastic
11. Flowing-elastic

2.2. Soils Strengthened with Binding Materials

Soils strengthened with binding materials are used as artificial bedding of all types of airfield pavement and also pavement of airfields of classes E and F and airfields for agricultural aviation.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The main normative document that determines the requirements on strengthened soils is "Instructions for use of soils strengthened with binder materials for construction of highway and airfield beds and pavements"--SN 25-74.

Mineral and organic binding materials are used to strengthen soils. The most widely used are portland cement, slag-portland cement, lime, ashes, liquid petroleum asphalt and asphalt emulsions. Complex methods of strengthening using additives of different substances are usually employed for efficient use of binder materials and to achieve higher indicators of the physicomechanical properties of strengthened soils.

The indicators of physicomechanical properties of strengthened soils should correspond to the requirements of Tables 2.5-2.7.

Table 2.5. Indicators of Physicomechanical Properties of Soils Strengthened with Mineral Binders

Физико-механические свойства (1)	(2) Показатель по классам прочности		
	I	II	III
(3) Предел прочности при сжатии водонасыщенных образцов, кгс/см², не менее	60-40	40—20	20—10
Предел прочности на растяжение при изгибе водонасыщенных образцов, кгс/см², не менее (4)	10	6	2
Коэффициент морозостойкости (отношение пределов прочности на сжатие водонасыщенных образцов после и до замораживания-оттаивания), не менее (5)	0,75	0,7	0,65
Влажность образца после испытания на замораживание-оттаивание сверх оптимальной при уплотнении, % массы, не более (6)	2	4	4

Note. The indicators of the physicomechanical properties are given for specimens aged for 28 days for soils strengthened with portland cement and slag-portland cement and those aged 90 days with strengthening of soils by other types of mineral binders.

Key:
1. Physicomechanical properties
2. Index by strength classes
3. Compressive strength of water-saturated specimens, kgf/cm^2, not less than
4. Tensile bending strength of water-saturated specimens, kgf/cm^2, not less than
5. Frost-resistance coefficient (ratio of compressive strength of water-saturated specimens before and after freezing-thawing), not less than
6. Moisture content of specimen after freeze-thawing testing above optimum with strengthening, percent by mass, not more than

The binder material and additives are selected as a function of the type of soils and the road-climatic zone of their use according to the recommendations of Tables 2.8-2.9.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Consumption of binder materials and additives is established on the basis of laboratory selection of the compositions of the mixtures.

Requirements on soils. All types and varieties of large-fragment, sandy and clay soils, except rich clays with plasticity number greater than 0.27, can be strengthened for installation of pavement and bedding with regard to the following main requirements:

the total number of particles from 2 to 25 mm should not exceed 70 percent of the soil mass in large-fragment soils with maximum grain size up to 25 mm;

particles measuring less than 0.5 mm in large-fragment rock should have plasticity number of not more than 0.12;

the content of humus particles in the soil should not exceed 0.2 percent in road-climatic zone 2 and 4 percent in road-climatic zones 3-4.

The following additional requirements and restrictions are also taken into account when determining the suitability of soils for strengthening with binder materials.

Table 2.6. Indicators of Physicomechanical Properties of Soils Strengthened with Asphalt Emulsions or Liquid Asphalt Together With Cement and Also with Asphalt Emulsions Together with Carbamide Resins

Физико-механические свойства (1)	(2) Показатели образцов в возрасте 28 сут по классам прочности	
	I	II
(3) Предел прочности при сжатии водонасыщенных образцов при 20° С, кгс/см²	40—25	25—15
(4) Предел прочности при сжатии при 50° С, кгс/см², не менее	20	12
Предел прочности на растяжение при изгибе водонасыщенных образцов при 20° С, кгс/см², не менее (5)	10	6
Коэффициент морозостойкости, не менее (6)	0,85	0,8
Водонасыщение, % объема, не более (7)	3	5

Key:
1. Physicomechanical properties
2. Indicators of specimens aged 28 days by strength classes
3. Compressive strength of water-saturated specimens at 20°C, kgf/cm^2
4. Compressive strength at 50°C, kgf/cm^2, not less than
5. Tensile bending strength of water-saturated specimens at 20°C, kgf/cm^2, not less than
6. Cold-resistance coefficient, not less than
7. Water-saturation, percent of volume, not more than

1. When strengthening soils with portland cement or slag-portland cement:

it is permissible to strengthen noncarbonate clays with cement only together with lime and different salt additives;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

carbonate varieties of clay in road-climatic zone 3 can be strengthened with cement after introduction of sand, gravel or crushed stone waste additives with particle size up to 25 mm;

clay soils should have moisture content of not more than 55 percent on the flowability boundary;

soils characterized by acid medium (pH less than 7) should be subjected to preliminary neutralization with additives of lime, caustic soda or other alkali compounds;

salty soils can be strengthened with portland cement if the salt content in them is not more than 4 percent of soil mass with chloride, sulfate-chloride and chloride-sulfate salinization and 2 percent of soil mass with sulfate salinization (1 percent for pavement);

salinized soils with salt content greater than 4 but not more than 6 percent of soil mass (with the exception of sulfate salinization) can be strengthened with portland cement only together with lime additives (1-2 percent by mass) and also with calcium chloride, ferric chloride and iron sulfate (1-1.5 percent by mass);

soils should not contain more than 10 percent gypsum impurities in road-climatic zones 2 and 3 and more than 20 percent in road-climatic zones 4 and 5.

Table 2.7. Indicators of Physicomechanical Properties of Soils Strengthened with Asphal Emulsions with Lime and Liquid Asphalt Additives

(1) Физико-механические свойства	(2) Грунты, укрепленные битумными эмульсиями с добавкой извести	(3) Грунты, укрепленные жидкими битумами с добавкой или без добавки активных и поверхностно-активных веществ	
	(4) Верхний слой основания или покрытия	(4) Верхний слой основания или покрытия	(5) Нижний слой основания
(6) Предел прочности при сжатии неводонасыщенных образцов при 20° С, кгс/см², не менее	15	12	Не определяется
То же, при 50° С, кгс/см², не менее (7)	9	7	То же (12)
Предел прочности при сжатии водонасыщенных образцов при 20° С, кгс/см², не менее (8)	7	6	4
Набухание, % объема, не более (9)	4	5	Не определяется
Капиллярное водонасыщение, % объема, не более (10)	Не определяется (12)	5	То же
Коэффициент морозостойкости, не менее (11)	0,7	0,6	»

Note. The cold-resistance coefficient is given for specimens aged 28 days and the remaining indicators are given for specimens aged 7 days.

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Physicomechanical properties
2. Soils strengthened with asphalt emulsions with lime additive
3. Soils strengthened with liquid asphalts with or without additive of active substances and surfactants
4. Upper layer of bed or pavement
5. Lower layer of bed
6. Compressive strength of unsaturated specimens at 20°C, kgf/cm^2, not less than
7. Compressive strength at 50°C, kgf/cm^2, not less than
8. Compressive strength of water-saturated specimens at 20°C, kgf/cm^2 not less than
9. Swelling, percent of volume, not more than
10. Capillary water-saturation, percent of volume, not more than
11. Cold-resistance coefficient, not less than
12. Undetermined

2. When salinized soils are strengthened with waste ashes, the salt content in them should not exceed 3 percent with sulfate salinization and 5 percent with chloride salinization while the pH value should not be less than 4.

3. When soils are strengthened with organic binder materials:

large-fragment soils of non-optimum granulometric composition, sands of the same size and sandy loams with plasticity number less than 0.03 must be strengthened with liquid petroleum asphalt after their granulometric composition has been improved by additives of active substances or light loams. Only lime must be added when these soils are strengthened with asphalt emulsions;

heavy loams should have plasticity number of not more than 0.15 when they are strengthened with asphalt emulsions. Loams with plasticity number greater than 0.15 and also humus-containing loams with plasticity number from 0.12 to 1.5 can be strengthened with asphalt emulsions when granulometric additives of coarse sand or stone-crushing wastes and lime are introduced in them. Heavy loams should be strengthened with liquid petroleum asphalts in road-climatic zones II and III with granulometric additives, lime and surfactants being introduced to the soil, while those in road-climatic zones IV and V should be strengthened only with granulometric additive or lime additive;

granulometric additives, lime and surfactant additives must be introduced when clays are strengthened with liquid asphalts;

the content of easily soluble salts should not exceed 1 percent in salinized soils strengthened with liquid asphalts, and the content of Na_2SO_4 and $MgSO_4$ salts should be less than 0.25 percent, the Na_2CO_3 and $NaHCO_3$ salts should be less than 0.1 percent and the total content of absorbed sodium should be less than 20 percent of the soil exchange capacity;

salinized soils with plasticity number less than 0.17 can be strengthened with liquid asphalts if they contain up to 5 percent easily soluble salts (including not more than 2.5 percent sodium sulfate and sodium carbonate) only if lime and surfactants are added after granulometric additives have been introduced to the

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.8. Recommendations on Use of Binders to Strengthen Soils

Soils	Binder Materials and Additives	Road-Climatic Zones
1. Large-fragment uncemented, close to optimum composition, gravelly, coarse and medium different-granular sands	Portland cement; asphalt emulsions together with cement or with lime additive; waste ashes in combination with cement or lime or with electrolyte additive; liquid asphalts with additive of active substances	II-V
	Liquid petroleum asphalts together with cement and liquid asphalts	IV, V
2. Large-fragment uncemented soils of nonoptimum composition, coarse, medium and fine sands of the same size	Portland cement with additive of waste ashes or organic materials (high-resin crude petroleum or liquid asphalt); waste ashes or waste ashes in combination with cement or lime or an electrolyte additive; asphalt emulsions together with cement or with lime additive	II-V
	Asphalt emulsions together with carbamide resins	II, III
	Liquid petroleum asphalts together with cement; liquid asphalts with additive of active materials	IV, V
3. Dusty sands and different sandy loams with plasticity number less than 0.03	Portland cement; portland cement with additive of waste ash or organic materials (high-resin crude petroleum or liquid asphalt); waste ashes or waste ashes in combination with cement or lime or with electrolyte additive; asphalt emulsions together with cement or with lime additive; liquid asphalts with additive of active materials	II-V
	Asphalt emulsions together with carbamide resins	II, III

[Continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.8 (Continued)

Soils	Binder Materials and Additives	Road-Climatic Zones
	Liquid petroleum asphalts together with cement	IV, V
4. Sandy loams close to optimum composition and light coarse and dusty sandy loams	Portland cement, portland cement with additive of waste ash or organic materials (high-resin crude petroleum or liquid asphalt); asphalt emulsions together with cement or additive of lime, waste ashes or waste ashes in combination with cement or with lime or with electrolyte additive	II-V
	Liquid asphalts with additive of active materials	II, III
	Liquid petroleum asphalts with cement and liquid asphalts	IV, V
5. Heavy dusty sandy loams, light loams and light dusty loams	Portland cement, portland cement with additive of lime, waste ash or electrolytes; waste ashes or in combination with cement, lime or electrolytes; asphalt emulsions together with cement or lime; liquid asphalts with additive of active materials	II-V
	Asphalt emulsions with carbamide resins	II, III
	Lime with additives of electrolytes or water glass	III-V
	Lime or lime-slag cement; liquid petroleum asphalts together with cement	IV, V
6. Heavy and heavy dusty loams	Portland cement with or without additive of lime or electrolytes; liquid asphalts with additive of lime and surfactants	II-V

[Continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.8 (Continued)

Soils	Binder Materials and Additives	Road-Climatic Zones
	Lime with additive of water glass or electrolytes; lime or lime-slag cement	III-V
	Liquid asphalts	IV, V
7. Clays with plasticity number not more than 0.22	Portland cement with additives of lime or electrolytes; liquid asphalts with additive of lime and surfactants	III-V
	Lime with additive of water glass or electrolytes; lime or lime-slag cement	III-V
8. Clays with plasticity number up to 0.27	Lime with or without electrolyte additives	III-V

Note. The soils in items 3-5 can be strengthened with liquid asphalts of class SG without additives of other materials in road-climatic zone V.

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.9. Materials and Additives in Strengthening Soils with Liquid Petroleum Asphalts and Methods of Application

Soils	Road-Climatic Zones: II and III	Road-Climatic Zones: IV and V	Methods of Application
	Materials and Additives		
Large-fragment uncemented soils close to optimum composition, gravelly coarse and medium sands (different sizes), sandy loams, close to optimum composition	Lime and shale ash Cation-active materials	Lime	Introduced to soil Introduced to asphalt
Large-fragment uncemented soils of nonoptimum composition, gravelly and medium-coarse homogeneous sands, fine and dusty sands and sandy loams with plasticity number not less than 0.03	Dry waste ash, ash-slag mixtures without lime additive, crushed limestone and crushed opoka with lime	Dry waste ash, ash-slag mixtures with and without lime additive, crushed limestone, crushed opoka with lime and lime	Introduced to soil
Light dusty and heavy dusty sandy loams with plasticity number more than 0.03 and light and light dusty loams	" or lime	"	"
Heavy loams and heavy dusty loams, sandy clays and dusty clays with plasticity number not more than 0.02	Limestone together with anion-active materials	Lime, non-ionogenic materials: OP-7 or OP-10 wetting agent, sulfite-yeast grains, lime together with anion-active materials	Lime and non-ionogenic materials are introduced to soil; anion-active materials are introduced to asphalt

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

soil in a quantity in which the total easily soluble salt content does not exceed 1 percent;

salinized soils containing absorbed sodium of more than 20 percent the exchange capacity of the soil should be strengthened with liquid asphalts only with additives of active materials and surfactants; in this case the plasticity number ofthe soils after introduction of granulometric additives should not exceed 0.17.

Requirements on binder materials. The cements used to strengthen soils should meet the requirements of GOST 10178-76. It is recommended that finely ground portland cements with high specific surface, including plasticized and hydrophobic cements, be used.

The loss in mass during roasting should not exceed 2 percent. It is recommended that the mark of cement not below 400 be used.

Lime-slag, lime-pozzualanic, lime-clay and lime-ash cements may be used in construction in road-climatic zones IV and V.

Construction grades I and II according to GOST 9179-77, air-hardening and hydraulic and also hydrophobic lime are used. Hydraulic lime is used in powder form and the MgO content in it is not regulated.

Dry waste ashes should meet requirements of Table 2.10.

Liquid petroleum asphalts of classes SG and MG, marks 25/40/, 40/70 and 70/130 (with viscosity of not more than 100 s at C^{5}_{60}), corresponding to the requirements of GOST 11955-74, are primarily used to strengthen soils.

Table 2.10. Requirements on Indicators of Composition and Properties of Waste Ashes

(1) Нормируемые показатели	(2) Применение золы уноса в качестве		
	(3) самостоятельного вяжущего	(4) активного компонента смешанного вяжущего	
		(5) с цементом	(6) с известью
(7) Содержание свободной окиси кальция, %	(8) Не менее 8	(9) Не более 4	—
Удельная поверхность, см²/г (10)	Не менее 3000	Не менее 3000	Не менее 3000
(11) Содержание сернистых и сернокислых соединений (в пересчете на SO_3), %, не более	6	3	—
Потери в массе при прокаливании, %, не более (12)	5	10	10

Key:

1. Normalized indicators
2. Use of waste ash as

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

3. An independent binder
4. As the active component of a mixed binder
5. With cement
6. With lime
7. Free calcium oxide content, percent
8. Not less than
9. Not more than
10. Specific surface, cm^2/g
11. Content of sulphur and sulphuric acid compounds (calculated for SO3), percent, not more than
12. Losses in mass during roasting, percent, not more than

The class and mark of asphalts is established as a function of the climatic condition for use and the properties of the strengthened soils: it is recommended that asphalts of class SG and MG, marks 40/70 and 70/130 be used in road-climatic zones Iv and V and that asphalts of class SG and MG, mark 25/40 be used in zones II and III;

asphalts of marks 40/70 and 70/130 are used to strengthen large-fragment and sandy soils and those of mark 25/40 are used to strengthen clay soils.

Table 2.11. Emulsifiers and Alkali Materials Used to Prepare Asphalt Emulsions

Эмульгаторы и щелочные вещества (1)	(2) Количество, % массы воды или битума	
	при введении в воду (3)	при введении в битум (4)
Газогенераторная и топочная смола — мягчитель древесно-пирогенный марок А и Б (5)	3,5	—
Едкий натр (6)	По специальному расчету (7)	—
Нефтяные сульфокислоты марки КIIг (8)	2,4—2,6	—
Едкий натр (6)	По специальному расчету	—
Госсиполовая смола (9)	8—10	3—5
Едкий натр (6)	По специальному расчету	—
Второй жировой гудрон (10)	—	8—10
Триполифосфат натрия (11)	2	—

Key:

1. Emulsifiers and alkali materials
2. Quantity, percent of water or asphalt mass
3. Upon introduction to water
4. Upon introduction to asphalt
5. Gas-generator and furnace tar--wood-pyrogenous softening agent of marks A and B
6. Caustic soda

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

7. By special calculation
8. Petroleum sulfonic acids of mark KPg
9. Gossypolic resin
10. Secondary fatty oil tar
11. Sodium tripolyphosphate

Anion asphalt emulsions of the direct type that break down slowly (class MA) prepared in petroleum asphalts of marks BND-200/300, BND-130/200, BND 90/130, BND 60/90 and BND 40/60, emulsifiers and alkali materials indicated in Table 2.11 should be used to strengthen soils.

An emulsion prepared on sulfite-yeast wastes (SDB) with the following content of components in percent of mass of the emulsion: 50-60 percent asphalt, 1.75 percent SDB and 48.25-38.25 percent water may be used.

The asphalt content in the emulsions should comprise 35-55 percent of the mass of the emulsion. Lower values are used to strengthen sandy loam and loam soils and also those having moisture content not above the optimu, while higher values are used in the remaining cases.

When selecting an emulsifier in preparation of asphalt emulsions, one proceeds from the following:

wood gas-generator and furnace tar and petroleum sulfonic acids can be used without restrictions by soil-climated zones and types of soils;

gossypolic resin, secondary fatty oil tar and SDB should be used primarily for emulsions in road-climatic zones III-V: SDB can also be used in zone II if the ambient air temperature is not below +15°C;

petroleum sulfonic acids and gossypolic resin should be used as emulsifiers to strengthen sandy loams and loams with moisture content equal to 0.2-0.3 of the moisture content on the flowability boundary and also barkhan sands in zones IV and V.

Asphalt compounds prepared in solid emulsifiers are used in road-climatic zones III-V to strengthen large-fragment soils, sands and sandy loams with plasticity number less than 0.03; their composition is designated according to Table 2.12.

One is guided by the following when selecting the emulsifier in preparation of asphalt compounds: lime can be used without restrictions on road-climatic zones and types of soils;

soil emulsifiers (clays, loesses and loams) can be used only in zones IV and V with ambient air temperature not below +15°C.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.12. Compositions of Asphalt Compounds

Эмульгаторы (1)	Содержание в битумных пастах компонентов, % массы пасты (2)		
	(3) Битум	(4) Эмульгатор	(5) Вода
Известь молотая кипелка (6)	50—55	8—12	42—33
Известь-пушонка (7)	45—50	15—20	40—30
Фильтр — прессная грязь (дефекат)(8)	40—50	25—30	35—20
Глины и тяжелые суглинки (9)	40—55	8—20	30—45
Лёсы и лёссовидные суглинки(10)	40—45	(12) 20	40—35
Лёсс совместно с известью-пушонкой(11)	40—45	Лёсс — 14 Известь — 3 (13)	43—38

Key:
1. Emulsifiers
2. Content of components in asphalt compounds, percent of mass of compound
3. Asphalt
4. Emulsifier
5. Water
6. Ground quicklime
7. Air-slaked lime
8. Filtered sewage sludge
9. Clays and heavy loams
10. Loesses and loess-type loams
11. Loess together with air-slaked lime
12. Loess
13. Lime

2.3. Stone Materials

Stone materials are divided into natural (crushed stone from natural stone, crushed stone from gravel, gravel and crushed stone-sand, gravel-sand and crushed stone-gravel-sand mixtures and sand) and artificial (slag rubble, slag sand and kermzit).

Crushed stone from natural stone (GOST 8267-75). Crushed stone from natural stone is produced by crushing rock. It is characterized by the following indicators: grainy composition, grain content of plate-type (slab) and spiny shape, strength, grain content of weak rock, cold resistance, dusty, clay and ooze particle content and petrographic composition.

Crushed stone is divided into four fractions as a function of grain size: from 5 to 10 mm, more than 10 to 20 mm, more than 20 to 40 mm and more than 40 to 70 mm.

The use of rubble in the form of a mixture of two related fractions and upon agreement of the parties in the form of a mixture of several fractions and also crushed stone of fractions 2-10, 10-15 (or 5-15), 15-20 and larger than 70 mm is permitted.

The grain composition of each fraction of crushed stone or mixture of fractions should correspond to the range indicated in Table 2.13.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.13. Requirements on Grain Composition

Размер контрольных сит (1)	Полный остаток на ситах по массе, % (2)	Размер контрольных сит	Полный остаток на ситах по массе, %
$Д_{наим}$ (3) для фракций с наименьшим размером зерен:		0,5 ($Д_{наим}$ + + $Д_{наиб}$): (5)	
5 (3) мм (4)	95—100	одной фракции	40—80
10 мм и более	90—100	смеси фракций (6)	50—70
	-	$Д_{наиб}$	0—10
		1,25 $Д_{наиб}$	0

Key:
1. Size of control screens
2. Total residue on screens by mass, percent
3. D_{naim} for fractions with smallest grain size:
4. And above
5. Of one fraction
6. Of mixture of fractions

Crushed stone is divided by grain shape into three groups (Table 2.14) as a function of the grain content of plate-type (slab) and needle shape (the thickness or width of which is one-third or less the length).

Table 2.14. Groups of Crushed Stone by Grain Shape

(1) Группа щебня по форме зерен	(2) Содержание зерен пластинчатой (лещадной) и игловатой формы по массе, % не более
Кубовидная (3)	15
Улучшенная (4)	25
Обычная (5)	35

Key:
1. Group of crushed stone by grain shape
2. Grain content of plate-type (slab) and needle shape by mass, percent, not more than
3. Cube
4. Improved
5. Ordinary

Crushed stone from natural stone is divided into marks according to strength (Table 2.15) established by the crushability of the crushed stone upon compression (crushing) in a cylinder, by wear in a shelved drum (Table 2.16) and by cold resistance (Table 2.17), determined by testing the crushed stone by alternate freezing and thawing and for preliminary analysis in a sodium sulfate solution.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.15. Mark of Crush Stone According to Strength

(1) Марка щебня по прочности	(2) Потери в массе, %, при определении дробимости щебня			
	из осадочных и метаморфических пород (3)		(4) из изверженных пород	
	(5) в сухом состоянии	(6) в насыщенном водой состоянии	(7) интрузивных	(8) эффузивных
1400	—	—	До 12	До 9
1200	(9)До 11	До 11	12—16	9—11
	11—13	11—13	16—20	11—13
	13—15	13—15	20—25	13—15
	15—19	15—20	25—34	15—20
	19—24	20—28	—	—
	24—28	28—38	—	—
	28—35	38—54	—	—

Key:
1. Mark of crushed stone according to strength
2. Losses in mass, percent, when determining the crushability of crushed stone
3. From sedimentary and metamorphic rock
4. From igneous rock
5. In dry state
6. In water-saturated state
7. Intrusive
8. Effusive
9. Up to

Table 2.16. Mark of Crushed Stone According to Wear

(1) Марка щебня по износу	(2) Потеря в массе, %, при испытании в полочном барабане	Марка щебня по износу	Потеря в массе, %, при испытании в полочном барабане
И-I	(3) До 25	И-III	>35—45
И-II	>25—35	И-IV	>45—60

Key:
1. Mark of crushed stone according to wear
2. Losses in mass, percent, during testing in shelved drum
3. Up to

The grain content of weak rock with compressive strength in a water-saturated state of less than 20 kgf/cm^2 should not exceed 5 percent by mass in crushed stone of mark 1400 and 1200 in strength, 10 percent by mass in crushed stone of marks 1000, 800, 600 and 400 and 15 percent in crushed stone of marks 300 and 200.

The crushed stone should not contain foreign contaminating impurities and the content of dusty, clay and ooze particles should not exceed 1 percent by mass for crushed stone of igneous and metamorphic rock, 2 percent for crushed stone of sedimentary rock of marks 600-1200 and 3 percent for marks from 200 to 400. The clay content in the pieces should also not exceed 0.25 percent in all cases.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.17. Marks of Crushed Stone According to Cold Resistance

(1) Способ испытания и показатели	Мрз15	Мрз25	Мрз50	Мрз100	Мрз150	Мрз200	Мрз300
Попеременное замораживание (2) и оттаивание:							
количество циклов (3)	15	25	50	100	150	200	300
потеря в массе после испытания, %, не более (4)	10	10	5	5	5	5	5
В растворе сернокислого натрия: (5)							
количество циклов (3)	3	5	10	10	15	15	15
потеря в массе после испытания, %, не более (4)	10	10	10	5	5	3	2

Key:
1. Method of testing and indicators
2. Alternate freezing and thawing
3. Number of cycles
4. Loss in mass after testing, percent, not more than

Rock waste from gravel (GOST 10260-74*). Rock waste from gravel is a product of crushing gravel and boulders. The content of crushed grains, whose surface is more tan half knocked off, should not be less than 80 percent by mass in rock waste from gravel.

The division of rock waste from gravel into fractions by grain size, into marks by cold resistance and also by grain shape is the same as foı rock waste from natural stone.

The grain composition of each fractional mixture of related fractions of rock waste from gravel should correspond to that indicated in Table 2.18.

Table 2.18. Grain Composition of Rock Waste from Gravel

(1) Размер контрольных сит	$Д_{наим}$	$0,5(Д_{наим}+Д_{наиб})$ (2) одна фракция	(3) смесь фракций	$Д_{наиб}$	$1,25 Д_{наиб}$
Полный остаток (4) на сите, % по массе	95—100	40—70	50—70	0—5	0

Key:
1. Dimensions of control screens
2. Single fraction
3. Mixture of fraction
4. Total residue on screen, percent by mass

The strength of rock waste from gravel is characterized by its marks according to crushability (Table 2.19) and according to wearability (Table 2.20).

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Rock waste from gravel should not contain grains of weak rock more than 10 percent by mass for marks Dr.8, Dr. 12 and Dr. 16 and 15 percent by mass for mark Dr. 24, while the content of dusty, clay and ooze particles in it should not be greater than 1 percent by mass for marks Dr.8, Dr.12 and Dr.16 and 2 percent for mark Dr.24, and the clayn in the pieces should not be more than 0.25 percent in all cases.

Table 2.19. Mark of Rock Waste from Gravel According to Crushability

Марка щебня по дробимости (1)	Потеря в массе после испытания, % (2)	Марка щебня по дробимости	Потеря в массе после испытания, %
Др.8	(3) До 10	Др.16	14—18
Др.12	10—14	Др.24	18—26

Note. The approximate compressive strength of rock consisting of rock waste grains comprises more than 1,000 kgf/cm^2 for Dr.8, more than 800 to 1,000 kgf/cm^2 for Dr.12, more than 600 to 800 kgf/cm^2 for Dr.16 and from 400 to 600 kgf/cm^2 for Dr.24.

Key:
1. Mark of rock waste according to crushability
2. Loss in mass after testing, percent

Table 2.20. Mark of Rock Waste from Gravel According to Wearability

Марка щебня по истираемости (1)	Потеря в массе после испытания, % (2)	Марка щебня по истираемости	Потеря в массе после испытания, %
И-I	(3) До 20	И-III	30—40
И-II	20—30	И-IV	40—50

Key:
1. Mark of rock waste according to wearability
2. Loss in mass after testing, percent

Gravel (GOST 8268-74*). Gravel is produced by screening natural gravel-sand mixtures. The requirements placed on gravel are mainly the same as for rock waste from gravel. The difference is as follows:

gravel may contain crushed grains in a quantity of less than 80 percent by mass;

the mark of gravel according to crushability in a cylinder is established by the loss in mass after testing, which is permitted as follows: up to 8 percent for mark Dr.8, more than 8 to 12 percent for mark Dr.12, more than 12 to 16 percent for mark Dr.16 and more than 16 to 24 percent for mark Dr.24.

Sand (GOST 8736-77). It is divided into natural sand formed as a result of natural breakdown of rock, and crushed sand produced by crushing of rock.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Natural sand is divided into natural sand in the natural state, natural fractionated sand with separation into two or more fractions or in the form of their finished mixtures and natural enriched sand with improved granular composition.

Natural sand in its natural state is divided by grain size into four groups (Table 2.21).

Table 2.21. Groups of Sand by Coarseness

Группа песка (1)	Полный остаток на сите № 063, % по массе (2)	Модуль крупности Мк (3)
Крупный (4)	>50	>2,5
Средний (5)	30—50	2,5—2
Мелкий (6)	10—30	2—1,5
Очень мелкий (7)	<10	1,5—1

Note. If the sand does not correspond to both requirements of Table 2.21 simultaneously when determining its group by coarseness, the Mk value is the decisive one.

Key:
1. Group of sand
2. Total residue on screen No 063, percent by mass
3. Size modulus Mk
4. Coarse
5. Medium
6. Fine
7. Very fine

The content of gravel grains larger than 10 mm should not exceed 0.5 percent by mass in sand, of grains 5-10 mm should not exceed 5 percent and of grains passing through a screen with mesh size No 014 should not exceed 10 percent.

The number of dusty, clay and ooze particles in sand should not exceed 3 percent by mass, including not more than 0.5 percent clay.

Natural fractionated sand comprises two fractions: coarse--5.0-1.25 mm or 5.0-0.63 mm and fine--1.25-0.14 mm or 0.63-0.14 mm. The grain composition and amount of sand delivered in coarse and fine fractions should be in the range indicated in Table 2.22.

The presence of grains measuring more than 10 mm is not permitted in coarse sand fraction and grains measuring from 5 to 10 mm should not be more than 10 percent by mass. The grain content of fine fraction in the coarse fraction, as in the content of coarse fraction in fine fraction, is permitted up to 15 percent by mass. The number of dusty, ooze and clay particles should not exceed 2 percent by mass, including not more than 0.25 percent clay.

Natural enriched sand should meet the following requirements by grain composition: size modulus in the range from 2.5 to 3.25, total residue on screen with mesh size

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.22. Grain Composition of Fractionated Natural Sand

(1) Размер граничного зерна, мм	(2) Размер отверстий контрольных сит, мм	(3) Полные остатки на ситах, % по массе	(4) Соотношение поставляемых количеств крупной и мелкой фракций
	Крупные фракции 5—1,25 мм (5)		
1,25	5,0 2,5 1,25	— 20—50 100	20—50
	Мелкие фракции (6)		
	0,63 0,315 0,14	30—50 50—80 90—100	80—50
	Крупные фракции 5—0,63 мм (7)		
0,63	5,00 2,5 1,25 0,63	0—40 50—70 100	30—70
	Мелкие фракции 0,63—0,14 мм (8)		
	0,315 0,14	40—60 90—100	70—30

Note. The conformity of the grain composition of each fraction is determined by the requirements of Table 2.22 after grains larger than the maximum grain size of the given fraction are removed from it.

Key:
1. Maximum grain size, mm
2. Dimensions of control screen mesh, mm
3. Total residue on screens, percent by mass
4. Relationship of delivered quantities of coarse and fine fractions
5. Coarse fractions of 5-1.25 mm
6. Fine fractions
7. Coarse fractions of 5-0.63 mm
8. Fine fractions of 0.63-0.14 mm

No 063--not less than 50 percent and passage through screen with No 014 mesh--not more than 5 percent. The presence of gravel grains measuring more than 10 mm in natural enriched sand should not exceed 0.5 percent while grains from 5 to 10 mm should not exceed 5 percent by mass; the number of dusty and clay particles should not exceed 2 percent by mass and clay particles should not exceed 0.25 percent.

Crushed sand is manufactured from unweathered igneous, metamorphic or dense sedimentary rock and also from gravel. It can also be manufactured from rock or gravel crushing wastes in production of crushed stone.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Crushed sand is divided by strength into two marks 800 and 400.

The grain composition of crushed sand should meet the requirements on coarse or medium sand according to Table 2.21. The number of grains passing through screen No 014 should not exceed 10 percent by mass and the content of dusty and oozy particles should not be greater than 5 percent by mass, including 0.5 percent clay. There should be no foreign contaminating impurities in crushed sand.

Slag rubble (GOST 33440-73). It is produced by crushing and screening or only by screening waste slag or slags of current production and ladle residues. Slag rubble is divided into the following fractions: up to 5 mm, from 5 (3) to 10 mm, from 10 to 20 mm, from 20 to 40 mm, from 40 to 70 mm and from 70 to 120 mm. The grain composition of each fraction or mixture of fractions should meet the requirements of Table 2.23.

Table 2.23. Requirements on Grain Composition of Slag Rubble

Размер отверстий контрольных сит (1)	Полный остаток на ситах, % по массе (2)	Размер отверстий контрольных сит	Полный остаток на ситах, % по массе
$Д_{наим}$	95—100	$Д_{наиб}$	0—5
0,5 ($Д_{наим}$ + + $Д_{наиб}$)	40—70	1,25 $Д_{наиб}$	0

Key:
1. Size of control screen openings
2. Total residue on screens, percent by mass

Slags used to manufacture rubble are divided into high-active, active and low-active.

The activity of slags is determined by the compressive strength of specimens after special testing of them.

It should be greater than 50 kgf/cm^2 for high-active slags, 25-50 kgf/cm^2 for active slags and less than 25 kgf/cm^2 for low-active slags.

The rubble is divided into four strength classes according to Table 2.24.

Table 2.24. Strength Class of Slag Rubble

Класс прочности щебня (1)	(2) Потери в массе при испытании в полочном барабане, % по массе, не более	(3) Потери в массе при испытании на дробимость в цилиндре, % по массе (в водонасыщенном состоянии), не более
1	25	15
2	35	25
3	45	35
4	55	45

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Strength class of rubble
2. Losses in mass during testing in shelved drum, percent by mass, not more than
3. Losses in mass during testing for crushability in cylinder, percent by mass (in water-saturated state), not more than

Rubble is divided into the following marks according to cold resistance: Mrz15, Mrz25, Mrz50, Mrz100, Mrz150 and Mrz200. The indicators that characterize the cold resistance of rubble when testing by direct freezing or in a sodium sulfate solution should be the same for slag rubble as for the corresponding marks of crushed stone from natural stone (see Table 2.17).

Slag rubble should be stable to all types of breakdown.

The content of weak grains, including breakdown of refractory brick, should not exceed 5 percent in rubble of strength classes 1 and 2 and 15 percent by mass in strength class 3.

Keramzit gravel (GOST 9759-76). This is an artificial porous material produced by swelling of silicate rock (clays, tripoli earth and shales) upon annealing or from ashes of thermoelectric power plants.

Keramzit gravel is divided into three fractions: from 5 to 10 mm, from 10 to 20 mm and from 20 to 40 mm. Keramzit gravel is used mainly in airfield construction as a coarse filler for concrete used in the artificial beds of rigid and asphalt-concrete pavement and in heat-insulating layers.

Keramzit gravel is divided into marks as a function of the volumetric bulk mass and into classes by compressive strength according to Table 2.25.

Table 2.25. Strength Indicators of Keramzit Gravel

(1) Марка гравия	(2) Прочность гравия, кгс/см², для класса		Марка гравия	Прочность гравия, кгс/см², для класса	
	А	Б		А	Б
150	4	3	450	20	15
200	5	4	500	25	18
250	7	6	550	30	21
300	10	8	600	35	25
350	13	10	700	45	30
400	16	12	800	55	40

Key:
1. Mark of gravel
2. Strength of gravel, kgf/cm^2, for class

The mark of keramzit gravel should not be below Mrz15 according to cold resistance.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

2.4. Mixtures of Stone Materials Treated With Inorganic Binders

Crushed stone-sand, gravel-sand and crushed stone-gravel-sand mixtures and sands from natural and artificial stone materials are used for strengthening with inorganic binders.

The strengthened mixtures are divided into coarse-grained with grain size up to 70 and up to 40 mm, medium-grained with grain size up to 20 mm and fine-grained with grain size up to 10 mm and sandy with grain size up to 5 mm as a function of the largest grain size of the stone material.

The strengthened mixtures are divided into the following marks: compressive strength of 60, 40, 20 and 10 and cold resistance of Mrz25, Mrz15 and Mrz10.

The strength indicators of the mixture should correspond to those given in Table 2.26. The consumption of air-attracting neutralized resin, naphthenate soap and osidol in a cement-strengthened mixture comprises 0.01-0.02 percent of the cement mass.

The water content in the strengthened mixtures should correspond to the optimum value determined by the maximum density of packed specimen with regard to the moisture content of the initial materials.

Strengthened mixtures used to construct pavement and the upper layer of beds should have strength mark not below 40. The strengthened mixture and the stone materials should correspond to the requirements of Table 2.27 in cold resistance.

Table 2.26. Indicators of Strengthened Mixture

(1) Показатели	(2) Норма для смеси марки по прочности			
	60	40	20	10
Прочность на сжатие, кгс/см², в возрасте: (3)				
7 сут, не менее (4)	50	30	15	6
28 сут, » » (5)	60	40	20	10
Прочность на растяжение при изгибе в возрасте 28 сут, кгс/см², не менее	12	10	6	2
Коэффициент морозостойкости в возрасте 28 сут, не менее (6)	0,75	0,75	0,7	0,65
Примерный расход вяжущего, % (7) от массы укрепленной смеси, при марке вяжущего:				
600	6—8	5—6	3—4	2—4
500	7—9	5—7	4—5	3—4
400	8—10	6—8	4—6	3—5
300	9—15	6—12	5—8	4—6
200	10—19	7—15	6—10	5—7
100	28—38	18—28	12—18	12—14
50	—	—	—	30—35

Note. The final consumption of binders is established by laboratory selection of the composition of mixtures on specific materials.

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Indicators
2. Norm for mixture of mark according to strength
3. Compressive strength, kgf/cm^2, of age
4. Days, not less than
5. Tensile bending strength aged 28 days, kgf/cm^2, not less than
6. Cold-resistance coefficient aged 28 days, not less than
7. Approximate consumption of binder, percent of mass of strengthened mixture, with mark of binder

Crushed stone, crushed stone from gravel, gravel, slag and sand used to manufacture strengthening of the mixture should meet the requirements of GOST 8267-75, GOST 10260-74*, GOST 8268-74*, GOST 3344-73 and GOST 8736-77, respectively. The stone material should correspond to the requirements of Table 2.28 in grain composition and Table 2.29 in strength.

The content of clay particles in the stone material should not exceed 4 percent, including 1 percent lumps of clay measuring more than 5 mm.

Cements, cements with surface-active plasticizing, air-attracting and gas-forming additives, crushed high-active slags from ferrous metallurgy, uncrushed granulated blast furnace slag with cement additive, crushed slags from ferrous metallurgy with cement or lime additive, crushed granulated slags with water glass additive and crushed fuel slags from ash with portland cement or lime additive are used as binder materials in strengthened mixtures.

Portland cement, plasticized and hydrophobic portland cement and slag-portland cement meeting the requirements of GOST 10178-76, are used in strengthened mixtures.

Cement should begin to set up no earlier than 2 hours after hardening. To extend the setting periods and to reduce the consumption of cement, surface-active additives are added to the strengthening mixture during manufacture.

Binder based on slags from ferrous metallurgy should meet the requirements of Table 2.30.

Binder based on fuel slags and ashes should have a mark not below 200 and should contain 75-85 percent slag by mass and 25-15 percent portland cement or lime.

Fuel slags and ashes should be crushed to a specific surface of 3,500-4,000 cm^2/g and should meet the requirements of Table 2.31.

Slag binder from high-active slags without activators should be crushed to specific surface of not less than 3,000 cm^2/g.

2.5. Asphalt Concrete and Asphalt Concrete Mixtures

Asphalt concrete (GOST 9128-76) consists of stone material (crushed stone or gravel and sand), mineral powder and asphalt.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.27. Requirements on Cold Resistance of Strengthened Mixture and Stone Materials

(1) Наименование материала	(2) Конструктивный слой	(3) Категория нормативной нагрузки								
		III (4) и IV			V			VI		
		(5) Климатические условия								
		(6) суровые	(7) умеренные	(8) мягкие	суровые	умеренные	мягкие	суровые	умеренные	мягкие
		Марка по морозостойкости, не менее (9)								
Укрепленная смесь (10)	Покрытие (11)	Не применяется (12)			25	25	15	25	25	10
	Верхний слой основания (13)	25	25	15	25	15	10	15	10	—
	Нижние слои основания (14)	15	15	10	15	10	—	10	—	—
Каменный материал (15)	Покрытие и верхний слой основания (16)	50	25	15	50	25	15	25	15	15
	Нижние слои основания (14)	25	25	15	25	15	—	25	15	—

Note. Severe climatic conditions are characterized by average monthly temperature of the coldest month of the year below -15°C, moderate conditions are characterized by temperature from -5 to -15°C and mild conditions are characterized by temperature above -5°C.

Key:

1. Name of material
2. Structural layer
3. Category of normative load
4. And
5. Climatic conditions
6. Severe
7. Moderate
8. Mild
9. Mark according to cold resistance, not less than
10. Strengthened mixture
11. Pavement
12. Not used
13. Upper layer of bed
14. Lower layers of bed
15. Stone material
16. Pavement and upper layer of bed

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.28. Requirements on Grain Composition of Stone Material

(1) Максимальная крупность зерен, мм	(2) Размер отверстий сит, мм										
	70	40	20	10	5	2,5	1,25	0,63	0,28	0,14	0,071
	(3) Полный остаток на сите, % по массе										
70	0	20—40	40—65	55—80	65—88	75—93	80—96	87—98	91—98	93—99	94—100
40		0	20—40	40—65	55—80	65—88	75—93	80—96	87—98	91—98	92—99
20			0	20—40	40—65	55—80	65—88	75—93	80—96	87—97	90—98
10				0	30—40	50—65	65—80	75—88	85—93	87—96	88—97
5					0	30—40	50—65	65—80	75—88	82—93	85—96

Key:
1. Maximum grain size, mm
2. Dimensions of screen mesh, mm
3. Total residue on screen, percent by mass

Table 2.29. Requirements on Strength of Stone Materials

(1) Материал	(2) Марка, класс прочности	(3) Марка по дробимости в цилиндре или % потерь в массе, не более	(4) Марка по истираемости в полочном барабане или % потерь в массе, не более
(5) Щебень из осадочных и метаморфических горных пород	200	54	II-IV
Щебень из интрузивных горных пород (6)	600	34	И-IV
Щебень из эффузивных горных пород (7)	600	20	И-IV
Щебень из гравия прочностью 400 кгс/см² (8)	400	Др.24	И-IV
Гравий (9)	400	Др.24	Н-IV
Щебень из шлаков черной металлургии (10)	4	45	55

Key:
1. Material
2. Mark, strength class
3. Mark by crushability in cylinder or percent of losses in mass, not more than
4. Mark by wearability in shelved drum or percent of losses in mass, not more than
5. Crushed stone from sedimentary and metamorphic rock
6. Crushed stone from intrusive rock
7. Crushed stone from effusive rock
8. Crushed stone from gravel with strength of 400 kgf/cm^2
9. Gravel
10. Slag rubble from ferrous metallurgy

Asphalt concretes are divided into compact having residual porosity of 2.5-5 percent and which must contain mineral powder, porous having residual porosity of 5-10 percent, rubbly, gravel and sand.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.30. Requirements on Binder Based on Slags from Ferrous Metallurgy

(1) Марка вяжущего по ГОСТ 3344—73	(2) Предел прочности на сжатие в возрасте 28 сут, кгс/см², не менее	(3) Удельная поверхность шлака, см²/г	(4) Добавка активатора, % по массе вяжущего		
			(5) Цемент	(6) Известь	(7) Жидкое стекло
50	50	100	10	5	—
		1200	3	2	—
		3000	2	1	5
100	100	100	30	—	—
		1200	10	10	—
		3000	5	—	10
200	200	100	50	—	—
		1200	20	—	—
		3000	10	10	15
300	300	100	—	—	—
		1200	30	—	—
		3000	15	—	20

Key:
1. Mark of binder according to GOST 3344-73
2. Compressive strength aged 28 days, kgf/cm^2, not less than
3. Specific surface of slag, cm^2/g
4. Additive of activator, percent of binder by mass
5. Cement
6. Lime
7. Water glass

Table 2.31. Requirements on Fuel Slags and Ashes

(1) Показатели	(2) Норма
Модуль основности, не менее (3)	0,6
» активности, » » (4)	0,25
Содержание сернистых и сернокислых соединений (в пересчете на SO_3), % по массе, не более (5)	3
Потери при прокаливании, % по массе, не более (6)	1

Key:
1. Indicators
2. Norm
3. Alkalinity modulus, not less than
4. Activity modulus, not less than
5. Content of sulphur and sulfuric acid compounds (calculated for SO_3), percent by mass, not more than
6. Losses during roasting, percent by mass, not more than

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Asphalt concrete mixtures are divided into hot, warm and cold. Hot and warm asphalt concrete mixtures are divided into coarse-grained with grain size up to 40 mm, medium-grained with grain size up to 20 mm and fine-grained with grain size up to 15 (10) mm as a function of the largest dimensions of the crushed stone or gravel. Sand asphalt concrete mixtures may contain grains up to 5 mm. Cold asphalt concrete mixtures can only be fine-grained or sandy.

Viscous asphalts of marks BND 90/130, BND 60/90 and BND 40/60 are used to prepare hot asphalt concrete mixtures; viscous asphalts of marks BND 200/300 and BND 130/200 or liquid asphalts of marks BND 70/130 and SG 130/200 are used to prepare warm asphalt concrete mixtures and liquid asphalts of marks SG 70/130 and MG 70/130 are used to prepare cold asphalt concrete mixtures.

Dense asphalt concretes are used in the upper layer of the pavement and porous concretes are used in the lower layer and in the bed.

Dense asphalt concretes are divided into types (Table 2.32) and marks (Tables 2.33 and 2.34).

Table 2.32. Types of Dense Asphalt Concretes

Вид асфальтобетонных смесей (1)	(2) Тип асфальтобетона	Количество щебня (гравия) или песка в асфальтобетонной смеси, % (3)
Горячие и теплые (4)	А	50—65% щебня (5)
	Б	35—50% » (гравия) (6)
	В	20—35% » »
	Г	Не менее 33% фракции 1,25—5,0 мм в дробленом песке (7)
	Д	Не менее 14% фракции 1,25—5,0 мм в природном песке (8)
Холодные (9)	Бх	35—40% щебня (гравия) (10)
	Вх	20—35% » »
	Дх	Не менее 33% фракции 1,25—5,0 мм в дробленом или 15% в природном песке (11)

Key:
1. Type of asphalt concrete mixtures
2. Type of asphalt concretes
3. Amount of crushed stone (gravel) or sand in asphalt concrete mixture, percent
4. Hot and warm
5. Crushed stone
6. Gravel
7. Not less than 33 percent of fraction 1.25-5.0 mm in crushed sand
8. Not less than 14 percent fraction of 1.25-5.0 mm in natural sand
9. Cold
10. Crushed stone (gravel)
11. Not less than 33 percent fraction of 1.25-5.0 mm in crushed or 15 percent in natural sand

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.33. Marks of Dense Asphalt Concretes from Hot and Warm Mixtures

Марка асфальтобетона (1)	Тип асфальтобетона (2)	(3) Минеральные материалы			
		Щебень (гравий) (4)		Песок (7)	(8) Минеральный порошок
		(5) Горные породы и материалы	Марка по прочности или класс (6)		
I	А, Б В	Изверженные и карбонорфические (9)	1200 1000	(14) Природный и дробленый с Мк не менее 2, а также природный активированный с Мк не менее 1,7	(15) Преимущественно активированный, а также неактивированный (ГОСТ 16557—78)
	А, Б В	Осадочные некарбонатные (10)	1000 800		
	В	Осадочные карбонатные (11)	1000		
	Б В	Шлаки металлургические (12)	1 2		
	Б В	Щебень из гравия (13)	Др.8 Др.12		
	Г	—	—	(16) Дробленый с Мк не менее 2 из горных пород, применяемых в виде щебня в марке I типа А	
II	А, Б В	Изверженные и метаморфические (17)	1000 800	(14) Природный и дробленый с Мк не менее 2, а также природный активированный с Мк не менее 1,7	(18) Активированный и неактивированный (ГОСТ 16557—78), а также тонкомолотые металлургические шлаки
	А Б В	Осадочные некарбонатные	1000 800 600		
	Б В	Осадочные карбонатные	800 600		
	А, Б В	Шлаки металлургические	2 3	(14) То же	(18) То же
	А Б, В	Щебень из гравия	Др.8 Др.12		

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.33 (Continued).

Марка асфальтобетона	Тип асфальтобетона	Минеральные материалы			
		Щебень (гравий)		Песок	Минеральный порошок
		Горные породы и материалы	Марка по прочности или класс		
	Г	—	—	(19) Дробленый с Мк не менее 2 из горных пород, применяемых в виде щебня в марке II типа А	
	Д	—	—	Природный с Мк не менее 2 или смесь природного с дробленым (20)	
III	Б, В	Изверженные и метаморфические	800	(21) Природный с Мк не менее 1, а также дробленый	(22) Тонкомолотые карбонатные горные породы (ГОСТ 16557—78) и основные металлургические шлаки, порошкообразные отходы промышленности
	Б В	Осадочные карбонатные и некарбонатные (23)	800 600		
	Б, В	Шлаки металлургические	3		
	Б В	Щебень из гравия и гравий (24)	Др.12 Др.16		
	Д	—	—	(25) Природный с Мк не менее 1	
IV	Б В	Изверженные и метаморфические	800 600	(25) То же	(26) Тонкомолотые карбонатные и некарбонатные горные породы, порошкообразные отходы промышленности
	Б В	Осадочные карбонатные и некарбонатные	600 300		
	Б В	Шлаки металлургические	3 4	»	(26) То же
	Б В	Щебень из гравия и гравий	Др.16 Др.24		
	Д	—	—		

Key:

1. Mark of asphalt concrete
2. Type of asphalt concrete
3. Mineral materials
4. Crushed stone (gravel)

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

5. Rock and materials
6. Mass according to strength or class
7. Sand
8. Mineral powder
9. Igneous and carbonorific
10. Sedimentary noncarbonate
11. Sedimentary carbonate
12. Metallurgical slags
13. Crushed stone from gravel
14. Natural and crushed with Mk not less than 2 and also natural activated with Mk not less than 1.7
15. Primarily activated and also nonactivated (GOST 16557-78)
16. Crushed with Mk not less than 2 from rock used in the form of crushed stone in mark I of type A
17. Igneous and metamorphic
18. Activated and nonactivated (GOST 16557-78) and also finely crushed metallurgical slags
19. Crushed with Mk not less than 2 from rock used in the form of crushed stone in mark II of type A
20. Natural with Mk not less than 2 or mixture of natural and crushed
21. Natural with Mk not less than 1 and also crushed
22. Finely crushed carbonate rock (GOST 16557-78) and basic metallurgical slags and powdery wastes from industry
23. Sedimentary carbonate and noncarbonate
24. Crushed stone from gravel and gravel
25. Natural with Mk not less than 1
26. Finely crushed carbonate and noncarbonate rock and powdery wastes from industry

Asphalt concrete mixtures should meet the requirements of Tables 2.35 and 2.36 in granular (granulometric) composition of the mineral part and the content of asphalt in them and the requirements of Tables 2.37-2.39 in indicators of physicomechanical properties.

The reommended range of application of dense asphalt concretes for the upper layer of pavement is presented in Table 2.40 as a function of climatic conditions and the normative load category.

The error in proportioning the components of asphalt concrete mixtures should not exceed the values presented in Table 2.41 and the temperature of the mixtures should correspond to the requirements indicated in Table 2.42.

Petroleum highway asphalts corresponding to requirements of GOST 22245-76* and GOST 11955-74* are used to prepare asphalt concrete mixtures.

The mark of asphalt should be selected as a function of the type of asphalt concrete and the conditions of use according to the data presented in Table 2.43.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.34. Marks of Dense Asphalt Concretes from Cold Mixtures

(1) Марка асфальтобетона	(2) Марка битума	(3) Тип асфальтобетона	Минеральные материалы (4)			
			Щебень (гравий) (5)		(8) Песок	(9) Минеральный порошок
			(6) Горные породы и материалы	Марка по прочности или класс (7)		
I	СГ	Бх Вх	(10) Изверженные и метаморфические	1000 800	(11) Природный и дробленый с Мк не менее 2, а также природный активированный с Мк не менее 1,7	(12) Преимущественно активированный, а также неактивированный (ГОСТ 16557--78), тонкомолотые основные металлургические шлаки
		Бх Вх	Осадочные карбонатные и некарбонатные (13)	800 600		
		Бх Вх	(14) Шлаки металлургические	1 2		
		Бх Вх	(15) Щебень из гравия	Др.8 Др.12		
		Дх	—	—	(16) Дробленый с Мк не менее 2, природный активированный с Мк не менее 1,7 и их смесь	
II	СГ М	Бх Вх	Изверженные и метаморфические	800 600	(11) Природный и дробленый с Мк не менее 2, а также природный активированный с Мк не менее 1,7	(18) Неактивированный и активированный (ГОСТ 16557--78), тонкомолотые основные металлургические шлаки
		Бх Вх	Осадочные карбонатные и некарбонатные	800 600		
		Бх Вх	Шлаки металлургические	2 3		
		Бх Вх	(17) Щебень из гравия и гравий	Др.12 Др.16		
		Дх	—			

Key:

1. Mark of asphalt concrete
2. Mark of asphalt
3. Type of asphalt concrete
4. Mineral materials

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

5. Crushed stone (gravel)
6. Rock and materials
7. Mark according to strength or class
8. Sand
9. Mineral powder
10. Igneous and metamorphic
11. Natural and crushed with Mk not less than 2 and also natural activated with Mk not less than 1.7
12. Primarily activated and also nonactivated (GOST 16557-78) and finely crushed basic metallurgical slags
13. Sedimentary carbonate and noncarbonate
14. Metallurgical slags
15. Crushed stone from gravel
16. Crushed with Mk not less than 2 and natural activated with Mk not less than 1.7 and mixture of them
17. Crushed stone from gravel and gravel
18. Nonactivated and activated (GOST 16557-78) and finely crushed basic metallurgical slags

Crushed stone from natural stone, gravel and metallurgical slags and gravel that meet the requirements of GOST 8267-75, GOST 10260-74*, GOST 3344-73, GOST 8268-74* and Tables 2.44 and 2.45, respectively, can be used for asphalt concrete mixtures.

Crushed stone from argillaceous (marly) limestones, argillaceous sandstones and argillaceous shales may not be used.

Crushed stone or gravel should be graded by fractions of 20-40, 10-20, 10-15, 5 (3)-25, 5 (3)-15 and 5 (3)-10 mm. The presence of scale-type (slab) shape in the grains should not exceed 15 percent by mass for hot and warm asphalt concretes of type A, 25 percent for those of type B, 35 percent for those of type C, 25 percent for cold asphalt concretes of type Bkh and 35 percent for those of type Vkh.

The number of particles of carbonate rock should not be more than 30 percent in crushed stone from gravel while the number of silaceous particles should not be more than 25 percent for asphalt concretes of mark I. The content of grains from weak and weathered rock should not exceed 10 percent by mass in the grains of the crushed stone (gravel) for asphalt concrete laid in pavement and 15 percent for asphalt concrete laid in the bed. The content of dusty and clay particles should not be more than that indicated in Table 2.4 in the crushed stone (gravel).

Coarse, medium and fine natural sands meeting the requirements of GOST 8736-77 and also crushed sands are used for asphalt concrete mixtures.

The use of fine sands (Mk less than 2) for asphalt concretes of mark I and II is permissible provided that they are enriched. The compositions of hot and warm mixtures for asphalt concretes of types A and B are selected with fine sands essentially of intermittent granulometry indicated in Table 2.35 in the absence of coarse sands for enrichment.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Natural sand with Mk 1-2 may be used to prepare hot and warm mixtures of asphalt concretes of marks III and IV provided that the granular composition of the mixtures conforms to the requirements of Table 2.35.

Crushed sand for hot and warm mixtures of asphalt concretes of marks I and II and cold mixtures of mark I should be manufactured from igneous, metamorphic and sedimentary rock of mark not below 800 in strength or from gravel with crushability indicators not below Dr.8 and that for hot and warm mixtures of asphalt concretes of marks III and IV and for cold mixtures of mark II should be manufactured from igneous, metamorphic and sedimentary rock of mark not below 400 in strength or from gravel with crushability indicators not below Dr.16.

Crushed sand from igneous rock of mark not less than 1000 is used for sandy asphalt concretes of type D.

The content of dusty and clay particles in natural sand should not exceed 3 percent, while the content of particles finer than 0.071 mm should not exceed 5 percent, including 0.5 percent clay particles, in crushed sand.

Activated and nonactivated mineral powders from carbonate rock used for asphalt concrete mixtures should meet the requirements of GOST 16557-78. Powdery wastes from industry used as mineral powder should not contain free calcium oxide (CaO) and should meet the requirements of Table 2.47.

2.6. Organic Binder Materials

The main organic binder materials used in construction of airfield pavements and artificial beds for them are petroleum asphalts and asphalt emulsions prepared on their basis.

Viscous and liquid road asphalts and more rarely construction asphalts are most widely used.

Viscous petroleum road asphalts (GOST 22245-76) are used to prepare asphalt concrete mixtures, to install pavements and beds from stone materials treated by impregnation and mixing methods, for surface treatment of pavements and also to prepare sealing materials of expansion joints.

Viscous petroleum highway asphalts are divided into marks BND 200/300, BND 130/200, BND 90/130, BND 60/90, BND 40/60, BN 200/300, BN 180/200, BN 90/130 and BN 60/90, the property indicators of which should meet the requirements of Table 2.48.

Liquid petroleum highway asphalts (GOST 11955-74) are divided into three classes as a function of the rate of structural formation: BG (quick-setting), SG (setting at average rate) and MG (slow-setting).

The marks of liquid highway asphalts are as follows as a function of viscosity:

BG 25/40, BG 40/70 and BG 70/130 for class BG;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.35. Requirements on Granular Composition of Hot and Warm Asphalt Concrete Mixtures and Asphalt Content in Them

(1) Назначение асфальтобетонных смесей и асфальтобетона	Содержание, %, зерен минерального материала мельче, мм (2)											Примерный расход битума, % от массы минеральной части (3)
	40	20	15	10	5	2,5	1,25	0,63	0.315	0,14	0,071	
Непрерывная гранулометрия (4)												
I. Для (5) плотного асфальтобетона, применяемого в верхнем слое покрытия:												
среднезернистые смеси асфальтобетонов (6) типов:												
А	—	95—100	75—85	60—70	35—50	24—38	17—28	12—20	9—15	6—11	4—10	5,0—6,0
Б	—	95—100	85—91	78—80	50—65	38—52	28—39	20—29	14—22	9—16	6—12	5,0—6,0
В	—	95—100	91—96	80—90	65—80	52—66	39—53	29—40	20—28	12—20	8—14	6,0—7,0
мелкозернистые смеси асфальтобетонов (7) типов:												

[Continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.35 (Continued).

А	—	—	95—100	63—75	35—50	24—38	17—28	12—20	9—15	6—11	4—10	5,0—6,0
А	—	—	—	95—100	35—50	24—38	17—28	12—20	9—15	6—11	4—10	5,0—6,0
Б	—	—	95—100	75—85	50—65	38—52	28—39	20—29	14—22	9—16	6—12	5,5—7,0
Б	—	—	—	95—100	50—65	38—52	28—39	20—29	14—22	9—16	6—12	5,5—7,0
В	—	—	95—100	85—93	65—80	52—66	39—53	29—40	20—28	12—20	8—14	6,0—7,0
В	—	—	—	95—100	65—80	52—66	39—53	29—40	20—28	12—20	8—14	6,0—7,0
песчаные смеси асфальтобетонов (8) типов:												
Г	—	—	—	—	95—100	68—83	45—67	28—50	18—35	11—23	8—14	7,0—9,0
Д	—	—	—	—	95—100	74—93	53—86	37—75	27—55	17—33	10—16	7,0—9,0
Прерывистая гранулометрия (9)												
средне- (6) зернистые смеси асфальтобетонов типов:												
А	—	95—100	78—85	60—70	35—50	35—50	35—50	35—50	17—28	8—15	4—10	5,0—6,5
Б	—	95—100	85—91	70—80	50—65	50—65	50—65	50—65	28—40	14—23	6—12	5,0—6,5
мелко-, зернистые смеси асфальтобетонов (7) типов:												
А	—	—	95—100	63—75	35—50	35—50	35—50	35—50	17—28	8—15	4—10	5,0—6,5
А	—	—	—	95—100	35—50	35—50	35—50	35—50	17—28	8—15	4—10	5,0—6,5
Б	—	—	95—100	75—80	50—65	50—65	50—65	50—65	28—40	14—23	6—12	5,5—7,0
Б	—	—	—	95—100	50—65	50—65	50—65	50—65	28—40	14—23	6—12	5,5—7,0

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.35 (Continued)

Назначение асфальтобетонных смесей и асфальтобетона	Содержание, %, зерен минерального материала мельче, мм											Примерный расход битума, % от массы минеральной части
	40	20	15	10	5	2,5	1,25	0,63	0,315	0,14	0,071	
	Непрерывная гранулометрия (7)											
II. Для пористого асфальтобетона, применяемого в нижних слоях: (10)												
(11) крупнозернистые смеси	95—100	—	57—80	45—73	27—60	18—48	10—37	7—26	4—19	2—12	0—4	4—6
(12) среднезернистые	—	95—100	68—85	52—76	27—60	18—48	10—37	7—26	4—19	2—12	0—4	4—6
(13) мелкозернистые	—	—	95—100	67—85	35—65	27—50	18—38	12—27	6—18	2—13	0—6	4—6,5
(11) крупнозернистые	95—100	72—82	60—72	47—60	30—40	30—40	30—40	30—40	30—40	14—22	0—4	4—6
(12) среднезернистые	—	95—100	72—88	60—80	35—65	35—65	35—65	35—65	22—44	10—25	0—4	4—6
(13) мелкозернистые	—	—	95—100	70—88	36—65	36—65	35—65	35—65	22—44	10—25	0—6	4—6,5

Notes. 1. The crushed stone content in the mixture (in the recommended range) should be increased when natural sand is used: it should be decreased when crushed sand is used.

2. The asphalt consumption should be reduced by 0.5-1.0 percent when using activated mineral powders.

3. Asphalt concrete mixtures recommended for the upper layers may be used in the lower layers of pavements with the corresponding engineering and economic substantiation.

4. The amount of mineral powder in the mixtures can be increased to 8 percent for the lower layer with heavy loads.

[Key on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]

1. Designation of asphalt concrete mixtures and of asphalt concrete
2. Content, percent, of grains of mineral material finer than, mm
3. Approximate asphalt consumption, percent of mass of mineral part
4. Continuous granulometry
5. For dense asphalt concrete used in the upper layer of pavement:
6. Medium-grained mixtures of asphalt concretes of types
7. Fine-grained mixtures of asphalt concretes of types
8. Sandy mixtures of asphalt concretes of types
9. Intermittent granulometry
10. For porous asphalt concrete used in lower layers
11. Coarse-grained mixtures
12. Medium-grained
13. Fine-grained

SG 25/40, SG 40/70, SG 70/130 and SG 130/200 for class SG;

MG 25/40, MG 40/70, MG 70/130 and MG 130/200 for class MG.

Asphalts of classes BG and SG are used in all road-climatic zones, while those of class MG are used in zones 3, 4 and 5. Liquid asphalts are produced by liquefying viscous asphalts with liquid petroleum products of established fractional composition with addition of surfactants.

The physicomechanical indicators of liquid petroleum highway asphalts should meet the requirements and norms presented in Tables 2.49-2.51.

Highway asphalt emulsions (GOST 18659-73) are produced by dispersion of asphalt in an aqueous solution of an emulsifier or alkaline material. The emulsions are divided into three classes by the rate of breakdown upon exposure to mineral materials: BA--fast-disintegrating anion, SA--medium-disintegrating anion and MA--slow-disintegrating anion. Emulsions of classes BA and MA are divided into marks BA-1, BA-2 and MA-1, MA-2.

2.7. Concrete

The concrete used to construct rigid airfield pavements and beds should meet the requirements of GOST 8424-72* "Highway concrete."

Highway concrete is divided into marks 55, 50, 45, 40, 35, 30, 25, 20 and 15 by tensile bending strength and 500, 400, 350, 300, 250, 200, 150, 100 and 75 by compressive strength.

Mark 45/350, not lower than, of concrete is used for single-layer and the upper layer of two-layer pavements and mark 35/250 is used for the lower layer of two-layer pavements.

The cold resistance of concrete and coarse filler used to prepare it should meet the requirements of Table 2.52.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.36. Requirements on Granular Composition of Cold Asphalt Concrete Mixtures and Asphalt Content in Them

(1) Вид и назначение асфальтобетонных смесей	(2) Содержание, %, зерен минерального материала мельче, мм									(3) Примерный расход битума, % от массы минеральной части
	15	10	5	2,5	1,25	0,63	0,315	0,14	0,071	
(4) Мелкозернистые для асфальтобетона типа Бх	95—100 —	79—85 95—100	50—65 65—75	33—53 43—53	21—39 27—38	14—29 19—29	10—22 13—22	9—16 10—16	8—12 9—13	3,5—5,5
(5) Мелкозернистые для асфальтобетона типа Вх	95—100 —	85—90 95—100	65—80 75—82	53—60 53—66	39—49 38—55	29—38 29—44	22—31 22—35	16—22 16—25	12—17 13—19	4,6—6,0
(6) Песчаные для асфальтобетона типа Дх	—	—	95—100	65—82	42—68	26—54	18—43	14—30	12—20	4,5—6,5

Notes. 1. The crushed stone content (in the recommended range) should be increased when using natural sand and it should be increased when using crushed sand.

2. The asphalt consumption should be reduced by 0.5-1.0 percent when using activated mineral powders.

Key:

1. Type and designation of asphalt concrete mixtures
2. Content, percent, of mineral material grains finer than, mm
3. Approximate asphalt consumption, percent of mass of mineral part
4. Fine-grained for asphalt concrete of type Bkh
5. Fine-grained for asphalt concrete of type Vkh
6. Sandy for asphalt concrete of type Dkh

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.37. Indicators of Physicomechanical Properties of Dense Asphalt Concretes from Hot and Warm Mixtures

Показатели (1)	(2) Нормы для асфальтобетонов марок			
	I	II	III	IV
Пористость минерального остова, % по объему: (3)				
для асфальтобетонов типа А и Б (4)	15—19	15—19	15—19	15—19
То же В и Г (5)	18—22	18—22	18—22	18—22
» Д	—	—	Не более 22	Не более 22
Остаточная пористость, % по объему (6)	2,5—4,5	2,5—4,5	(19) 2,5—4,5/3,0—5,0	2,5—4,5/3,0—5,0
Водонасыщение, % по объему, для асфальтобетонов типа: (7)				
А	2,0—4,5	2,0—4,5	—	—
Б и Г (8)	1,5—3,5	1,5—3,5	1,5—3,5/1,5—4,0	1,5—3,5/1,5—4,0
В и Д (9)	1,5—3,0	1,5—3,0	1,0—3,0/1,5—4,0	1,0—3,0/1,5—4,0
Набухание, % по объему, не более (10)	0,5	1,0	1,0	1,5
Предел прочности при сжатии, кгс/см², не менее, при: (11)				
+20° С для асфальтобетонов всех типов (12)	24/20	22/18	20/18	16/14
+50° С для асфальтобетонов типа: (13)				
А	9/8	8/7	—	—
Б и В (14)	10/9	9/8	9/8	8/6
Г	14/10	12/9	—	—
Д (15)	—	12/9	10/8	8/6
0° С для горячих смесей всех типов, не более	120	120	120	120
Коэффициент водостойкости, не менее (16)	0,9	0,85	0,8/0,7	0,7/0,6
» » при длительном водонасыщении, не менее (17)	0,85/0,80	0,75/0,60	0,70/0,60	0,60/0,50
Сцепление битума с минеральной частью смеси (18)	Выдерживает			

Notes. 1. The low range of water saturation and static porosity should be maintained in regions with excess moisture content.

2. Indicators for hot asphalt concretes are presented in the numerator and those for warm concretes are presented in the denominator.

3. The strength indicator at T = +50°C increases by 20 percent for asphalt concretes when using crushed stone and by 30 percent when using gravel and sand in road-climatic zones IV and V.

4. The strength indicator at T = 0°C should not exceed 90 kgf/cm^2 in road-climatic zones I and II.

[Key on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Indicators
2. Norms for asphalt concretes of marks
3. Porosity of mineral skeleton, percent by volume
4. For asphalt concretes of type A and B
5. For asphalt concretes of types C and D
6. Residual porosity, percent by volume
7. Water saturation, percent by volume, for asphalt concretes of type
8. B and D
9. V and E
10. Swelling, percent by volume, not more than
11. Compressive strength, kgf/cm^2, not less than, at
12. +20°C for asphalt concretes of all types
13. +50°C for asphalt concretes of type
14. B and V
15. 0°C for hot mixtures of all types, not more than
16. Water-resistance coefficient, not less than
17. Water-resistance coefficient during prolonged water saturation, not less than
18. Adhesion of asphalt to mineral part of mixture
19. Not more than

The water-cement ratio in preparation of the concrete mixture should be not more than 0.5 (0.45 is permissible) for single-layer and the upper layer of two-layer pavements and 0.6 for the lower layer of two-layer pavements.

The mobility of the concrete mixture prior to laying in the pavement should correspond to the data of Table 2.53.

Air-attracting and plasticizing additives indicated in Table 2.54 should be introduced to the concrete mixture to increase the quality of operational resistance and durability of the concrete during its preparation.

The number of additives shown in Table 2.54 should be refined when selecting the compositions of concrete mixtures with regard to the given properties of the concrete and the materials used.

The volume of drawn-in air determined according to GOST 4797-69* should comprise 5-6 percent of the volume of the mixture when using air-attracting additives.

Portland cement, plasticizing, hydrophobic and sulfate-resistant portland cement without mineral additives that meet the requirements of GOST 10178-76 are used for concrete preparation. No more than 10 percent tricalcium aluminate is permissible in the cement. The cement should begin to set no sooner than 2 hours after mixing.

It is recommended that the mark of cement not lower than 500 be used to prepare the concrete used in pavement and not below 300 in beds.

The sand for concrete preparation should be natural or crushed coarse and medium that meets the requirements of GOST 8736-77 and the following additional requirements: size modulus of sand for pavement concrete should be no less than 2 and

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.38. Physicomechanical Properties of Dense Cold Asphalt Concretes

(1) Показатели	Норма для асфальтобетона марок (2)	
	1	2
Пористость минерального остова, % по объему, не более, для асфальтобетона типа: (3) (4)		
Бх	18	18
Вх	20	20
Дх	21	21
Остаточная пористость, % по объему (5)	6—10	6—10
Водонасыщение, % по объему (6)	5—9	5—9
Набухание, % по объему, не более (7)	1,2	2,0
Предел прочности при сжатии, кгс/см², не менее, при температуре +20° С до прогрева: (8)		
водонасыщенного асфальтобетона (9)	11/12	7/8
сухого асфальтобетона (10)	15/17	10/12
после прогрева: (11)		
водонасыщенного асфальтобетона (9)	16/18	10/12
сухого асфальтобетона (10)	18/20	13/15
Коэффициент водостойкости, не менее: (12)		
до прогрева (13)	0,75	0,60
после прогрева (14)	0,90	0,80
Коэффициент водостойкости при длительном водонасыщении, не менее: (15)		
до прогрева (13)	0,50	0,40
после прогрева (14)	0,75	0,65
Слеживаемость по числу ударов, не более (16)	10	10
Сцепление битума с минеральной частью асфальтобетонной смеси (17)	Выдерживает (18)	

Note. The indicators for fine-grained asphalt concretes are presented in the numerator and those for sandy asphalt concretes are presented in the denominator.

Key:
1. Indicators
2. Norm for asphalt concrete of marks
3. Porosity of mineral skeleton, percent by volume, not more than
4. For asphalt concrete of type
5. Residual porosity, percent by volume
6. Water saturation, percent by volume
7. Swelling, percent by volume, not more than
8. Compressive strength, kgf/cm^2, not less than, at +20°C prior to heating
9. Of water-saturated asphalt concrete
10. Of dry asphalt concrete
11. After heating
12. Water-resistance coefficient, not less than
13. Prior to heating

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

14. After heating
15. Water-resistance coefficient with prolonged water saturation, not less than
16. Caking by number of blows, not more than
17. Adhesion of asphalt to mineral part of asphalt concrete mixture
18. Tolerates

Table 2.39. Properties of Porous Asphalt Concretes

Показатели (1)	(2) Норма
Пористость минерального остова, % по объему, не более (3)	24
Остаточная пористость, % по объему (4)	5—10
Водонасыщение, % по объему (5)	3—9
Набухание, % по объему, не более (6)	1,5

Key:
1. Indicators
2. Norm
3. Porosity of mineral skeleton, percent by volume, not more than
4. Residual porosity, percent by volume
5. Water saturation, percent by volume
6. Swelling, percent by volume, not more than

the content of fractions determined by elutriation can be no more than 2 percent by mass in natural sand and 5 percent in crushed sand.

The granular composition of the sand should be in the range shown in Figure 1. Crushed sand for concrete of single-layer and the upper layer of two-layer pavements should be manufactured from igneous, metamorphic and sedimentary rock of mark not below 800 in strength or from gravel with crushability index not above DR-8.

Figure 1. Requirements on Granular Composition of Sand Used to Prepare Airfield Concrete

Key:
1. Total residues on control screens, percent by mass
2. Mesh size of control screens, mm

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.40. Recommended Range of Application of Dense Asphalt Concretes for Airfield Pavement

(1) Дорожно-климатическая зона	(2) Вид асфальтобетонных смесей	(3) ВПП и магистральные рулежные					
		(5) Категории нормативной					
		III		IV		V	
		(6) Марка асфальтобетона	(7) Тип асфальтобетона	Марка асфальтобетона	Тип асфальтобетона	Марка асфальтобетона	Тип асфальтобетона
I	Горячие (8)	I	А, Б, Г	I, II	А, Б, В, Г	II / III	А, Б, В, Г / Б, В
	Теплые (9)	I	А, Б, Г	I, II	А, Б, В, Г	II	А, Б, В, Г
	Горячие	I	А, Б, Г	I, II	А, Б, В, Г	II / III	А, Б, В, Г / Б, В
II,	Теплые	(10) Не применяются				II	А, Б, В, Г
III	(11) Холодные			Не применяются			
	Горячие	I	А, Б, Г	I, II	А, Б, В, Г	II / III	А, Б, В, Г / Б, В
IV,	Теплые	Не применяются				II	А, Б, В, Г
V							
	Холодные			Не применяются			

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.40 (Continued).

дорожки	(4) Прочие участки покрытий аэродрома									
нагрузки	VI		III		IV		V		VI	
	Марка асфальтобетона	Тип асфальтобетона	Марка асфальтобетона	Тип асфальтобетона	Марка асфальтобетона	Тип асфальтобетона	Марка асфальтобетона	Тип асфальтобетона	Марка асфальтобетона	Тип асфальтобетона
	III	Б, В	I, II	А, Б, В, Г	II / III	А, Б, В, Г / Б, В	III	Б, В, Д	IV	Б, В, Д
	III	Б, В	I	А, Б, В, Г	II / III	А, Б, В, Г / Б, В	III	Б, В	IV	Б, В, Д
	III	Б, В	I, II	А, Б, В, Г	II / III	А, Б, В, Г / Б, В	III	Б, В, Д	IV	Б, В, Д
	III	Б, В	Не применяются		II I	А, Б, В, Г Бх, Дх	III I	Б, В Бх, Вх, Дх	IV I, II	Б, В, Д Бх, Вх, Дх
	III	Б, В	I, II	А, Б, В, Г	II / III	А, Б, В, Г / Б, В	III	Б, В	IV	Б, В, Д
	II / III	Б / Б, В	Не применяются		II	А, Б, В, Г	II / III	В / Б, В	IV	Б, В, Д
					I	Ах, Дх	I	Бх, Вх, Дх	I, II	Бх, Вх, Дх

Notes. 1. Cold asphalt concrete mixtures are not used in road-climatic zone I.

2. Asphalt concrete of mark I of types A and B may be used for normative load categories I and II in repair and strengthening of existing rigid pavement.

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Road-climatic zone
2. Type of asphalt concrete mixtures
3. Take-off-landing strips and main taxiways
4. Miscellaneous sections of airfield pavement
5. Normative load categories
6. Mark of asphalt concrete
7. Type of asphalt concrete
8. Hot
9. Warm
10. Not used
11. Cold

Table 2.41. Permissible Error of Proportioning Components of Asphalt Concrete Mixtures

(1) Компоненты	(2) Норма, %, для асфальтобетонов марок	
	I–II	III–IV
Щебень (гравий)(3)	±3	±5
Песок и минеральный порошок (4)	±3	±5
Битум (5)	±1,5	±1,5

Key:
1. Components
2. Norm, percent, for asphalt concretes of marks
3. Crushed stone (gravel)
4. Sand and mineral powder
5. Asphalt

Crushed stone from natural stone, gravel, blast furnace slag rubble and gravel that meet the requirements of GOST 8267-75, GOST 10260-74, GOST 3344-73 and GOST 8268-74*, respectively, are used as coarse filler for concrete. Crushed stone from natural stone and from gravel should usually be employed for concrete of single-layer and the upper layer of two-layer pavements.

The indicators of crushed stone and crushed stone from gravel should meet the requirements of Table 2.55.

The compressive strength of the initial rock in the water-saturated state used to prepare crushed stone should not be less than that indicated in Table 2.56.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.42. Requirements on Temperature of Asphalt Concrete Mixtures

(1) Виды смесей	(2) Марка битума	(3) Температура смесей, °С			
		(4) при выпуске из смесителя		(5) в асфальтоукладчике при укладке в конструктивный слой, не ниже	
		(6) без поверхностно-активных веществ	(7) с поверхностно-активными веществами	без поверхностно-активных веществ	с поверхностно-активными веществами
(8) Горячие	БНД 90/130				
	БНД 60/90				
	БНД 40/60	140—160	120—140	120	100
Теплые (9)	БНД 200/300				
	БНД 130/200	110—130	100—120	80	80
	БГ 70/130				
	СГ 130/200	80—100	80—100	70	70
(10) Холодные	СГ 70/130	90—110	80—100	(11) Не ниже +5° весной	
	МГ 70/130	90—120	80—100	(12) +10° осенью	

Key:
1. Types of mixtures
2. Mark of asphalt
3. Temperature of mixtures, °C
4. Upon release from mixer
5. In asphalt layer when laying in structural layer, not below
6. Without surfactants
7. With surfactants
8. Hot
9. Warm
10. Cold
11. Not below +5° in spring
12. Not below +10° in spring

The largest size of coarse filler for concrete should be:

20 mm for the upper layer of two-layer pavements;

40 mm for single-layer and the lower layer of two-layer pavements;

70 mm for beds.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.43. Recommended Marks of Asphalt as a Function of Conditions of Use and Type of Asphalt Concrete

(1) Вид асфальто-бетонных смесей	Дорожно-климатическая зона (2)								
	I			II и III			IV и V		
	(3) Марка асфальтобетона	(4) Тип асфальтобетона	(5) Марка битума	Марка асфальтобетона	(6) Тип асфальтобетона	Марка битума	Марка асфальтобетона	Тип асфальтобетона	Марка битума
(7) Горячие	I	А, Б, Г	БНД 90/130	I	А, Б, Г	БНД 60/90 БНД 90/130	I	А Б, Г	БНД 40/60 БНД 60/90 БНД 40/60
	II	А, Б, В, Г		II	А, Б, В, Г		II	А, Б, Г	БНД 40/60 БНД 60/90 БНД 40/60
	III	Б, В, Д	БНД 60/90 БНД 90/130	III	Б, В, Д		III	В Б	БНД 40/60 БНД 60/90 БНД 40/60
	IV	Б, В, Д		IV	Б, В, Д			В	БНД 40/60 БНД 60/90
							IV	Б В, Д	БНД 40/60 БНД 40/60 БНД 60/90
(8) Теплые	I	А, Б, Г	БНД 130/200	II	А, Б, В, Г	БНД 130/200	II	А, Б, В, Г	БНД 130/200
	II	А, Б, В, Г	БНД 200/300	III	Б, Б	БНД 200/300	III	Б, В	БНД 200/300
	III	Б, В	БГ 70/130	IV	Б, В, Д	БГ 70/130	IV	Б, В, Д	БГ 70/130
	IV	Б, В, Д	СГ 130/200			СГ 130/200			СГ 130/200
Холодные (9)	(10) Не применяются			I	Бх, Вх, Дх	СГ 70/130	I	Бх, Вх, Дх	СГ 70/130
				II	Бх, Вх, Дх	СГ 70/130 МГ 70/130	II	Бх, Вх, Дх	СГ 70/130 МГ 70/130

Key:

1. Type of asphalt concrete mixtures
2. Road-climatic zone
3. Mark of asphalt concrete
4. Type of asphalt concrete
5. Mark of asphalt
6. And
7. Hot
8. Warm
9. Cold
10. Not used

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.44. Requirements on Crushed Stone and Gravel of Asphalt Concrete Used for Lower Layers of Pavements and Beds

(1) Показатели	Нижний слой покрытия (2)		(3) Основания	
	(4) Категория нормативной нагрузки			
	(5) III и IV	V и VI	III и IV	V и VI
(6) Марка щебня из изверженных и метаморфических горных пород по прочности при раздавливании в цилиндре, не менее	800	800	600	600
(7) То же, для щебня из осадочных пород, не менее	600	600	400	300
(8) Класс щебня из металлургического шлака	3	4	4	4
(9) Марка щебня из гравия или гравия, не менее	Др.12	Др.16	Др.16	Др.24
(10) Износ (потеря в массе при истирании в полочном барабане), %, не более:				
для щебня из естественного камня всех горных пород (11)	45	60	60	60
для гравия и щебня из гравия (12)	30	40	40	50
(13) Количество дробленых зерен в щебне из гравия, % по массе, не менее	80	70	70	50
(14) Количество циклов при испытании на морозостойкость в климатических условиях:				
суровых и умеренных (15)	25	25	25	25
мягких (16)	15	15	15	15

Notes. 1. Uncrushed gravel is not permitted in mixtures for the lower layer of pavement for normative load category III and IV.

2. The use of sedimentary carbonate rock of mark 400 is permissible in mixtures intended for installation of the lower layer of pavement for load categories V and VI provided the asphalt mixture is first treated with anion type surfactants. The use of sedimentary carbonate rock of mark 300 is permissible under the same conditions in mixtures intended for installation of beds for load categories III and IV and the use of mark 200 is permissible for load categories V and VI.

Key:

1. Indicators
2. Lower layer of pavement
3. Of bed
4. Normative load category

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

5. And
6. Mark of crushed stone from igneous and metamorphic rock by strength upon crushing in cylinder, not less than
7. Mark for crushed stone from sedimentary rock, not less than
8. Class of rubble from metallurgical slag
9. Mark of crushed stone from gravel or gravel, not less than
10. Wear (losses in mass during wear in shelved drum), percent not more than
11. For crushed stone from natural stone of all rock
12. For gravel and crushed stone from gravel
13. Number of crushed grains in crushed stone from gravel, percent by mass, not less than
14. Number of cycles when testing for cold resistance under climatic conditions
15. Severe and moderate
16. Mild

Crushed stone and gravel should be divided into the following two fractions with subsequent individual proportioning of them:

	D_{naib}, mm
5-10 and 10-20 mm	20
5-20 and 20-40 mm	40
5-40 and 40-70 mm	70

The granulometric composition of each fraction or of mixtures of several fractions of crushed stone or gravel should be in the range presented below.

Mesh size of control screens, mm	D_{naim}	$0.5(D_{naim} + D_{naib})$	D_{naib}	$1.25D_{naib}$
Total residue on screens in percent by mass	95-100	40-70	0-5	0

Water suitable for drinking can be used to wash the fillers and to prepare the concrete mixture without preliminary investigation. Water with soluble salt content in it greater than 5,000 mg/liter and SO_4 ion content greater than 2,700 mg/liter may not be used. The pH value should not be less than 4.

High-strength concrete. The surface layer of the concrete of airfield pavements undergoes intensive effects of different factors during operation such as loads from aircraft wheels, the gas-air jets of jet engines, climatic factors and so on. The practice of operating rigid pavements shows that frequently the reason for capital repairs of pavements is breakdown of the surface layer of the concrete (peeling, separation and knocking off the edges of slabs).

An effective method of increasing the operational qualities and durability of rigid airfield pavement is to use to high-strength concrete 6-7 cm thick in the upper layer. High-strength concrete of two types is used: that based on portland cement and that based on expansible cements.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.45. Requirements on Crushed Stone and Gravel of Asphalt Concretes Used to Install Upper Layer of Pavement

(1) Показатели	(2) Нормы для горячих и теплых асфальтобетонных смесей марок										(3) Нормы для холодных асфальтобетонных смесей марок			
	I			II			III		IV		I		II	
	Тип асфальтобетона (4)										(5) Тип асфальтобетона			
	А	Б	В	А	Б	В	Б	В	Б	В	Бх	Вх	Бх	Вх
(6) Марка щебня из изверженных и метаморфических пород по прочности при раздавливании в цилиндре, не менее	1200	1200	1000	1000	1000	800	800	800	800	600	1000	800	800	600
То же, для щебня из осадочных карбонатных пород, не менее (7)	—	—	1000	—	800	600	800	600	600	300	800	600	800	600
То же, для щебня из остальных осадочных пород, не менее (8)	1000	1000	800	1000	800	600	800	600	600	300	800	600	800	600
Класс щебня из металлургического шлака (9)	—	1	2	2	2	3	3	3	3	4	1	2	2	3
Марка щебня из гравия (10)	—	Др.8	Др.12	Др.8	Др.12	Др.12	Др.12	Др.16	Др.16	Др.24	Др.8	Др.12	Др.12	Др.16
Марка гравия (11)	—	—	—	—	—	—	Др.12	Др.16	Др.16	Др.16	—	—	Др.12	Др.16
(12) Износ (потеря в массе при истирании в полочном барабане), % по массе, не более: (13) для щебня из изверженных и метаморфических пород	25	25	35	35	35	45	45	45	45	45	35	45	45	55

[Continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.45 (Continued).

Показатели	Нормы для горячих и теплых асфальтобетонных смесей марок										Норма для холодных асфальтобетонных смесей марок			
	I			II			III		IV		I		II	
	Тип асфальтобетона										Тип асфальтобетона			
	А	Б	В	А	Б	В	Б	В	Б	В	Бх	Вх	Бх	Вх
для щебня из осадочных карбонатных пород (14)	—	—	25	—	35	45	35	45	45	55	35	45	35	45
для щебня из остальных осадочных пород (15)	25	25	35	25	35	45	35	45	45	55	35	45	35	45
для щебня из гравия (16)	—	20	30	20	30	40	30	40	40	50	20	30	30	40
для гравия (17)	—	—	—	—	—	—	30	40	40	50	—	—	30	40
Количество дробленых зерен в щебне из гравия, % по массе, не менее (18)	—	100	80	100	80	70	80	60	70	50	100	80	80	80
Количество циклов при испытании на морозостойкость в климатических условиях: (19)														
суровых и умеренных (20)	50	50	50	50	50	25	25	25	25	25	50	50	50	25
мягких (21)	25	25	25	25	25	15	15	15	15	15	25	25	25	15

Notes. 1. Mild climatic conditions are characterized by average monthly temperature of coldest month to -5°C and moderate and severe conditions are characterized by lower temperature.

2. The use of sedimentary carbonate rock of mark 400 is permissible for mark IV of asphalt concrete of type B and also for mark III of asphalt concrete of type C provided they are first treated with a mixture of asphalt and anion type surfactants.

Key:
1. Indicators
2. Norms for hot and warm asphalt concrete mixtures of marks
3. Norms for cold asphalt concrete mixtures of marks

[Key continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

4. Type of asphalt concrete
5. Type of asphalt concrete
6. Mark of crushed stone from igneous and metamorphic rock by strength during crushing in a cylinder, not less than
7. Mark for crushed stone from sedimentary carbonate rock, not less than
8. Mark for crushed stone from remaining sedimentary rock, not less than
9. Class of rubble from metallurgical slag
10. Mark of crushed stone from gravel
11. Mark of gravel
12. Wear (loss in mass during wear in shelved drum), percent by mass, not more than
13. For crushed stone from igneous and metamorphic rock
14. For crushed stone from sedimentary carbonate rock
15. For crushed stone from remaining sedimentary rock
16. For crushed stone from gravel
17. For gravel
18. Number of crushed grains in crushed stone from gravel, percent by mass, not less than
19. Number of cycles when testing for cold resistance under climatic conditions
20. Severe and moderate
21. Mild

Table 2.46. Maximum Norms of Dusty and Clay Particle Content in Crushed Stone (Gravel)

(1) Назначение асфальтобетонных смесей	Содержание пылевидных и глинистых частиц, % по массе, не более (2)	
	(3) из осадочных карбонатных пород	из изверженных, метаморфических и остальных осадочных пород (4)
(5)		
Горячие и теплые смеси для нижнего и верхнего слоя покрытий марок:		
I (6) и II	2	1
III и IV	3	2
Холодные смеси марок: (7)		
I	2	1
II	3	2
Горячие и теплые смеси для оснований (8)	4	3

Key:
1. Designation of asphalt concrete mixtures
2. Content of dusty and clay particles, percent by mass, not more than
3. From sedimentary carbonate rock
4. From igneous, metamorphic and remaining sedimentary rock

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

5. Hot and warm mixtures for lower and upper layer of pavement of marks
6. And
7. Cold mixtures of marks
8. Hot and warm mixtures for beds

Table 2.47. Requirements on Mineral Powders from Powdery Industrial Wastes

(1) Показатели	(2) Норма по видам порошка		
	(3) Основные металлургические шлаки и некарбонатные горные породы	(4) Зола уноса ТЭЦ	(5) Пыль уноса цементных заводов
(6) Зерновой состав, % по массе, не менее:			
мельче 1,25 мм (7)	100	100	100
» 0,315 »	90	55	90
» 0,071 »	70	35	70
Пористость, % по объему, не более (8)	35	45	45
Набухание образцов из смеси минерального порошка с битумом, % по объему, не более (9)	2,5	Не нормируется (10)	2,5
Коэффициент водостойкости образцов из смеси порошка с битумом (11)	Не нормируется	0,6	0,8
Показатель битумоемкости, г/100 см³ (абсолютного объема), не более (12)	То же (10)	100	100
Содержание водорастворимых соединений, % по массе, не более (13)	»	1	6
Влажность, % по массе, не более (14)	1,0	2,0	2,0
Содержание окислов щелочных материалов ($MgO - K_2O$), % по массе, не более (15)	Не нормируется	Не нормируется	6
Потери при прокаливании, % по массе, не более (16)	То же	20	Не нормируется

Notes. 1. The use of not less than 60 percent mineral powders with particle content finer than 0.071 mm is permissible in mixtures of mark IV
2. Porosity, water-resistance coefficient and specific asphalt content of ash-slag mixtures from thermoelectric power plants are determined for the part which passes through the screen with size 0.315 mm.
3. The specific asphalt index is determined only when the suitability of new material (rock) is established for preparation of mineral powder.

Key:
1. Indicators
2. Norms for types of powder
3. Basic metallurgical slags and noncarbonate rock
4. Waste ashes of TETs
5. Waste dust of cement plants
6. Granular composition, percent by mass, not less than
7. Finer than 1.25 mm
8. Porosity, percent by volume, not more than

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

9. Swelling of specimens of mineral powder-asphalt mixture, percent by volume, not more than
10. Nor normalized
11. Water resistance coefficient of specimens of powder-asphalt mixture
12. Index of specific asphalt content, g/100 cm^3 (absolute volume), not more than
13. Content of water-soluble compounds, percent by mass, not more than
14. Moisture content, percent by mass, not more than
15. Content of oxides of alkali materials ($MgO-K_2O$), percent by mass, not more than
16. Losses during crushing, percent by mass, not more than

The mark of concrete not below 60 in tensile bending strength is used. The compressive strength of concrete aged 28 days should not be less than 400 kgf/cm^2 and the cold resistance should not be below 200.

The cement consumption is established by selection of the concrete composition. It can initially be taken at 340-360 kg/m^3 for portland cement of mark 600 and 360-380 kg/m^3 for portland cement of mark 500 and expanding cements. It is recommended that a water-cement ratio in the range of 0.33-0.38 be used.

The stiffness of the concrete mixture should not be less than 40 s according to a commercial viscosimeter immediately after pouring from the concrete mixture and in the range of 60-100 s at the point where it is laid for pavement. The stiffness of the mixture can be used according to Table 2.57 for preliminary selection of the concrete composition.

Plasticizing additives, the approximate amount of which is presented in Table 2.58, must be introduced to the concrete mixture to ensure the required stiffness.

The following are used as binder for high-strength concrete:

portland cement of marks 600 and 500 that meet the requirements of GOST 10178-76;

expanding portland cement (RPTs) of marks 400 and 500 corresponding to the requirements of SNiP I-V2-69 "Inorganic binders and additives for concretes and mortars" and "Recommendations on concrete work using expanding cements" (VNIIST, Moscow, 1970);

stressed cement (NTs) with low self-stress energy that satisfies TU 21-20-18-74 in material composition.

Expanding portland cement is produced by joint fine pulverization of portland cement clinkers, high-alumina blast furnace slags, granulated blast furnace slag or active hydraulic additive, gypsum and lime.

Stress cement is produced by fine joint pulverization of portland cement clinkers, alumina slag and gypsum.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 2.48. Properties of Highway Asphalts

(1) Показатели	Нормы по маркам (2)									(3) Метод испытания
	БНД 200/300	БНД 130/200	БНД 90/130	БНД 50/90	БНД 40/60	БН 200/300	БН 130/200	БН 90/130	БН 60/90	
Глубина проникания иглы: (4) а) при 25° С (5)	201—300	131—200	91—130	61—90	40—60	201—300	131—200	91—130	60—90	(14) По ГОСТ 11501—78
б) при 0° С, не менее (6)	45	35	28	20	13	—	—	—	—	
Температура размягчения по кольцу и шару, °С, не ниже (7)	35	39	43	47	51	33	37	40	45	По ГОСТ 11506—73
Растяжимость, см: (8) а) при 25° С (5)	—	65	60	50	40	—	70	60	50	По ГОСТ 11505—75
б) при 0° С (9)	20	6	4,2	3,5	—	—	—	—	—	
Температура хрупкости, °С, не выше (10)	—20	—18	—17	—15	—10	—	—	—	—	По ГОСТ 11507—78
Температура вспышки, °С, не ниже (11)	200	220	220	220	220	200	220	220	220	По ГОСТ 4333—48
Сцепление с мрамором или песком (12)	(13) Выдерживает по контрольному образцу № 2					—	—	—	—	(15) По ГОСТ 11508—74, метод А
Изменение температуры размягчения после прогрева, °С, не более (16)	8	7	6	6	6	8	7	6	6	По ГОСТ 19180—72 и ГОСТ 11506—73 с (17) дополнением по п. 3.2 настоящего стандарта
Индекс пенетрации (18)	(19) Плюс 1 — минус 1					(20) Плюс 1 — минус 1,5				По справочному приложению к настоящему (21) стандарту
Содержание водорастворимых соединений; % не более (22)	0,2	0,2	0,3	0,3	0,3	—	—	—	—	По ГОСТ 11510—65*

Key:

1. Indicators
2. Norms by marks
3. Method of testing
4. Depth of indenter penetration
5. At 25°C
6. At 0°C, not less than
7. Softening temperature through ring and sphere, °C, not less than
8. Expansibility
9. At 0°C
10. Brittleness temperature, °C, not above
11. Flashpoint, °C, not below

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

12. Adhesion to marble or sand
13. Tolerates by control specimen No 2
14. According to
15. According to GOST 11508-74, method A
16. Variation of softening temperature after heating, °C, not more than
17. According to GOST 19180-72 and GOST 11506-73 with supplementation by section 3.2 of this standard
18. Penetration index
19. +1—-1
20. +1—-1.5
21. According to reference appendix to this standard
22. Content of water-soluble compounds, percent, not more than

Table 2.49. Requirements on Asphalts of Marks BG

Показатели (1)	(2) Нормы для марок			(3) Методы испытаний
	БГ 25/40	БГ 40/70	БГ 70/100	
(4) Условная вязкость по вискозиметру с отверстием 5 мм при 60°С, с	25—40	41—70	71—130	ГОСТ 11503—74
(5) Количество испарившегося разжижителя при выдерживании битума в термостате (60° С, 5 ч) или в вакуумтермостате (100° С, 1 ч), % от массы битума, не менее	8	7,5	7	ГОСТ 11504—73
(6) Температура размягчения остатка после определения количества испарившегося разжижителя, °С, не ниже	33	33	37	ГОСТ 11506—73
(7) Температура вспышки в открытом тигле, °С, не ниже	37	37	37	ГОСТ 4333—48
(8) Испытание на сцепление с мрамором или песком	(9) Выдерживает в соответствии с контрольным образцом № 2			ГОСТ 11508—74 по методу Б (10)

Key:

1. Indicators
2. Norms for marks
3. Test methods
4. Specific viscosity according to viscosimeter with opening of 5 mm at 60°C, s
5. Amount of evaporated liquefying agent during aging of asphalt in thermostat (60°C, 5 hr) or in a vacuum thermostat (100°C, 1 hour), percent of asphalt mass, not less than

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

6. Softening temperature of residue after determination of amount of evaporated liquefying agent, °C, not lower than
7. Flashpoint in open crucible, °C, not lower than
8. Testing for adhesion to marble or sand
9. Aged according to control specimen No 2
10. By method B

Table 2.50. Requirements on Asphalts of Marks SG

(1) Показатели	(2) Нормы для марки				(3) Методы испытаний
	СГ 25/40	СГ 40/70	СГ 70/130	СГ 130/200	
(4) Условная вязкость по вискозиметру с отверстием 5 мм при 60° С, с	25—40	41—70	71—130	131—200	ГОСТ 11503—74
(5) Количество испарившегося разжижителя при выдерживании битума в термостате (100° С, 3 ч) или в вакуумтермостате (100° С, 2 ч), % от массы битума, не менее	12	10	8	7	ГОСТ 11504—74
(6) Температура размягчителя остатка после определения количества испарившегося разжижителя, °С, не ниже	34	37	39	39	ГОСТ 11506—73
(7) Температура вспышки в открытом тигле, °С, не ниже	40	45	50	60	ГОСТ 4333—48
(8) Испытание на сцепление с мрамором или песком	(9) Выдерживает в соответствии с контрольным образцом № 2				ГОСТ 11508—74 по методу Б

Key:

1. Indicators
2. Norms for marks
3. Test methods
4. Specific viscosity according to viscosimeter with opening of 5 mm at 60°C, s
5. The amount of evaporated liquefying agent during aging of asphalt in thermostat (100°C, 3 hr) or in a vacuum thermostat (100°C, 2hr), percent of asphalt mass, not less than
6. Softening temperature of residue after determination of amount of evaporated liquefying agent, °C, not lower than
7. Flashpoint in open crucible, °C, not lower than
8. Testing for adhesion to marble or sand
9. Aged according to control specimen No 2
10. By method B

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.51. Requirements on Asphalts of Marks MG

(1) Показатели	Нормы для марок (2)				(3) Методы испытаний
	МГ 25/40	МГ 40/70	МГ 70/130	МГ 130/200	
(4) Условная вязкость по вискозиметру с отверстием 5 мм при 60° С, с	25—40	41—70	71—130	130—200	ГОСТ 11503—74
(5) Количество испарившегося разжижителя при выдерживании битума в термостате (110° С, 5 ч) или в вакуумтермостате (100° С, 3 ч), % от массы битума, не менее	9	8	7	5	ГОСТ 11504—73
(6) Температура размягчения остатка после определения количества испарившегося разжижителя, °С, не ниже	27	28	29	30	ГОСТ 11506—73
Температура вспышки в открытом тигле, °С, не ниже (7)	100	100	110	110	ГОСТ 4333—48
Испытание на сцепление с мрамором или песком (8)	(9) Выдерживание в соответствии с контрольным образцом № 2				ГОСТ 11508—74 по методу Б

Key:
1. Indicators
2. Norms for marks
3. Test methods
4. Specific viscosity according to viscosimeter with opening of 5 mm at 60°C, s
5. The amount of evaporated liquefying agent during aging of asphalt in thermostat (110°C, 5 hr) or in a vacuum thermostat (100°C, 3 hr), percent of asphalt mass, not less than
6. Softening temperature of residue after determination of amount of evaporated liquefying agent, °C, not lower than
7. Flashpoint in open crucible, °C, not lower than
8. Testing for adhesion to marble or sand
9. Aged according to control specimen No 2
10. By method B

The ultimate strength of standard specimens aged 28 days should not be less than that indicated in Table 2.59.

The requirements placed on sand used to prepare high-strength concrete are the same as for ordinary concrete.

Crushed stone from igneous rock with strength not below 1,200 kgf/cm^2 of 5-10 mm fraction, produced by secondary crushing of 10-20 mm fraction, should be used as

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.52. Requirements on Cold Resistance Mrz of Concrete and Coarse Filler

(1) Назначение бетона	(2) Среднемесячная температура в зиуха наиболее холодного месяца, °С	(3) Морозостойкость	
		(4) бетона не ниже	(5) крупного заполнителя, не ниже
(6) Для однослойных и верхнего слоя двухслойных покрытий	(7) (8) От 0 до —5	100	50
	» —5 » —15	150	100
	(9) Ниже —15	200	150
Для нижнего слоя двухслойных покрытий (10)	От 0 до —5	50	25
	» —5 » —15	50	50
	Ниже —15	100	100
Для оснований (11)	От 0 до —5	25	15
	Ниже —5	50	25

Key:
1. Designation of concrete
2. Average monthly air temperature of coldest month, °C
3. Cold resistance
4. Of concrete, not lower than
5. Of coarse filler, not lower than
6. For single-layer and upper layer of two-layer pavements
7. From
8. To
9. Below
10. For lower layer of two-layer pavements
11. For beds

Table 2.53. Requirements on Mobility of Concrete Mixture

Method of Concreting	Mobility, cm
By rail-travel complex of machines	1-2
By railless complex of machines at concrete-layer speed, m/min:	
up to 2	1-3
2-2.5	2-4
2.5-3	3-5
By small mechanization equipment	3-4

coarse filler. The use of crushed 10-20 mm fraction is permissible to supplement 5-10 mm fraction. The ratio of fractions in this case is established by the maximum volumetric mass of the mixture of two fractions. The content of particles determined by elutriation should not be greater than 0.5 percent, including 0.25 percent clay particles. Organic impurities are not permitted. The content of grains of scale and needle shape should not exceed 15 percent by mass.

The cold resistance of crushed stone should be no lower than 200.

It is recommended that syrup (SP)--molasses--be used as a plasticizing additive to the concrete mixture manufactured from portland cement and one can also use

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.54. Types and Approximate Consumption of Surfactants

Surfactants	GOST, MRTU and TU	Amount of Additives of Cement Mass, percent	Remarks
Air-attracting:			
sodium abietate (SNB resin)	TU 81-05-75-69	0.01-0.025	Calculated for dry matter
TsNIPS-1	VTU-GAKh-30-50	0.01-0.05	"
Naphthanate soap	GOST 13302-77	0.05-0.08	Calculated for commercial naphthanate soap solution
Plasticizing:			
sulfite-alcohol distillery grains	---	0.15-0.25	Calculated for dry distillery grains
sulfite-yeast grains	MRTU 13-04-35-66	0.15-0.25	
Gas-liberating plasticizing GKHz-94	GOST 10834-76	0.1-0.2	

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.55. Requirements on Crushed Stone and Crushed Stone from Gravel

Indicators	Designation of Crushed Stone and Crushed Stone from Gravel: For Concrete of Single-Layer and Upper Layer of Two-Layer Pavements	For Concrete of Lower Layer of Two-Layer Pavements
Content of particles determined by elutriation, percent by mass, not more than	1.0	1.0
Content of grains of scale (slab) and needle shape, percent by mass	25	--
Content of grains of soft rock, percent by mass	7	10
Loss in mass after testing in shelved drum:		
of igneous rock	25	45
of sedimentary rock	40	45
of gravel	30	45

Table 2.56. Requirements on Strength of Rock Used to Prepare Crushed Stone

	Strength of Rock, kgf/cm^2: Of Igneous	Sedimentary
For single-layer and upper layer of two-layer pavements	1,200	200
For lower layer of two-layer pavements	800	600
For beds	800	300

mixtures of syrup and sulfide-yeast grains and syrup and sulfide-alcohol distillery grains.

A setting retardant--boric acid, which should be used in combination with SP, SSB, SDB, PEI, SP + PEI and SDB + PEI (see Table 2.58)--must be introduced to the concrete mixture prepared on expanding and stress cements.

The composition of the concrete mixture for high-strength concrete is selected from achieving given tensile bending strength, mark by cold resistance and optimum ease of laying with minimum consumption of cement.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.57. Approximate Stiffness of Concrete Mixture

(1) Температура наружного воздуха при бетонировании, °С	(2) Продолжительность транспортирования смеси, мин	Жесткость смеси, с (3)	
		(4) на заводе	(5) на месте укладки
5—10	(6) До 20	60—80	60—100
10—15		60—80	60—100
15—20		60—70	60—100
20—25		50—70	60—80
25—30		40—60	60—80
5—10	21—30	60—80	60—100
10—15		60—70	70—100
15—20		50—70	70—100
20—25		40—50	60—80
25—30		40—50	60—80
5—10	31—45	60—80	70—100
10—15		60—80	70—100
15—20		50—70	70—100
20—25		40—60	60—80
25—30		40—50	60—70

Key:
1. Ambient air temperature during concreting, °C
2. Length of transporting mixture, min
3. Stiffness of mixture, s
4. At plant
5. At point of laying
6. Up to

Table 2.58. Plasticizing Additives

Type of Additives	Normative Document	Amount of Additives of Cement Mass, percent	Remarks
Plasticizing and setting retarders:			
sulfite-alcohol distillery grains (SSB)		0.15-0.25	Calculated for dry matter
sulfite-yeast grains (SDB)	MRTU 13-04-35-66	0.15-0.25	"
sulfite-molasses grains (SP)	TU 18-409-71	0.20-0.30	"
Setup retardant--boric acid (BK)	GOST 18704-78	0.8-1.2	"
Texture-forming--polyethylamine (PEI)	MRTU 6-02-422-74	0.8-1.2	Calculated for product with molecular weight of 10,000

The mixture, like that for ordinary cement, is selected in three stages: theoretical calculation, laboratory check and correction and treatment of the composition under production conditions.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.59. Strength of Specimens

(1) Марка цемента	(2) Предел прочности в возрасте 28 сут, кгс/см²	
	(3) при сжатии	(4) при изгибе
	(5) Образцы из РПЦ	
400	400	55
500	500	60
600	600	65
	(6) Образцы из НЦ	
400	400	60
500	500	65

Key:
1. Mark of cement
2. Strength, aged 28 days, kgf/cm^2
3. Compressive strength
4. Bending strength
5. Specimens of RPTs
6. Specimens of NTs

2.8. Materials for Sealing Expansion Joints of Rigid Pavement

Based on the designation and operating conditions, sealing materials that fill expansion joints of rigid airfield pavement should be sufficiently heat-resistant, deformative and elastic over a wide temperature range. Rubber-asphalt binders (RBV), polymer-asphalt mastics (PBM) and thiokol sealers are now used to fill joints.

Rubber-asphalt binder is a mixture of asphalt, rubber chips, indene, coumarone resins, AK-15 oil and P-200 polyisobutylene, prepared under plant conditions by heat treatment and plastification. RBV of three marks--RBV-25, RBV-35 and RBV-50--is used.

The RBV compositions are presented in Table 2.60 and the indices of the physico-mechanical properties and the recommended range of application are presented in Table 2.61.

RBV is heated in asphalt boilers to 180-200°C prior to use, the length of heating should not exceed two hours and the viability of RBV is one hour.

Polymer-asphalt mastics (PBM) are prepared on a base of water-insulating heat and cold-resistant asphalt (plastbit) that meet the requirements of TU 38-1253-69.

Polymer-asphalt mastics are manufactured in two marks--PBM-1 and PBM-2. The compositions of the mastics are presented in Table 2.62.

PBM-1 mastic is used in road-climatic zones II-IV and PBM-2 is used in zones I-IV.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.60. Compositions of Rubber-Asphalt Binders

(1) Составляющие	(2) ГОСТ или ТУ	(3) Состав, % по массе		
		РБВ-25	РБВ-35	РБВ-50
(4) Битум БН-IV	ГОСТ 6617—76	68	63	63—58
Резиновая крошка (5)	ТУ 38-10436—70	20	20	15
Инден-кумароновая смола (6)	—	5	5	5
Масло АК-15 (7)	—	7	7	7
Полиизобутилен П-200 (8)	ГОСТ 13303—67			

Key:
1. Components
2. GOST or TU
3. Composition, percent by mass
4. BN-IV asphalt
5. Rubber chips
6. Indene-coumarone resin
7. AK-15 oil
8. P-200 polyisobutylene

Table 2.61. Physicomechanical Properties and Range of Application of RBV

(1) Показатели физико-механических свойств и область применения	(2) Марка резино-битумного вяжущего		
	РБВ-25	РБВ-35	РБВ-50
(3) Температура размягчения, °С, не более	160	150	160
(4) Температуроустойчивость, °С, не ниже	160	160	160
(5) Температура хрупкости по Фраасу, °С, не менее	25	35	50
(6) Сцепление с бетоном, кгс/см², не менее	5	5	5
(7) Рекомендуемая область применения (дорожно-климатическая зона)	IV—V	(8) I и II при длине плит до 7 м; III, IV при длине плит до 7 м; III и IV при длине плит до 20 м	

Key:
1. Indicators of physicomechanical properties and range of application
2. Mark of rubber-asphalt binder
3. Softening temperature, °C, not more than
4. Temperature stability, °C, not lower than
5. Fraas brittleness temperature, °C, not less than
6. Adhesion to concrete, kgf/cm^2, not less than
7. Recommended range of application (road-climatic zone)
8. I and II with slab length up to 7 meters; III and IV with slab length up to 7 meters; III and IV with slab length up to 20 meters

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.62. Compositions of Polymer-Asphalt Mastics

(1) Компоненты	Состав, % по массе (2)	
	ПБМ-1	ПБМ-2
Битум гидроизоляционный тепломорозостойкий (3) (пластбит)	70	70
Битум БНД 40/60 (БНД 60/90) (4)	30	—
15%-ный раствор дивинилстирольного термоэластопласта (ДСТ) в растворителе (5)	13	15
Минеральный порошок или асбестовая крошка (6)	25	35

Key:
1. Components
2. Composition, percent by mass
3. Water-insulating heat- and cold-resistant asphalt (plastbit)
4. BND 40/60 (BND 60/90) asphalt
5. 15 percent divinylstyrene thermosetting plastic solution (DST) in solvent
6. Mineral powder or asbestos chips

The procedure for preparation of polymer-asphalt mastics is as follows:

the DST is dissolved in a solvent, xylene or naphtha at 18-20°C, 3-4 days prior to preparation;

plasbit is melted in a boiler at 140°C. The melted plastbit for PBM-1 mastic is mixed with BND 40/60 or BND 60/90 asphalt heated to 120°C;

the dissolved DST is introduced with constant mixing to the melted plastbit or a mixture of it with asphalt with the burner of the boiler extinguished;

the mixture is heated to 140°C and held for 3-4 hours until the light fractions of the solvent are completely driven off, mineral powder or asbestos chips are introduced to it with careful mixing and it is boiled for 30 minutes, producing a homogeneous mass--finished mastic;

the finished mastic is poured into metal moulds and briquettes are produced after cooling.

Thiokol sealers are produced on the basis of liquid thiokol-polysulfide polymers (GOST 12812-72*). The most effective for filling the expansion joints of airfield pavement are Gidrom thiokol sealers whose physicomechanical indicators are presented in Table 2.63.

These sealers can be used to fill joints in all road-climatic zones.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 2.63. Physicomechanical Indicators of Gidrom Thiokol Sealers

Показатели (1)	(2) „Гидром-1"	(3) „Гидром-2"
Температура размягчения, °C, не более (4)	220	180
Температуроустойчивость, °C, не ниже (5)	250	210
Температура хрупкости по Фраасу, °C, не менее (6)	—80	—60
Сцепление с бетоном, кгс/см², не менее (7)	12	8

Key:
1. Indicators
2. Gidrom-1
3. Gidrom-2
4. Softening temperature, °C, not more than
5. Temperature stability, °C, not below
6. Fraas brittleness temperature, °C, not less than
7. Adhesion to concrete, kgf/cm^2, not less than

Thiokol sealers are prepared by mixing the components in special forced mixers immediately prior to filling the joints.

The ambient air temperature should be above 0°. PM-15 soot is initially introduced with continuous mixing until a homogeneous mass is achieved and hardening paste No 30 is then introduced to V-30 sealing paste. Coal tar is introduced to the sealing paste prior to the addition of soot when preparing Gidrom-2 sealer.

The viability of thiokol sealers is 2-8 hours.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 3. PREPATORY WORK AND EXCAVATION TO CONSTRUCT THE FLYING FIELD

[Text] 3.1. Preparatory Work and Vegetation Removal

Preparatory work includes preparation and development of the construction area (Table 3.1) and can be performed only after the airfield design has been transferred to the terrain (Table 3.2).

Vegetation-laden soil is cut prior to installation of recesses and embankments and is subsequently used to create a firm cover over the entire soil area of the flying field. The thickness of the cut layer of soil is taken from Table 3.3.

When working with vegetation-laden soil one must clean sections of stones on which work with vegetation-laden soil must be carried out, avoid mixing the vegetation-laden soil to be cut and to be restored with underlying layers of soil; the removed vegetation-laden soil is cleaned of roots, tree branches and forest floor litter; the natural moisture content of the vegetation-laden soil is retained when it is removed and piled up.

The methods of working with vegetation-laden soil are presented in Table 3.4.

The final operations of any of the indicated methods are grading and rolling of the filled-in layer of soil.

3.2. Excavation of Channels

Requirements on excavation of channels. Excavation of a channel is begun after removal of the vegetation-laden soil. The channel is excavated without reaching the planned mark to the depth determined by control packing.

Deep channels are excavated in two phases:

during the first phase excavation does not reach the planned mark by 8-10 cm to avoid excess digging into the soil;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.1. Work Performed During Preparatory Period

Name of Work	Composition and Sequence of Work and Method of Performing It
Cleaning area of bushes and small trees	Preliminary inspection of the area subject to cleaning, removal of large stones, large-diameter stumps and trees more than 30 cm in diameter, cutting off humps, filling holes, ditches and so on. Cutting bushes, very small and small trees up to 20 cm in diameter and separately standing trees up to 30 cm in diameter with brush hogs. Raking cut bushes and removing them beyond the cleaned area with brush rakes, stump removers-gatherers or rippers. Cleaning the area of roots and small stumps with a bulldozer with teeth or stump pullers-collectors.
Cleaning area of trees	Cutting bushes and small trees. Dividing the section into individual strips (divisions) 50-100 meters wide. Installing straight and main paths (portages) for transportation of removed trees. Felling of trees. Cutting or sawing of brush at tree-felling site. Collection and cutting of brush beyond section to be cleaned or felling and burning it at the collection site. Cutting (finishing) of branches (performed at the felling site or on a previously selected site). Trimming of trees--moving timber from production section to temporary storate area or site for loading onto transport equipment.
Uprooting of stumps	Performed by mechanical method: by using stump pullers with stump diameter up to 45 mm, using bulldozers with stump diameter up to 40 cm, using tractor stump-remover--winches with stump diameter from 40 to 70 cm; by explosive method usually in winter season. After pulling, the stumps are removed beyond the section to be cleaned.
Removal of stumps	Removal of stones up to 2.5 m^3 in volume partially embedded in soil with bulldozers, stump removers-collectors and by tractor. Stones more than 2.5 m^3 in volume are pulverized by explosives. Small stones are collected into a pile with bulldozers or stump pullers-collectors for subsequent removal. The stones are moved (to a distance up to 150 meters) by the same machinery which was used to remove the stones from the soil and using special accessories (PEN, sleds or tractor trailers) and dump trucks.

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.1 (Continued).

Name of Work	Composition and Sequence of Work and Method of Performing It
Breaking or demolishing of old pavement	Pavement of precast slabs is assembled with subsequent use of it to install parking areas for trucks and transportation equipment inside airfield roads and other purposes. Crushed stone and gravel surfaces are broken and pulverized with rippers. Asphalt concrete pavement is broken with bulldozers with steel teeth on the blade, heavy rippers, scarifiers, concrete breakers and also with pneumatic or electric tools. Cement-concrete pavement is broken by mechanical methods.
Removal and transfer of structures and engineering systems	Buildings and structures are moved only if an area has been prepared for them on a new site beforehand. Communications lines and electric power transmission lines are disassembled and removed after the corresponding coordination and without interrupting their operation.
Preliminary drainage of construction sections	Carried out in cases when the section is superwet or swampy and it must be preliminarily drained by creating a temporary network of open ditches that includes auxiliary ditches (small furrows with brow toward water-directing ditches), water-drain ditches from 0.5 meter or more deep, main ditches from 1 to 4 meters deep and catch drains to catch water from adjacent areas.

Table 3.2. Phases and Types of Work in Transferring the Design to Terrain

Phases	Types of Work
I	Inspection, checking and restoration of the geodetic network created during surveys: checking for the presence of all geodetic signs on the terrain and control levelling of all benchmarks; comparison of the planned layout of the all points (if necessary); transfer of restored geodetic network according to report of contract construction organization
II	Layout and full-scale attachment of basic lines and points of structures: detailed layout of structural components; installation of additional working benchmarks and corner markers
III	Layout of excavation work: establishing full-scale outlines of recesses and fills; removal of planned excavation marks beyond terrain; layout of excavation work with installation of troughs for beds of airfield pavement

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.3. Thickness of Layer of Vegetation-Laden Soil to be Cut

Характеристика участка (1)	(2) Толщина срезаемого слоя, см
С дерновым покрытием (3)	8—12
Пахотные земли (4)	15—18
Залесенные участки (5)	15—25

Key:
1. Characteristic of section
2. Thickness of layer to be cut, cm
3. With sod surface
4. Plowed lands
5. Forested sections

Table 3.4. Methods of Working with Vegetation-Laden Soil

Method of Work	Characteristics of Method
Bulldozer	More productive with distance to move soil of 40-60 meters and thickness of layer to be cut more than 10 cm. Shift productivity of bulldozer comprises approximately 1 ha
Scraper	Most effective when forming embankments beyond the profile to be worked on the soil part of the flying field and removal of vegetation layer from areas intended for installation of trough. The recommended thickness of the layer to be cut is 10 cm or more and the distance of moving soil is from 50 to 300 meters with bucket capacity up to 3 m^3 and to 500 meters with bucket capacity of 6-8 m^3. The shift productivity of a towed scraper with bucket capacity of 6 m^3 at thickness of layer to be cut of 10 cm, length of soil removal and moving path of 50-100 meters comprises 0.1-1.0 ha
Grader	Most feasible with shallow layer of vegetation-laden soil and short moving distance (up to 15 meters)
Combination	Joint operation of grader and bulldozer in removal and cutting of vegetation layer of soil. A grader moving along the section to be treated removes the layer of vegetation-laden soil and forms longitudinal rows of it every 2-3 meters. A bulldozer, moving perpendicular to the section to be worked, then pushes the piles formed by the grader beyond the site, forming large piles. It is recommended that the method be used when removing vegetation layer 10-15 cm thick

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

in the second phase excavation is carried out to the planned mark.

Shallow channels are excavated during one-two passes of the earth movers.

Soils of groups II-III must be ripped during excavation. Rocky and frozen soils must be broken up with explosives and must be excavated with excavators.

Low-quality soils (mud, peat, solonchaks and so on) should be removed and replaced with good-quality soils.

Soils are classified into groups as a function of the difficulty of excavation (Table 3.5).

Table 3.5. Distribution of Unfrozen Soils into Groups as a Function of Excavation Method

(1) Грунты	Группы грунта при разработке (2)				
	(3) экскаваторами		(6) скреперами	(7) бульдозерами	(8) грейдерами
	(4) одноковшовыми	(5) многоковшовыми			
1	2	3	4	5	6
Гравийно-галечные: (9)					
размером частиц до 80 мм (10)	I	—	II	II	III
размером частиц более 80 мм (11)	II	—	—	III	—
Глина: (12)					
жирная мягкая и мягкая (13) юрская без примесей	II	II	II	II	II
то же, с примесью щебня, гальки или строительного мусора в объеме до 10% (14)	II	II	II	III	III
жирная мягкая и мягкая юрская с примесью щебня, гравия, гальки или строительного мусора в объеме более 10% (15)	III	—	II	II	—
мягкая карбонная (16)	III	—	II	III	III
тяжелая ломовая сланцевая твердая юрская карбонная или кембрийская (17)	IV	—	—	III	—
Грунты растительного слоя: (18)					
без корней и примесей (19)	I	I	I	I	I
с корнями кустарника и деревьев (20)	I	II	I	II	—
с примесью щебня, гравия или строительного мусора (21)	I	II	I	II	—

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.5 (Continued).

1	2	3	4	5	6
(22) Грунты ледникового происхождения (моренные):					
песок моренный с содержанием валунов массой (23) более 50 кг (средний размер более 30 см) до 5% по объему, а также глина ленточная моренная с тонкими прослойками мелкозернистого песка	II	—	—	—	—
песок моренный с содержанием валунов массой (24) более 50 кг (более 30 см) от 5 до 10% по объему; супесок, суглинок и глина моренные с включением валунов массой более 50 кг (более 30 см) до 5% по объему	III	—	—	—	—
Лёсс: (25)					
мягкий без примесей (26)	I	II	I	I	I
то же, с примесью гравия или гальки (27)	I	II	II	I	II
отвердевший (28)	IV	—	II	III	—
Песок: (29)					
без примесей, а также с (30) примесью щебня, гравия, гальки или строительного мусора в объеме до 10%	I	II	II	II	II
то же, с примесью в объе- (31) ме более 10%	I	—	II	II	—
барханный и дюнный (32)	II	—	—	III	III
Ракушечник: (33)					
слабосцементированный (34)	III	—	—	—	—
сцементированный (35)	V	—	—	—	—
Солончак и солонец: (36)					
мягкие (37)	I	II	I	I	I
отвердевшие (38)	III	—	—	III	III
Суглинок: (39) (40)					
легкий и лёссовидный без примесей	I	I	I	I	I
легкий и лёссовидный с (41) примесью щебня, гальки или строительного мусора в объеме до 10%	I	II	I	I	I
то же, в объеме более 10% (42)	II	—	II	II	—

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.5 (Continued).

1	2	3	4	5	6
(43) тяжелый без примесей и с примесью щебня, гравия, гальки или строительного мусора в объеме до 10%	II	II	II	II	II
то же, с примесью в объеме более 10% (44)	III	—	—	II	—
Супесок: (45)					
без примесей, а также с (46) примесью гравия, гальки, щебня или строительного мусора в объеме до 10%	I	II	II	II	II
то же, с примесью в объеме более 10% (47)	I	—	II	II	—
Строительный мусор: (48)					
рыхлый и слежавшийся (49)	II	—	—	II	—
сцементированный (50)	III	—	—	III	—
Торф: (51)					
без древесных корней (52)	I	I	I	I	I
с древесными корнями толщиной до 30 мм (53)	I	I	I	I	—
с древесными корнями толщиной более 30 мм (54)	II	—	—	II	—
Чернозем и каштановый грунт: (55)					
мягкий (37)	I	I	I	I	I
отвердевший (38)	II	II	II	II	III
Шлак: (56)					
котельный (57)	I	I	—	I	—
металлургический выветривший (58)	II	II	—	I	—
то же, невыветривший (59)	III	—	—	—	—
Щебень (60)	II	—	—	III	—

Key:

1. Soils
2. Groups of soil during excavation
3. With excavators
4. Single-bucket
5. Continuous
6. With scrapers
7. With bulldozers
8. With graders
9. Gravel-pebble
10. Particle size up to 80 mm
11. Particle size more than 80 mm
12. Clay
13. Rich soft and soft jurassic without impurities
14. Rich soft and soft jurassic with impurity of crushed stone, pebbles or construction waste up to 10 percent
15. Rich soft and soft jurassic with impurity of crushed stone, gravel, pebbles or construction waste more than 10 percent
16. Soft carbonate

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

17. Heavy broken shale hard jurassic carbonate or cambrian
18. Soils of vegetation layer
19. Without roots and impurities
20. With roots of bushes and trees
21. With impurity of crushed stone, gravel or construction waste
22. Soils of glacier origin (moraine)
23. Moraine sand with boulders weighing more than 50 kg (average size of more than 30 cm) up to 5 percent by volume and also varved moraine clay with thin interlayers of fine-grain sand
24. Moraine clay with boulders more than 50 kg in size (more than 30 cm) from 5 to 10 percent by volume; sandy loam, loam and moraine clay with boulder inclusion of more than 50 kg by mass (more than 30 cm) up to 5 percent by volume
25. Loess
26. Soft without impurities
27. Soft with gravel or pebble impurities
28. Hardened
29. Sand
30. Without impurities and also with impurity of crushed stone, gravel, pebbles or construction waste up to 10 percent
31. Without impurities and also with impurities more than 10 percent
32. Barkhan and dune
33. Shell rock
34. Slightly cemented
35. Cemented
36. Solonchak and solonets
37. Soft
38. Hardened
39. Loam
40. Light and loess-type without impurities
41. Light and loess-like with impurities of crushed stone, pebbles or construction waste up to 10 percent
42. Light and loess-like with impurities of crushed stone, pebbles or construction waste more than 10 percent
43. Heavy without impurities and with impurities of crushed stone, gravel, pebbles or construction waste up to 10 percent
44. Heavy without impurities and with impurities more than 10 percent
45. Sandy loam
46. Without impurities and also with impurities of gravel, pebbles, crushed stone or construction waste up to 10 percent
47. Without impurities and with impurities more than 10 percent
48. Construction waste
49. Loose and caked
50. Cemented
51. Peat
52. Without woody roots
53. With woody roots up to 30 mm thick

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

54. With woody roots more than 30 mm thick
55. Chernozem and chestnut soil
56. Slag
57. Boiler
58. Weathered metallurgical
59. Unweathered metallurgical
60. Crushed stone

Excavation of channels with bulldozers. The most economical distance for moving soil with a bulldozer is 50-70 meters on a horizontal section and up to 100 meters on a sloping section.

The methods of performing work with bulldozers are presented in Table 3.6 and productivity is shown in Table 3.7.

Table 3.6. Cutting Schemes and Method of Collecting Soil (Figure 2)

Soil Cutting Scheme	Method of Collecting Soil (Recommendations According to Use)
Rectangular	The bulldozer blade is dug into the soil by 10-15 cm, cutting an even section of soil in the entire path of collecting it. The length of the soil collection (cutting) path is equal to approximately 10 meters and the volume of excavated soil is 2-2.5 m^3. Cutting is carried out in second gear and the cutting time is 16-20 seconds. The scheme is most effective when working on the slope and excavation of the channel in inclined layers
Wedge	Used in light soils. The bulldozer blade is first dug into the soil at its greatest depth (25-30 cm) and then the blade is gradually raised as the bulldozer moves forward, collecting the soil on it. The cutting path is approximately 5 meters and the soil collection time is 5-8 seconds.
Comb-shaped	Used when excavating heavy compact soils. The bulldozer blade is first submerged to the maximum into the soil and then is raised by approximately three-fourths of its submerging depth with the engine rpms reduced. This submergence of the blade into the soil and raising it is repeated two-three times, during which the soil is completely collected on the bulldozer blade. The soil collection time is 14-15 seconds and the cutting path is 5-7 meters

Excavation of channels with scrapers. The main production rules, upon observation of which the most effective scraper work is achieved, consist in the following:

soil is excavated when the scraper is moving on a slope. The optimum slope is 8-10 percent;

the soil is first ripped and pulverized when working on compact and heavy soils;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

the most effective scheme for soil excavation is selected for complete filling of the bucket within the shortest minimum time;

linearity of the scraper motion during collection and dumping of the soil in first gear is observed;

the length of the channel excavation section should be greater than the path of the total collection of the scraper bucket;

the scraper makes turns with an empty bucket but the number of turns should be as few as possible;

earth-hauling paths are prepared in time and with quality.

Figure 2. Diagram of Cutting Soil with Bulldozer: a--rectangular; b--wedge; c--comb-like (the direction of bulldozer motion is shown by the arrow).

Towed scrapers with bucket capacity up to 3 m^3 with hauling distance up to 300 meters, 6-8 m^3 with hauling distance up to 500 meters and 10 m^3 with hauling distance up to 3-5 km can be used.

The schemes for excavation of channels with scrapers (Figure 3) and their characteristics are presented in Table 3.8 and scraper productivity is shown in Table 3.9.

Excavation of channels with excavators. The range of application is excavation of channels from 1 meter or more deep, excavation of trenches catch drains, drain ditches and loading soil into transport equipment. Excavators with bucket capacity from 0.25 to 3 m^3 with interchangeable equipment shown in Table 3.10 are the most used. The scheme for excavation of a channel with an excavator is shown in Figure 4.

The approximate productivity of excavators can be taken from Table 3.11. The recommended dimensions of faces for excavators with straight bucket are shown in Tables 3.12 and 3.13.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.7. Bulldozer Productivity

(1) Дальность перемещения, м	(2) Трактор мощностью 80–100 л.с.			(3) Трактор мощностью 54–75 л. с.		
	(4) Группа грунтов					
	I	II	III	I	II	III
	(5) Производительность, м³/смену					
10	1050	820	680	525	390	310
20	650	520	435	295	220	175
30	470	380	320	205	155	125
40	370	300	255	160	115	95
50	305	250	210	130	95	78
60	255	210	180	100	80	65
70	225	185	155	93	68	57
80	200	165	140	82	61	47
90	175	145	125	74	55	44
100	160	130	110	66	49	40

Note. The volume of soil collected by the bulldozer blade is equal to 1.25-2 m^3 with tractor horsepower of 100-110 hp and 4-6 m^3 with horsepower of 130-180 hp.

Key:
1. Moving distance, meters
2. Tractor with power of 80-100 hp
3. Tractor with power of 54-75 hp
4. Group of soils
5. Productivity, m^3/shift

Figure 3. Diagrams of Excavating Channels with Scrapers: a--one-way elliptical; b--two-way elliptical; c--figure-eight; 1--collection of soil; 2--dumping of soil

Self-dumping tractor trailers and dump trucks are employed to transport soil when it is excavated with excavators.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The approximate need for transport equipment can be determined from Table 3.14.

Table 3.8. Schemes for Excavating Channels With Scrapers

Scheme	Characteristics and Range of Application
One-way elliptical	With distance from excavation to embankment of 300-500 meters. The scraper makes a working pass only in one direction with this scheme during one cycle and makes a return empty pass with two turns
Two-way elliptical	When excavating a channel between embankments to which soil is moved and with soil moving distance of 200-250 meters. The scraper makes two working passes in both directions with this scheme
Zigzag and figure-eight	With parallel arrangement of channel with embankment extending along the contour. The scraper completes a series of operations in a specific order which are contained in a single working cycle with these schemes, which include movement of the empty scraper to the soil excavation point, cutting into the soil and filling the bucket, moving the loaded scraper and dumping the soil

Table 3.9. Scraper Productivity During Soil Excavation

(1) Дальность перемещения грунта, м	(2) Вместимость ковша скрепера, м³									
	(3) До 3–4		До 6–8		(4) 10 с тягачом 200–250 л. с.			(5) 15 с тягачом 300–350 л. с.		
	Характеристика грунта (6)									
	(7) легкий	(8) средний	легкий	средний	легкий	средний	(9) тяжелый	легкий	средний	тяжелый
50	360	295	750	620	—	—	—	—	—	—
100	245	205	555	470	720	800	700	940	980	880
200—250	150	130	365	315	480	500	450	610	650	580
300	105	95	270	235	—	—	—	—	—	—
400	85	75	215	190	—	—	—	—	—	—
500	70	60	180	160	330	360	320	415	455	415
600	58	52	155	135	—	—	—	—	—	—
700	50	45	135	120	—	—	—	—	—	—
800	—	—	120	105	—	—	—	—	—	—
1000	—	—	98	88	200	215	190	255	270	255
1200	—	—	82	74	—	—	—	—	—	—
1400—1500	—	—	71	60	135	145	135	175	190	175
1600	—	—	63	64	—	—	—	—	—	—
2000	—	—	—	—	105	120	105	135	150	135
3000	—	—	—	—	72	80	72	96	104	96
5000	—	—	—	—	40	48	40	56	64	56

Key:
1. Distance of moving soil, meters
2. Scraper bucket capacity, m^3
3. Up to
4. 10 with 200-250 hp tractor
5. 15 with 300-350 hp tractor
6. Soil characteristics
7. Light
8. Medium
9. Heavy

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 4. Scheme for Excavation of Channel with Straight-Shovel Excavator: A--sections excavated with bulldozer or scraper to form minimum height of face; B--sections excavated with excavator; 1--excavator; 2--transport equipment; I-IV--numbers of faces

Table 3.10. Interchangeable Equipment of Excavator and Range of Application

Type of Interchangeable Equipment	Range of Application
Straight shovel	When excavating deep channels with soil loaded onto transport equipment, high faces in brittle rock (sandy, gravel and so on) that does not form peaks
Reverse shovel	When soil is excavated below the level of the excavator (trenches, ditches and so on)
Dragline	When light and medium soils are excavated and also soils in damp faces or under water
Grab	When excavating loose or thin soils below the level of the excavator

Table 3.11. Excavator Productivity with Soil Loaded onto Transport Equipment

(1) Группа грунтов	(2) Вместимость ковша (прямая лопата), м³				(3) Вместимость ковша (драглайн), м³				
	0,25-0,3	0,5—0,65	0,8	1,0—1,25	0,25	0,35	0,5	0,65	0,8-1,0
	Производительность, м³/смену (4)								
I	150—175	340—440	520	620—700	150	210	320	410	500
II	125—140	275—360	410	525—640	115	165	230	340	420
III	82—105	220—285	350	425—500	75	120	200	260	320
IV	--	155—205	240	310—400	—	—	135	185	235

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Group of soils
2. Bucket capacity (straight shovel), m^3
3. Bucket capacity (dragline), m^3
4. Productivity, m^3/shift

Table 3.12. Lowest Recommended Height of Face During Operation With Straight-Shovel Excavator

(1) Вместимость ковша, м³	(2) Минимальная высота забоя в зависимости от группы грунтов, м		
	(3) I и II	III	IV
0,25	1	2	3
0,5	1,5	2,5	3,5
1,0	2,5	3,5	4,5
(4) 2 и более	3,5	4,0	6,0

Note. The height of the face should not be more than 6 meters in heavy soils.

Key:
1. Bucket capacity, m^3
2. Minimum height of face depending on group of soils, meters
3. I and II
4. Two or more

Table 3.13. Recommended Width of Soil Face for Straight-Shovel Excavator

(1) Вместимость ковша, м³	(2) Ширина забоя, м	Вместимость ковша, м³	Ширина забоя, м
0,25	4,6	1,0	8,7
0,5	6,8	2,3	11,6

Key:
1. Bucket capacity, m^3
2. Width of face, meters

It is recommended that semicircular buckets with solid cutting edge be used to increase excavator productivity (TsNIIS Mintransstroy [Ministry of Transport Construction]) (Table 3.15).

The operating procedure of single-bucket excavators and the dimensions of faces when soil is loaded onto transport equipment are presented in Tables 3.16-3.17.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.14. Approximate Need for Transport Equipment per Excavator

(1) Дальность возки грунта, км	(2) Вместимость ковша экскаватора, м³						
	(3) до 0,40		до 0,65		до 1,25		
	(4) Количество автомобилей-самосвалов грузоподъемностью, т				(5) Количество транспортных прицепов грузоподъемностью, т		
	до 4,5	до 7,0	4,5	7,0	15–20	30–40	10,0
0,3	2	—	3	—	3	—	—
1,0	3	2	4	3	4	2	—
1,5	4	3	6	4	4	3	4
2,0	6	4	7	5	6	4	4

Key:
1. Distance of moving soil, km
2. Excavator bucket capacity, m^3
3. Up to
4. Number of dump trucks with capacity, tons
5. Number of transport trailers with capacity, tons

Excavation of channels with grader elevators. It is most reasible for grader elevators to excavate channels up to 1.5 meters deep and not less than 500 meters long in soils of groups I-III, except loose sands that are overmoistened and are in a viscous-plastic state.

A grader elevator is used with the highest productivity when the soil is excavated into a pile. Its productivity reaches 500 m^3/hr or more in this case and the work time utilization factor comprises 0.85-0.95.

Table 3.15. Range of Application of Straight-Shovel Excavators Having Semicircular Cutting Edge

(1) Вместимость ковша, м³	(2) Группа грунта		Вместимость ковша, м³	Группа грунта	
	I, II	III		I, II	III
	(3) Высота забоя, м			Высота забоя, м	
0,4	1,5	2	0,8		
0,65	2	4	1,1	3	5
			1,5		

Key:
1. Bucket capacity, m^3
2. Group of soils
3. Height of face, meters

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.16. Conditions and Working Procedure of Single-Bucket Excavators When Excavating Channels

Working Equipment of Excavators	Order of Performing Work	Auxiliary Means of Mechanization
Straight shovel with loading into transport equipment	Excavation of pioneer trench by "frontal" method and construction of ramp from zero marker	Bulldozer for excavation or driving beginning trench
	Loading soil into transport equipment	Transport trailers or dump trucks
	Excavation of channel in longitudinal passes. The earth-hauling paths are located on one or two sides	Tractor trailers or dump trucks, rail or conveyor transport
	Excavation with widened face (to total width of excavation)	Bulldozer and powered grader
Dragline with soil excavated into a pile or with loading onto transport equipment	Collapse of edge. Excavation of channels in longitudinal passes: the procedure and working conditions are the same when loading into transport equipment as when using a straight shovel; the excavator moves in a shuttle scheme	Bulldozer. The transport equipment is the same as for a straight-shovel excavator. Bulldozers for straightening terraces.

Table 3.17. Recommended Dimensions of Faces When Soil is Loaded by Excavator

(1) Вместимость ковша экскаватора, м³	(2) Расположение транспортных средств						(9) Высота от подошвы забоя до верха борта транспортной машины, м	(10) Радиус разгрузки при наибольшей высоте нагрузки, м
	(3) В одном уровне			(4) В разных уровнях				
	(5) Расстояние от оси экскаватора до подошвы, м		(8) Ширина забоя по лучу, м	Расстояние от оси экскаватора до подошвы, м		Ширина забоя по лучу, м		
	(6) откоса	(7) забоя		откоса	забоя			
0,5—0,65	4,6	4,8	9,4	2,1	4,8	6,9	4,1	6,6
0,75—0,80	5,4	6,3	11,7	2,2	6,3	8,5	4,8	7,4
1,0—1,25	5,8	6,4	12,2	2,4	6,4	8,8	5,0	7 8
2,0	7,0	7,4	14,4	4,9	7,4	12,3	5,5	10,2

Key:
1. Excavator bucket capacity, m^3
2. Arrangement of transport equipment
3. On same level

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

4. At different levels
5. Distance from excavator axis to bottom, meters
6. Slope
7. Face
8. Width of face along bottom, meters
9. Height from bottom of face to top of bed of transport machine, meters
10. Unloading radius with greatest loading height, meters

Table 3.18. Recommended Angles of Setting Cutting Disk of Grader Elevator

(1) Грунт	(2) Угол, град		
	(3) резания	(4) захватки	(5) заточки режущей кромки
Супесь (6)	45—35	35—53	15—20
Суглинок (7)	30—25	45	15—20
Глина (8)	20	50—40	10—15
Разрыхленный (9)	35—40	55—50	—

Key:

1. Soil
2. Angle, degrees
3. Cutting
4. Grab
5. Dressing of cutting edge
6. Sandy loam
7. Loam
8. Clay
9. Broken

The face should first be prepared with a powered grader or bulldozer by cutting a furrow with vertical wall up to 0.4 meters high for a grader elevator to operate. The recommended angles of setting the cutting disk of the grader elevator should be taken from Table 3.18.

3.3. Construction of Fills

Two methods of dumping--longitudinal and transverse--are used when constructing fills.

Two schemes can be used with the longitudinal method: "from oneself" when dumping of the soil is begun with sections of the contour of the fill located closest to the excavation in which the soil is excavated and it is carried to the opposite end of the fill, and "to oneself" when filling of the fill begins from the sections most remote from the excavation and it is carried out in a direction toward the excavation.

Only the "to oneself" scheme is used with the transverse method when the soil is dumped perpendicular to the strips since intersection of the soil hauling paths with the direction of motion of the packing machines is inevitable in the case of dumping "from oneself."

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The driving machines should be selected from Table 3.19 as a function of the conditions for constructing the fills.

Recommendations on construction of fills by different machines, the compositions of the sections and productivity are presented in Tables 3.20-3.27.

The maximum permissible slope when collecting soil with a scraper bucket comprises 15-20 percent, the steepness of the ramps onto the fill should not be more than 200 percent and the distances between access ramps should be 50-100 meters. A width of the fill of 8.5 meters is adequate for the scraper to turn.

Methods of constructing a fill with scrapers are shown in Figure 5.

Packing of soils. It is most effective to pack soils with optimum moisture content (Table 3.28).

Soils with moisture content less than 80 percent of the optimum prior to packing should be wetted down, but if the moisture content of the soils in the fill or drain channel is above the optimum, the soils should be drained prior to excavation or movement into a fill.

The methods of packing soils and the recommended operating modes of machines are presented in Tables 3.29 and 3.30.

3.4. Grading and Landscaping Work

The composition of grading work is as follows: ripping the surface layer of the soil (when working with heavy soils), preliminary grading and packing of the surface, final grading and packing of the surface. The recommendations on performing grading work are presented in Table 3.31 and the productivity of the machines is presented in Table 3.32.

The following grading schemes are usually employed: with length of cut of 500 meters or more and width of not less than 100 meters:

a) circular with machines moving from edge of section to its middle or vice versa, from the middle of the section to its edges;

b) the shuttle scheme is used with alternation of machine passes in mutually perpendicular directions with length of cut from 200 to 500 meters and width up to 100 meters and the scheme with working pass in the same direction is used with length of cut up to 200 meters.

The purpose of landscaping work is to create a firm sod cover of vegetation uniform in thickness on the soil part of the flying field (Tables 3.33 and 3.34).

The quality of the sod cover is characterized by the number of shoots of sod-forming grasses per unit area (20 X 20 cm) (Table 3.34).

The composition of landscaping work and recommendations on performing it are presented in Tables 3.35 and 3.36 and the rates of fertilizer application are given in Table 3.37.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.19. Selecting the Driving Machines to Construct Fills

Type of Earth Bed	Height of Fill, meters	Distance of Moving Soil, meters	Length of Excavation Section, meters	Driving Machines in Section
Fills from two-way lateral drain channels in flat or slightly broken terrain	Up to 1.0	5-10	500-1,000	Powered graders (medium and heavy) or bulldozers
Fills of two-way lateral drain channels (or of one-way channels) in flat terrain with longitudinal slope not more than 50-60 percent	1.25-1.50	8-15	500-1,000	Grader elevators of all modifications
Fills of two- or one-way drain channels: for lower part of fill; for upper part of fill	More than 1.0	8-50	250-500	Bulldozers. Scrapers with bucket capacity up to 10 m^3 or dragline excavators with bucket capacity up to 1 m^3
Fills from soils excavated in open pits	Unlimited	Up to 3,000	Dependent on concentrated work conditions	Motor scrapers with bucket capacity of 10 m^3 or more or excavators with bucket capacity of 1-1.5 m^3 and transport equipment
"	"	More than 3,000	"	Excavators with bucket capacity up to 3 m^3 with group of dump trucks having capacity of 7-10 tons and motor scrapers with bucket capacity more than 10 m^3
Semi-fills-semi-channels on sloping sections no steeper than 20°	According to plan	Up to 30	50-100	Universal bulldozers and excavators (straight shovel or dragline) with bucket capacity of 1 m^3

[Continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 3.19 (Continued)

Type of Earth Bed	Height of Fill, meters	Distance of Moving Soil, meters	Length of Excavation Section, meters	Driving Machines in Section
Semi-fills-semi-channels with longitudinal movement of soil	According to plan	Up to 500	250-500	Scrapers with bucket capacity up to 10 m^3
Fills and excavations on mountains and also in frozen rocky soils	"	"	Dependent on working conditions	Compressors and jack hammers, excavators with bucket capacity up to 2 m^3, large-capacity dump trucks and universal bulldozers
Fills in river floodplains	Unlimited	Up to 2,000	"	Equipment for hydromechanical soil excavation
Fills in swamps	According to plan	Dependent on working conditions		Excavators with bucket capacity up to 2 m^3 and group of dump trucks, bulldozers

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.20. Recommended Distances of Moving Soil With Scrapers Having Different Bucket Capacity

(1) Вместимость ковша, м³	(2) Пределы возки грунта, м	Вместимость ковша, м³	Пределы возки грунта, м
(3) *Прицепные скреперы*		(5) *Самоходные скреперы*	
(4) До 3	До 250	До 6	До 1500
» 6	» 300—350	» 10	» 2500
» 10	» 550—1000	» 15	» 3000
» 15	» 1500—3000		

Key:
1. Bucket capacity, m^3
2. Range of hauling soil, meters
3. Towed scrapers
4. Up to
5. Motor scrapers

Table 3.21. Recommended Thicknesses of Cut When Collecting Soil with Scraper and Height of Filling Bucket

(1) Вместимость ковша, м³	(2) Высота наполнения ковша, см	(3) Суглинок	(4) Супесь
		(5) Толщина стружки, см	
(6) До 3	100—120	2—3	3—4
» 6	130—150	4—6	6—8
» 10	180—200	8—10	10—12
» 15	230—250	12—14	14—16
25	250—270	16—18	18—20

Key:
1. Bucket capacity, m^3
2. Height of filling bucket, cm
3. Loam
4. Sandy loam
5. Thickness of cut, cm
6. Up to

Table 3.22. Length of Path When Collecting Soil With Scraper

(1) Вместимость ковша, м³	(2) Длина скрепера с трактором, м	(3) Длина участка наполнения с учетом начального пути зарезания, м
(4) До 3,0	9,5—9,6	6,0—8,0
6,0—8,0	13,4—13,5	6,5—7,2
9,0—11,0	13,8—14,0	8,0—14,0
15,0—18,0	15,2—15,5	10,0—23,0

Key:
1. Bucket capacity, m^3
2. Length of scraper and tractor, meters
3. Length of filling section with regard to initial cutting path, meters

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 3.23. Composition of Scraper Group (with Flow Rate up to 3,000 Meters per Shift)

Composition of Group	Operations Performed	Height of Fill, Meters, up to 1.5	3.0	6.0
		Number of Machines and Workers		
Machines				
Towed scrapers with bucket capacity of 6-8 m^3 or motor scrapers with bucket capacity up to 10 m^3	Excavation and moving soil from drain channels or excavation with preliminary levelling to fills	3-5	5-8	7-10
Bulldozers on T-100 or T-180 tractor	Moving soil over short distances	1	2	3
Rippers (three-tine) on T-100 or T-180 tractor (the tractor is used as a pusher if necessary	Preliminary ripping of soil of groups II and III before collection of soil by scraper	1	1	2
Heavy powered graders	Layer by layer levelling of soil prior to packing	1	1	2
Towed sheepsfoot rollers or rollers on pneumatic tires	Layer by layer packing of soil into fills	2	3-4	4-6
Wetting-washing machines	Wetting of soil during packing	2	3	3-5
Electric power stations	Lighting the job site	1	1	1-2
Workers				
Operators, sixth rank	Driving the machines	8-10	12-15	19-23
Mechanics, fourth and fifth rank	Maintenance and repair of machines	4	6	7-9
Laborers, third rank	Refueling and lubrication and staking work	3	4-7	6

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 3.24. Composition of Bulldozer Section During Pouring of Fill

Composition of Group	Operations Performed	Height of Fill, Meters, up to 0.5	1.0	1.5
		Number of Machines and Workers		
Machines				
Bulldozers on T-100 M tractors	Excavation and moving of soil from drainage channel to fill with preliminary levelling	3	7	12
Bulldozers on T-180 and DET-250 tractors	" " "	2	5	8
Towed sheepsfoot rollers with mass of 9-18 tons and on pneumatic tires with mass of 16-50 tons	Layer by layer packing of fill soil	1	2	4
Heavy or medium motorized graders	Grading of fill and bottom of drainage channel	1	1	1
Ripper mounted on caterpillar tractor	Preliminary ripping of soil in drainage channel	1	1	1
Electric power station with output of 4.5-6 kW	Lighting the jobsite	1	1	1
Workers				
Operators, sixth rank	Operation of machines	5	11	21
Mechanics, fourth and fifth rank	Maintenance and repair of machines	2	2	3
	Staking and miscellaneous jobs and refuelling of machines in field	3	3	4

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.25. Most Efficient Angles of Setting Powered Grader Blade When Constructing Fills

(1) Операции	(2) Углы, град		
	(3) захвата	(4) резания	(5) наклона
(6)			
Зарезание грунта (без удлинителя):	(18)		
разрыхленного плугом (7)	о 30	До 40	15
то же, рыхлителем (8)	30—35	» 40	15
неразрыхленного несвязного (9)	40—45	» 35	15
Перемещение грунта: (10)			
влажного (11)	40—50	30—35	11
сухого (12)	35—45	35—40	13
Планировка (13)	45—60	35—40	18
Разравнивание:(14)			
с уплотнением (15)	70—90	50—60	2
без уплотнения (16)	55—60	45—50	3
Срезка откосов (17)	60—65	40—45	50

Key:

1. Operations
2. Angles, degrees
3. Grab
4. Cutting
5. Of slope
6. Cutting of soil (without extender)
7. Of broken soil with plow
8. Of broken soil with ripper
9. Of unbroken loose soil
10. Moving soil
11. Wet
12. Dry
13. Levelling
14. Grading
15. With packing
16. Without packing
17. Cutting of slopes
18. Up to

Table 3.26. Distances for Transverse Movement of Soil with Powered Graders

(1) Способ работы	(2) Угол захвата, град			
	35	40	45	60
	(3) Расстояние поперечного перемещения грунта при одном проходе, м			
(4)				
Без удлинителя	1,6	1,9	2,2	2,5
С одним удлинителем (5)	2,0	2,4	2,8	3,2
С двумя удлинителями (6)	2,4	2,9	3,4	3,9

Key:

1. Method of operation
2. Grab angle, degrees
3. Distance of transverse movement of soil with single pass, meters
4. Without extender
5. With single extender
6. With two extenders

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.27. Calculated Productivity of Heavy Powered Graders When Constructing Fills Up to 1 Meter High

(1) Расстояние перемещения грунта, м	Группа грунтов (2)		
	I	II	III
	Производительность, м³/смену (3)		
10	310	260	235
20	160	135	120
30	105	92	80

Key:
1. Distance of moving soil, meters
2. Group of soils
3. Productivity, m^3/shift

Figure 5. Methods of Constructing Fills with Scrapers: a--longitudinal method; b--transverse method; c--construction of fill "from oneself" with longitudinal method; c--construction of fill "to oneself" with longitudinal method; e--construction of embankment "to oneself" with transverse method; 1-6--sequence of unloading scraper; I-IX--sequence of filling strips

Key:
1. Packing

Grass mixtures and sowing seeds. Grass mixtures are selected from several species (4-7) of grasses which have different beginning and ending of the vegetation period, which contributes to the longest extension of the operating season of the sod cover.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.28. Values of Optimum Moisture Content and Maximum Density of Soils

(1) Грунт	(2) Оптимальная влажность, %	(3) Максимальная плотность грунта при стандартном уплотнении, г/см³
(4) Песчаный	8—13	1,80—1,88
Супесчаный (5)	9—15	1,85—2,08
Пылеватый (6)	16—20	1,61—1,80
Суглинистый (7)	12—18	1,85—1,95
Тяжелый суглинистый (8)	14—20	1,67—1,69
Суглинистый пылеватый (9)	15—22	1,65—1,74
Глинистый (10)	16—30	1,58—1,70

Key:
1. Soil
2. Optimum moisture content, percent
3. Maximum soil density with standard packing, g/cm^3
4. Sandy
5. Sandy loam
6. Dusty
7. Loam
8. Heavy loam
9. Heavy dusty
10. Clay

Table 3.29. Methods of Packing Soils and Packing Equipment

Method 1	Packing Devices 2
Rolling	Static machines--rollers (towed and self-propelled with smooth wheels and sheepsfoot rollers on pneumatic tires). Their productivity is 100-600 m^3/hr Recommended tire pressure (P, kgf/cm^2) for soils: 2.0 for sandy 3-4 for sandy loam 4-5 for light and medium loams 6-8 for heavy loams and clays Most efficient speed of rollers when rolling: 2-2.5 km/hr during first and last two passes; 8-15 km/hr during all intermediate passes. It is recommended that heavy cohesive soil be packed with different mass rollers--light, medium and heavy, while noncohesive soils be packed with light and medium rollers. The previous pass must be overlapped by 15-20 cm in all cases
Vibration	Motorized and towed vibrating rollers and motorized towed and suspended vibrating plates. Vibration is most effective when packing noncohesive soils (sandy, sandy loam and gravelly with no more than

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.29 (Continued).

Method	Packing Devices
1	2
	5-6 percent clay particle content and having optimum moisture content) in layers more than 0.5 meter thick. Vibrating plates are more applicable in finishing trenches to pack soils under cramped conditions
Tamping	Tamping plates with mass of 1-3 tons suspended to the boom of a crane or excavator, towed rollers with falling weights having mass of 0.8, 1.2 and 1.7 tons, motorized impact-tamping machines, pneumatic and electric tampers for packing noncohesive, cohesive and rocky soils. The productivity of tamping plates is approximately 75-125 m^3/hr
	Electric and pneumatic tampers are used to perform small volumes of work in cramped places. A levelled layer of soil of 25-30 cm can be packed with light tampers (with mass of 40-60 kg) during two-four passes on the same track, while a layer of soil 30-50 cm thick can be packed with heavy tampers (with mass of 150-200 kg) during two-four passes

Note. Smooth-wheeled, vibrating and pneumatic tire motorized rollers are used only during the last stage of packing soils. The use of pneumatic tire rollers with air pressure control systems in the tires are most effective.

The sequence of work in sowing seeds is:

sowing half the rate when the seed drill is moving along the strip;

sowing the second half with the seed drill moving perpendicular to the strip;

working in the seeds with toothed harrows or brushwood drags from 0.5 to 4 cm deep;

rolling in one pass with light wood rollers;

watering at the rate of 1.5-2 m^3 of water per 10 m^2 of area;

caring for the plantings (periodic watering during the entire vegetation period, sowing grasses, weed control, destruction of rodents, mowing the grass stand and top dressing with mineral fertilizers).

3.5. Performing Excavation Work Under Special Conditions

Filling fills in swamps. Sections with swamps of only first type with smallest thickness of the peat layer are selected for airfield construction in swampy locales. The methods and procedure of performing excavation work in swamps are shown in Table 3.38.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.30. Operating Modes of Soil-Packing Machines

(1) Уплотняющие машины	(2) Оптимальная толщина уплотняемого слоя в плотном теле, см		(3) Ориентировочное число проходов (или ударов) уплотняющей машины по одному следу	
	(4) Несвязный грунт	(5) Связный грунт	Несвязный грунт	Связный грунт
(6) Катки прицепные на пневматических шинах массой:				
10—18 т (7)	20—25 / 15—20	15—20 / 10—15	4—6 / 6—8	6—8 / 8—12
15—30 »	35—40 / 25—30	30—35 / 20—25	4—6 / 6—8	6—8 / 8—10
50 т	45—50 / 35—45	35—40 / 25—30	4—6 / 6—8	6—8 / 8—10
100 »	90—100	60—80	4—8	6—10
(8) Каток самоходный на пневматических шинах массой:				
10—25 т	30—35 / 25—30	25—30 / 15—20	4—6 / 6—8	6—8 / 8—10
30—35 »	40—60	40—45	4—6	6—8
(9) Кулачковые катки прицепные массой:				
(10) до 9 т	—	15—20	—	6—8 / 8—10
» 30 »	—	10—15	—	4—6 / 6—10
Катки моторные тяжелые (11)	30—35 / 20—30	—	4—6 / 6—8	—
(12) Виброуплотняющие машины, прицепные виброкатки массой 2,5—6 т	50—150	—	2—6	—
(13) Плиты трамбующие на экскаваторах массой до 2000 кг, размером в плане 1×1 м при падении с высоты 1 м	80—90 / 65—70	70—80 / 60—70	2—4 / 4—6	4—6 / 6—8
То же, при падении с высоты 2 м (14)	100—110 / 80—90	80—90 / 70—80	2—4 / 4—6	4—5 / 6—8
(15) Самоходные машины:				
ударно-трамбующего действия (16)	80—100	60—80	2—4	4—6
статического действия (17)	50—60 / 40—50	40—50 / 30—40	1	1
(18) Вибротрамбующий каток массой 6 т	60—80 / 40—45	15—20	4—5 / 5—6	8—10

Note. Up to density not less than 0.95 in the numerator and 1.0-0.98 in the denominator of the maximum density during standard packing.

Key:
1. Packing machines
2. Optimum thickness of packed layer in dense body, cm

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

3. Approximate number of passes (or blows) of packing machine over the same track
4. Noncohesive soil
5. Cohesive soil
6. Towed rollers on pneumatic tires with mass
7. Tons
8. Motorized rollers on pneumatic tires with mass
9. Towed sheepsfoot rollers with mass
10. Up to
11. Motorized heavy rollers
12. Vibrating packing machines and towed vibrating rollers with mass of 2.5-6 tons
13. Tamping plates on excavators with mass up to 2,000 kg measuring 1 X 1 meter in cross-section when dropped from a height of 1 meter
14. Tamping plates on excavators up to 2,000 kg in mass measuring 1 X 1 meter in cross-section when dropped from a height of 2 meters
15. Motorized machines
16. Impact-tamping
17. Static
18. Vibrating tamping roller with mass of 6 tons

Table 3.31. Recommendations on Grading Operations

Location of Work	Recommendations on Performing Work
Sections with zero datum marks	The work is performed in two phases: the first phase is rough grading of the section and the second phase is final finishing of the surface by levelling datum marks. The machine used is a motorized grader with the blade set at an angle of 45-60°, with cutting angle of 40-60° and with angle of inclination of 18-25°
Sections of excavations	The work is performed immeidately after completion of excavating the mineral soil and control levelling of the entire excavation surface. The composition of the work and the setting of the blade angles are the same as when performing work on sections with zero datum marks. The surface of the excavations is finally finished only after the layer of vegetation-laden soil is restored. The number of passes of the grader is from two to six on the same track
Installation of trough	It is completed prior to the beginning of trenches dug earlier when laying sewer lines. The work is performed shortly before installation of the pavement. Grading is carried out only along the longitudinal axis of the trough with constant check by levelling
On fill sections	The composition of work is layer by layer levelling of the soil in one-two passes with a bulldozer (when dumping soil with dump trucks or tractor trailers) or with scrapers (when they are used to fill in a fill), rough preliminary grading with bulldozers or graders and final surface finishing after packing the top layer

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.32. Calculated Productivity of Machines in Grading Operations, m^2/shift

(1) Машины	(2) Расстояние перемещения, м	(3) Группа грунтов		
		I	II	III
		(4) Производительность, м²/смену		
Автогрейдер тяжелого типа (5)	(6) До 5	4700	4100	3500
Грейдер прицепной (7)	» 5	4150	3600	3100

Key:
1. Machines
2. Distance of moving soil, meters
3. Group of soils
4. Productivity, m^2/shift
5. Heavy motorized grader
6. Up to
7. Towed grader

Table 3.33. Characteristics of Sod Depending on Thickness of Layer

(1) Наименование дерна	(2) Толщина пласта, см	Наименование дерна	Толщина пласта, см
(3) Слабый	(5) До 6	(6) Мощный	12—18
Средний (4)	6—12	Очень мощный (7)	18

Key:
1. Name of sod
2. Thickness of layer, cm
3. Shallow
4. Medium
5. Up to
6. Thick
7. Very thick

Table 3.34. Estimating the Quality of Sod Cover

(1) Качество дернового покрова	(2) Подзолистая и лесо-степная зоны	(3) Черноземная зона	(4) Сухие степи и полустепи
	(5) Количество побегов на 400 см²		
(6) Отличное	>400	>200	>100
Хорошее (7)	200—400	100—200	50—100
Удовлетворительное (8)	<100—200	50—100	35—50
Плохое (9)	,100	<50	<35

Key:
1. Quality of sod cover
2. Podzolic and forest-steppe zone
3. Chernozem zone
4. Dry steppes and semi-steppes
5. Number of shoots per 400 cm^2
6. Excellent
7. Good
8. Satisfactory
9. Poor

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.35. Types and Composition of Landscaping Work

Types of Work	Composition, Designation and Characteristics of Work
Preplanting working of soil	Carried out after completion of entire complex of excavation work on flying field, including removal and restoration of vegetation-laden soil layer. Composition: plowing performed with agricultural or brush plows. The purpose of plowing is to break up the top layer of soil, to destroy weeds and to work in the fertilizers applied to the soil. The depth of plowing is 20-25 cm in unbroken or firmly packed and salinized soils. The moisture content of the soil should be in the range of 40-60 percent of total moisture capacity; disking performed immediately after completing of plowing the section. The purpose is to break up dense layers of heavy cohesive soils and sod. It is performed with tractor disk harrows and heavy disk cultivators. Disking is carried out in three-four passes on heavy soils, two-three passes of less cohesive soils and in five-six passes on virgin sections; disking performed after plowing and disking of the worked section. The purpose is additional breaking of the soil, retention of moisture in it, removal of undestroyed plant residues and working in mineral fertilizers and grass seeds. It is performed with harrows to a depth up to 10-15 cm; rototilling--a process which replaces plowing, disking and harrowing simultaneously. It is performed by a special machine with a working member--a cutter. The depth of rototilling is from 8 to 25 cm usually in two passes; rolling, performed both during preplanting working of the soil and after sowing of seeds. Its purpose is to break up small clumps of soil, smoothing and packing of broken soil and improvement of the capillary system of the soil and contact between seeds and soil particles. Rollers with mass up to 5 tons are used during preplanting working of the soil and on light soils and rollers with mass up to 2-3 tons are used on heavy soils. The worked surface is rolled with light wooden rollers after the seeds have been planted and worked in.
Preparation of fertilizers and application to soil	Organic fertilizers are applied when creating a sod cover on sections with vegetation-laden soil layer up to 10 cm thick. The turf is specially prepared prior to application to the soil: it is aerated to avoid iron oxide compounds and to reduce its moisture content to 60-75 percent (the duration of aeration is 7-15

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.35 (Continued).

Types of Work	Composition, Designation and Characteristics of Work
	days), it is composted, i.e., it is mixed with other types of fertilizers (manure, lime, ashes and so on) and the mixture is aged in piles up to 1 year. Before mineral fertilizers are applied to the soil they must be dried, pulverized and passed through a screen with mesh of 5-6 mm

Excavation work in sandy deserts. All excavation work is usually performed in winter and spring when the sand is moist when constructing airfields in sandy deserts and semideserts. Artificial wetting is employed during the dry season of the year. Excavation work should be carried out continuously and finished sections should be strengthened immediately.

Moist and cohesive soil from quarries is usually employed to construct a 10-30 centimeter layer laid between the fill constructed from sand and the bed under the pavement during excavation work on poorly drained or barkhan sections. This layer prevents the bed material from sinking into the sand and improves the base packing conditions.

Excavation work is usually not carried out on overgrown and semi-overgrown sands to preserve the vegetation, but is limited to low-scale grading work. Embankments are made sloping in excavation work and are immediately reinforced with panels or are treated with organic binder materials.

Excavation work on salinized soils. Salinized soils are divided by types into solonchaks, solonets and takyrs and they are subdivided as a function of the percentage content of salts in them into slightly salinized, medium salinized, strongly salinized and excessively salinized.

Excessively salinized soils are unsuitable for constructing fills and strongly salinized soils are suitable only when a number of specific measures are implemented. An invariable condition when constructing fill from salinized soils is to protect the upper layers of the fill against wetting.

Excavation work should be conducted during the summer season and during the fall before the onset of rains on cohesive salinized soils (clay solonchaks) with high level of standing groundwater. The work should be conducted in spring or the beginning of the summer season on noncohesive salinized soils (sandy solonchaks) with high level of standing groundwater. The fill is poured from hauled-in noncohesive soils (sands and sandy loams) on wet salinized soils (clay solonchaks). The bed should be protected from a salt crust in summer prior to pouring the fill.

Excavation work on loess-type soils. Loessy soils are unstable sagged sandy soils that run easily when wetted. A thoroughly packed artificial bed not less than 0.6 meter thick must be installed under them when pouring fill on these soils. A protective zone up to 60 meters wide to prevent accumulation of moisture in the airfield region and consequently to avoid possible sags of soil is established around the perimeter for the entire period of construction and operation of the airfield.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 3.36. Recommendations on Applications of Fertilizers

Group of Fertilizers	Type of Fertilizer	Method (Sequence) of Application
Organic	Peat and manure	Uniform distribution using special spreaders at 1/3 to 1/4 of established norm of area to be treated. Mixing with disk harrows or cutters to the entire depth of the soil layer to be treated. Spreading and mixing of next portion of fertilizer. The operations are repeated 3-4 times. The rates of application of well decomposed and weathered peat are from 100 to 400 tons and those of composted peat are from 50 to 100 tons per hectare
	Green manures (siderites): lupine, alfalfa, clove, vetch and so on. Bacterial fertilizers are soil masses containing rhizobia	They are cultivated directly on the site of the proposed plant ground cover and are then plowed into the soil. They are applied to the soil together with seeds and are used to activate the nitrogen nutrient of legume and cereal grasses
Mineral	Nitrogen--ammonium sulfate, ammonium nitrate, potassium nitrate, ammonium chloride, Chile saltpeter and so on	Complete mineral fertilizers, i.e., a mixture of nitrogen, phosphorus and potassium fertilizers, are usually applied to the soil in the following sequence: uniform distribution over the entire area using spreaders and seed drills and working the mixture into soil of different types with disks and cultivators
	Phosphorus (superphosphates, thomas phosphate, phosphorite meal, bone meal and so on)	Nitrogen and potassium fertilizers are applied to the soil immediately prior to seeding and are worked in with the teeth of a harrow to a depth of 2-3 cm, while phosphorus fertilizers are worked in in advance by cultivators or harrows to a depth of 10-20 cm
	Potassium (potassium chloride, potassium sulfate, potassium salt, ash and so on)	The rates of fertilizer application are determined by the plan

[Continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 3.36 (Continued)

Group of Fertilizers	Type of Application	Method (Sequence) of Application
	Indirect mineral fertilizers (lime, agstone and gypsum)	Liming is used if there is increased acidity of the soil (if pH is up to 5.5). Gypsum is applied with salinized and alkaline soil. Lime is applied to the soil not less than a week prior to planting of grasses. It is sown uniformly by means of manure spreaders and special drills with subsequent mixing with the soil to the entire depth of layer to be treated with disk cultivators or a cutter

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.37. Rates for Application of Nutrient (Active) Substance of Nitrogen, Phosphorus and Potassium Fertilizers

(1) Почва	(2) Минеральные удобрения питательного (действующего) вещества		
	(3) азотные	(4) фосфорные	(5) калийные
	Нормы внесения удобрений, кг/га (6)		
(7) Содержащая до 2% гумуса — улучшенная торфом или другими органическими добавками	60	90—120	90—120
(8) Содержащая более 2% гумуса — подзолистая, супесчаная и легкосуглинистая	30—40	60—90	90—120
(9) Подзолистая суглинистая и глинистая	30—50	30—120	40—60
Серая лесная суглинистая, выщелоченный чернозем (10)	30—50	60—90	60—90
Суглинистая (11)	20—30	60—90	30—60
Мощный чернозем (12)	—	30—40	—
Каштановая (13)	30—40	60	—

Note. To determine the required amount of each type of fertilizer, recalculation is made with regard to the percentage content of nutrient (active) material in it, which is indicated on the fertilizer bag. For example, with a rate of nutrient material application of 80 kg/ha for phosphorus fertilizer, the required amount of superphosphate with 20 percent nutrient matter is (100·80)/20 = 400 kg/ha.

Key:

1. Soil
2. Mineral fertilizers of nutrient (active) matter
3. Nitrogen
4. Phosphorus
5. Potassium
6. Rates of fertilizer application, kg/ha
7. Containing up to 2 percent humus—improved with peat or other organic additives
8. Containing more than 2 percent humus—podzolic, sandy loam and light loam
9. Podzolic loam and clay
10. Gray forest loam and leeched chernozem
11. Loam
12. Thick chernozem
13. Chestnut

Canals must not be constructed, drain channels must not be installed and any structures for collection of moisture must not be constructed in the protective zone.

Excavation work during the winter season. The types of work performed in winter are:

removal of peat from frozen swamps with simultaneous pouring of fill;

laying pipelines in water-saturated frozen soils;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 3.38. Methods of Pouring Fill in Swamps

Method	Sequence of Work
Pouring fill with total removal of peat	The peat within the contour of the fill is completely removed with an excavator equipped with a drag line if the peat is up to 4 meters thick with the formed trench being filled by a bulldozer hauling in drain soil. If the peat layer is more than 4 meters thick, the explosive or hydromechanical method is used with subsequent pouring of fill to the mineral bottom. Total peat removal is also possible during operation of an excavator (to a depth up to 4 meters) and a dredge (more than 4 meters)
Pouring fill with partial removal of peat	The peat is partially removed within the contour of the fill. The lower part of the peat layer is squeezed to the sides under the weight of the fill soil and the fill is poured onto the mineral bottom
With installation of vertical sandy drains and drain cuts	Sandy drains are installed to construct fill. The sequence of work is pouring an easily-draining sandy layer 25-30 cm thick over the entire area, installation of drains 30-50 cm in diameter in alternating order at a distance from 1.8 to 6 meters from each other and at a depth from 3 to 30 meters with special equipment, filling the drains with coarse sand and constructing the fill to the design marks. Drainage cuts (trenches) from 0.4 to 1 meter wide located from 1.5 to 3 meters from each other are installed on swamps with peat layer up to 3 meters using an excavator with wide tracks which moves on standard planking. The cuts are filled with sand with a bulldozer immediately after they are cut out

deep excavation work in dry sands and other nonfreezing soils;

pouring of fill from dry noncohesive soils.

Excavation work during the winter season should be preceded by careful preparation: indication on the terrain of excavation and fill profiles, construction of earth-hauling paths and temporary drain channels, procurement of panels for snow retention and heat-insulating materials (local), preparation of machines and mechanisms to operate under winter conditions, construction of worker warming stations, organization of lighting and so on.

To protect the soil against freezing or to reduce the depth of freezing, it is ripped to different depths and disked and snow-retaining panels are installed and the soil surface is covered with local heat-insulating materials (straw mats, moss, brushwood, dry peat, sawdust, slag and so on).

In these cases excavation of the soil is begun with removal of snow and heat-insulating materials. The area of the exposed soil should be excavated during a single shift. The duration of loading the soil into transport equipment should be minimal. Thawed soil should be completely packed before the temperature drops to +2°C. It is recommended that tamping plates or meshed rollers be used for packing.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Excavation work with frozen soil is performed by the methods indicated in Table 3.39.

Table 3.39. Excavation Work With Frozen Soil

Method	Types of Work and Means of Mechanization
Ripping	Employed when the thickness of the frozen layer is 10-20 cm. Bulldozers with stingers on the ripper blades are used. Excavators with straight shovel are used if the depth of freezing is up to 0.5 meter
Breakup (Fracturing)	It is used when the thickness of the frozen layer is more than 0.5 meter. The frozen soil is broken up (fractured) with a wedge or spherical attachment having mass of 2.0-2.5 tons suspended to the excavator boom or with wedges driven into the soil with a diesel hammer or vibrator
Drilling-explosive	It is used in excavating large volumes of deeply frozen soils. If the freezing depth is 0.6-2.0 meters, the work is carried out with blast charges 45-70 mm in diameter and if it is more than 2.0 meters it is carried out with hole charges with hole diameter of more than 70 mm drilled by mobile rigs. The size of the explosive charges is determined by calculation and is refined by test explosions. To avoid freezing, the broken soil is sampled every 3-4 hours with severe cold and during the shift with temperature up to -15°C
Thawing of soil	The fire method using a set of metal semipipes that form a channel through which hot gas coming from burners with nozzles is passed. The heat formed in the channel heats the strip of soil lying under the channel and the soil is thawed to a depth up to 1.5 meter within 12-15 hours
	The thermochemical method using lime, which releases heat when ignited. Unignited lime is poured in a layer 8-10 cm thick and it is covered with a layer of sawdust 20-25 cm thick or other heat-insulating material on the section subject to thawing. The layer of lime is moistened with snow and upon moistening intensive release of heat occurs which warms the soil to 1.5 meters
	Using electricity--steel electrodes 12-19 mm in diameter and 1.5-2.0 meters long driven in checkerboard fashion into the soil below the freezing boundary. Electric current which, passing through the thawed soil, is passed through the electrodes, heats the soil and by transmitting heat from the warmed thawed soil to the frozen soil, it thaws gradually from bottom to top

The work should be performed on a small front and without interruption with any of the indicated methods of excavating thawed soil to prevent its freezing. The

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

surface of excavated sections should be protected against freezing during forced interruptions.

The fill should usually be poured from thawed soil without ice and snow in it. The content of frozen soil clumps should not be more than 15-20 percent and not more than 15-20 cm in size.

The work processes in pouring fill are as follow:

cleaning the bed for filling of snow and ice;

layer by layer pouring of soil with the calculation that packing of the moistened layer is done before it freezes;

packing the soil by tamping or rollers with mass not less than 25 tons or with vibrating or vibrating-tamping machines. The degree of packing should correspond to established norms.

3.6. Organization of Excavation Work

The excavation work plan (PPR) should provide:

the use of complex mechanization of excavation work by supplying sections and brigades with different earth-moving, packing and transport machines with the calculation that all components of the process flow diagram of excavation work are mechanized;

performing the work by the continuous method by organizing a special flow in which all processes are performed in parallel and simultaneously. Each of these processes is a partial flow;

a high degree of rhythm in work during the entire year, which eliminates the seasonal nature of conducting the work, raises the degree of machine utilization and reduces the turnover of personnel and the total period of construction work.

The composition of the work production plan is:

a diagram of the flying field layout to sections of the sequence of performing the work. In this case excavation work should primarily be completed at the point where the pavement is installed in the following sequence: the trough for the takeoff-landing strip, shoulders and end safety strips, RD, MS, taxiway and the ground part of the flying field;

process flow charts for all types of excavation work included in the specialized flow;

making up the machines into sections and brigades to perform individual types of excavation work;

the excavation work flow schedule;

the calendar schedule of performing excavation work.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The total length of the specialized flow of excavation work consists of the following three periods:

1--period of organizing the flow--preparation of the front for operation of the driving machines (removal and piling of vegetation-laden soil, ripping mineral soil, preparation of the face for the excavators, installation of pumping stations, drains, chutes, debris lines and so on);

2--the period of the total course of the flow. The main leading processes of excavation work (excavation of channels, pouring fill and so on) are performed;

3--period of winding down the flow. The final work of the main processes is performed (grading work, restoration of the vegetation layer, rolling the surface of channels, packing and grading fills and so on).

The number of leading earth-moving machines for a brigade is determined by the formula

$$N = \frac{M}{n},$$

where M is the number of machine-shifts of the leading earth-moving machine required to perform excavation work, n is the number of shifts, M = Q/P, P is the productivity of a machine per shift, m^3, and Q is the volume of excavation work, m^3.

The need for machines to perform auxiliary operations is determined by the same formula.

The best version of supplying a brigade with leading machines is that in which the greatest volume of excavation work is performed within a given time at the lowest cost.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 4. CONSTRUCTION OF THE DRAINAGE-RUNOFF SYSTEM

[Text] 4.1. General Data

The drainage-runoff system of an airfield is a unified system of installations designed to protect the airfield area from the influx of water from outside, to collect and drain surface and ground water from the flying field within its limits and to drain the bed under pavements.

The designation and characteristics of individual components of the runoff-drainage system of an airfield are presented in Tables 4.1-4.5.

The diagrams of runoff and drain systems of airfield pavement are presented in Figure 6 while standard designs of the components are presented in Figure 7.

4.2. Organization of Work to Construct Drain-Runoff System

The basis for organization of work to construct the drain-runoff system should be as follows:

sequence of its different components during construction;

tying this construction to performance of other types of work;

the continuous method of conducting the work.

Besides collectors, installation of the components of the runoff-drain structures should be carried out simultaneously with the pavement.

Installation of runoff ditches, drains and drain channels on a dirt flying strip, of deep drains, halweg pits, rain-intakes, overflows from rain-intakes and thalweg pits and collectors should be carried out upon completion of grading operations.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 4.1. Components of Runoff System of Soil Part of Flying Field

Name of Component	Designation	Brief Characteristics
Drains	Entrapment of water from a small section of the flying field and drainage of it to collectors. The distance between drains is from 15 to 50 meters. The depth is 0.9-1.2 meters	Without pipes 40-60 meters long. They are laid with slope of 0.006-0.015. With pipes the length is 50-75 meters. They are laid with a slope of 0.002-0.01. The drain is a trapezoidal or rectangular trench filled with filter material. Water flows into collectors along the bottom of the trench or through a pipe laid on the drain layer. Asbestos-cement pipes 75-100 mm in diameter and ceramic pipes 40-50 and 75 mm in diameter are used to construct pipe drains.
Collectors	Intake of water from drains and runoff of it to collector	The working part of the collectors consists of asbestos-cement, concrete or ceramic pipes 189 or 235 mm in diameter laid on the bottom of the trench. The length of the collectors is 200-250 meters
Soil chutes	To capture surface waters running off to pavement from areas adjacent to it. Chutes are located along the edge of the pavement on the catch drain side at a distance of not more than 20 meters from the edge of the surface of the takeoff-landing strip and 15 meters from the edge of the surface of the taxiway. Thalweg wells from which water enters the well of the collector through overflows are installed along the axis of the chute and wells are installed beyond the airfield along the collector	Triangular cross-section with longitudinal slopes not less than 0.005

[Continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 4.1 (Continued).

Name of Component	Designation	Brief Characteristics
Open runoff ditches	For water runoff from a closed runoff system to a water intake. They are installed only beyond the limits of the flying field	Trapezoidal shape, slopes from 0.005 to 0.002, width of the channel is not less than 0.4 meter along the bottom and slopes are constructed as a function of soil. The depth of the channel is taken as a function of the calculated water flow rates and the slopes. The slopes are reinforced
Catch drain drains	To capture surface waters running off to the flying field and to drain them to lower points or reservoirs. They are installed beyond the airfield on the catch drain side. An earth barrier embankment is installed along the drain on the airfield side	Open trapezoidal cross-sections with reinforced slopes. The cross-section is established by hydraulic calculation
Water i intakes	To discharge water from the drain-runoff system	Rivers, reservoirs, ditches, ravines and other low places are used
Thalweg wells	To collect water from lower sections of the dirt flying field with subsequent drainage of this water along overflows to collectors. If the slopes of the dirt chutes are up to 0.005, the distance between wells is 100 meters and if the slopes are more than 0.005 the distance is up to 200 meters	The design of the wells is the same as for rain intakes. A path of crushed stone 20-25 cm thick and 1-1.5 meters wide is laid around the perimeter of the well.

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 4.2. Components of Drain-Runoff System of Artificial Airfield Pavements

Name of Component	Designation	Brief Characteristics
Collectors	To receive water from collectors, rain-intakes and bin drains and to discharge it beyond the airfield. The collectors are arranged along the edges of the pavement at a distance of 5-10 meters from it	Asbestos-cement, concrete and reinforced concrete pipes laid on a specially prepared base with minimum slope of 0.002 are used to install collectors. The minimum dimensions of the collector are 200 mm. Concrete and reinforced concrete pipe 300-600 mm in diameter are laid for reinforced concrete collector components while those more than 600 mm in diameter are laid on a base of monolithic concrete or reinforced concrete. The depth of laying is not less than that of the soil freeze point
Manholes	For operational maintenance and repair of the runoff system. Manholes are installed on the path of collectors at points where overflows or other runoff lines join, at turns of the route, when the slopes or pipe diameter vary, at the beginning of the collector and on straight sections of it. Manholes can also be installed on collector routes at the points where pipe drains join the collector, at points where the collector route turns and at the beginning of the collector section	Made of sectional reinforced concrete components, monolithic concrete and brick. They can be rectangular and circular in cross-section and deepened with outlets to the surface for cover arrangement. The manholes are circular with collector diameters up to 600 mm and rectangular with diameters of 600-800 mm
Rain-intake wells	To collect water running along an open chute of VPP, RD and MS pavement and to discharge	They are installed in the form of a rectangular pit of sectional reinforced concrete components or monolithic concrete. The pits are covered on top with metal gratings
Discharge structures (sills)	To receive water near its output from the collector to a water intake	Consist of a supporting wall, covers and chute. They are made of precast concrete components, monolithic concrete, quarrystone and brick

[Continued on following page]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 4.2 (Continued).

Name of Component	Designation	Brief Characteristics
Bin drains	To remove water from filtering beds of pavement. They are located along the edges of the pavement at a distance of 1-2 meters from it. The water coming into the bin drain is discharged through a pipe to the collector well	The structure of the working part of the drain is similar to a pipe drain. The filter fill of the bin drain reaches the bed of the pavement in height
Deep drains	To reduce groundwaters under pavement. They are located along the edges of the pavement	The height of the filter fill above the level of the pipe is only 25-30 cm. A layer of sod and then soil are placed above the fill. The pipes are laid below the soil freeze point
Open chutes	To collect water flowing along the surface of the pavement and to discharge it to rain intakes	The cross-section of the chute is triangular. The longitudinal slope of the chute is not less than 0.0025
Overflows	To discharge water from rain intake (thalweg) wells to the collector	Of asbestos-cement pipe 141-322 mm in diameter. Overflows from rain-intake wells should have a slope of 0.02-0.03 while those from Thalweg wells should have one of 0.005-0.03

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 4.3. Precast Bases for Concrete and Reinforced Concrete Pipes of Runoff Collectors

(1) Внутренний диаметр, мм	(2) Размеры основания, мм				(7) Разрушающая нагрузка на прессе, кгс	(8) Марка бетона	(9) Расход материалов		
	(3) Высота H	(4) Ширина A	(5) Длина звена z	(6) Радиус обхвата R			(10) Бетон, м³	(11) Сталь, кг	(12) Масса, т
300	250	550	2 000	220	4 430	300/50	0,21	3,38	0,505
500	350	850	2 000	340	11 500	300/50	0,43	3,71	1,005

Key:

1. Inner diameter, mm
2. Base dimensions, mm
3. Height H
4. Width A
5. Length of section z
6. Radius of perimeter R
7. Breaking load on press, kgf
8. Mark of concrete
9. Consumption of materials
10. Concrete, m^3
11. Steel, kg
12. Mass, tons

Table 4.4. Reinforced Concrete and High-Strength Concrete Pipes for Installation of Runoff Collectors

(1) Класс объекта	(2) Трубы	(3) Размеры, мм			(5) Разрушающая нагрузка при испытании на прессе, кгс	(6) Марка бетона	(7) Расход материала на 1 пог. м трубы		(10) Масса, т
		$D_{внутр}$	(4) Толщина δ	$D_{нар}$		$R_{сж}$ / $R_{р.изг}$	(8) Бетон, м³	(9) Сталь, кг	
I	(11) Железобетонные	500	80	660	5 980	200	0,146	12,3	0,365
		750	80	910	8 800		0,251	23,86	0,628
		1 000	120	1 240	10 700		0,422	58,46	1,094
	(12) Бетонные	1 250	140	1 530	12 700		0,620	82,96	1,530
		300	60	420	4 100	300/40	0,070	—	0,168
					6 430	300/50			
					5 870	300/50			
II	(11) Железобетонные	500	80	660	4 720	200	0,146	10,68	0,365
		750	80	910	6 430		0,251	19,60	0,628
		1 000	120	1 240	7 700		0,422	43,19	1,084
		1 250	140	1 530	9 100		0,620	69,13	1,517

Key:

1. Class of facility
2. Pipes
3. Dimensions, mm
4. Thickness
5. Breaking load during testing on press, kgf
6. Mark of concrete
7. Consumption of material per running meter of pipe
8. Concrete, m^3
9. Steel, kg
10. Mass, tons
11. Reinforced concrete
12. Concrete

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 4.5. Precast Pits

(1) Наименование элемента	(2) Расход материалов		(5) Масса, т
	(3) Бетон, м³	(4) Сталь, кг	
(6) *Прямоугольный колодец 70×70 см*			
(7) Верхнее звено	0,405	7,65	0,97
Нижнее звено с днищем при $d_{нар}$ = = 42 см (8)	0,74	25,44	1,780
(9) *Прямоугольный колодец 100×100 см*			
(10) Горловина колодца	0,47	10,31	1,13
Среднее звено (11)	0,59	11,11	1,42
Нижнее звено с днищем (12)	0,96	43,73	2,31
(13) *Круглый колодец D = 70 см*			
(7) Верхнее звено	0,306	6,62	0,735
Нижнее звено с днищем при (8) $d_{нар}$ = = 42 см	0,640	24,68	1,535
Круглый колодец D = 100 см			
Горловина колодца	0,37	8,65	0,885
Среднее звено	0,46	9,27	1,11
Нижнее звено с днищем	0,93	35,32	2,26
(14) *Дождеприемный колодец с одной решеткой*			
(14) Дождеприемный колодец с одной решеткой	0,73	7,11	1,85
(15) *Прямоугольный колодец с решетчатой крышкой и отстойником*			
Верхнее звено	0,522	8,04	1,29
Нижнее звено с днищем (16) при высоте 105 см	0,856	27,99	2,05
(17) *Дождеприемные и тальвежные колодцы с двумя решетками*			
Верхнее звено	0,43	6,7	1,22
Нижнее » (18)	1,28	7,65	3,10
(19) *Дождеприемные и тальвежные колодцы с тремя решетками*			
Верхнее звено	0,63	8,9	1,60
Нижнее »	1,95	10,51	4,95

Key:

1. Name of component
2. Consumption of materials
3. Concrete, m^3
4. Steel, kg
5. Mass, tons
6. Rectangular pit 70 X 70 cm
7. Upper section
8. Lower section with bottom at d_{nar} = 42 cm
9. Rectangular pit 100 X 100 cm

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

10. Manhole
11. Middle section
12. Lower section with bottom
13. Circular pit D = 70 cm
14. Drain-intake pit with single grating
15. Rectangular pit with grating cover and settling tank
16. Lower section with bottom at height of 105 cm
17. Drain-intake and thalweg pits with two gratings
18. Lower section
19. Drain-intake and thalweg pits with three gratings

Shoulder drains are installed upon completion of work to construct the dirt base under the pavement or simultaneously with it.

Open concrete gutters on pavements are installed during concreting of the gutter row while closed gutters are installed before concreting of the pregutter row.

Dirt gutters along the edges of the pavement are installed after completion of work to install the pavement.

Work to install runoff collectors should usually keep ahead of excavation work on the airfield. This work is performed in the following production sequence: digging of trenches (ditches) and reinforcing their walls, installation of the bases for pipes and pits, installation of manholes, laying pipes and finishing joints, checking pipelines for water tightness, lowering the pipes into the trenches with packing of the soil and installation of sills.

When laying collector pipes, the strength and tightness of the butt joints, tight abutment of the pipes to the base, stability of the pipelines against shearing forces and adherence to the planned profile of the pipeline must be provided. The pipes are laid only from bottom to top along a slope. Pipes should be laid after the conformity of the base marks to the planned marks are checked and prior to the concrete in the base reaching not less than 50 percent of its planned strength.

Excavation work in digging trenches under collectors should move ahead of pipe laying. The bottom of the trench should be protected during the fall and winter season against freezing by incomplete removal of the soil or covering it with insulation.

Fill should be poured and packed not less than 5 cm from the planned mark of the top of the collector if the runoff collector initially passes through the fill and the trench should then be opened and the collector should be laid. Digging trenches for pipes and also holes for pits below groundwater level should be carried out after their level has been artificially lowered or by using open water discharge.

When filling in trenches, the soil must be packed in layers without permitting damage to the joints of the pipe and moving it. The wall reinforcement of the trenches should be removed prior to this.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 6. Diagrams of Runoff and Drain Systems (Profile and Layout) of Airfield Pavements: 1--thalweg pit; 2--dirt chute; 3--bridge; 4--pavement; 5--chute in edge of pavement; 6--manhole; 7--bed with drain layer; 8--water-intake pit; 9--overflow; 10--collector; 11--edge drain; 12--base without drain layer

Key:
1. Diagram

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 7. Manholes and Rain-Intake Pits: a--circular manhole; b--rectangular rain-intake pit with one-section grating; c--rectangular rain-intake pit with three-section grating; d--rectangular rain-intake pit with two-section grating

(Figure continued on following page)

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 7 (Continued from preceding page).

In winter trenches should be filled 0.5 meter above the pipeline with local thawed soil immediately after the pipe has been laid with the layers being packed no more than 0.2 meter, while sections of trenches under pavement should be filled with sandy soils to the entire depth of the trench with careful layer by layer packing and installation of barriers against spring flooding. The pipe joints should be insulated prior to the completion of preliminary testing for water permeability.

Lateral grooves are concreted after the joints of concrete and reinforced concrete pipe have been finished. The concrete mixture should be packed with deep vibrators. The form must be removed no sooner than 12 hours after concreting. Maintenance of the concrete should be performed by wetting it or applying a waterproofing film to it.

Shoulder drains are installed in the following sequence: the trenches are dug for drain pipe, the sand base is installed and the drainpipe is laid on it, the notches and joints of the pipe are packed with moss or another filter material and the trench is filled in with drain material.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Portholes and Thalweg pits are installed in the following sequence: layout of the pit location in cross-section, digging the trench, preparation of the base, concreting or installation of precast components of the bottom and walls of the lower part of the pit, installation of flexible abutment of pipes, installation of the gutter, concreting or installation of precast components of the walls of the upper part of the pit and filling in the ditches (trenches) with packing of the soil.

Prefabricated pits of rings are installed in the following sequence: laying out the position of the lower ring on the bottom, application of mortar in a ratio of 1:2 not less than 2 cm thick on the bottom, installation of the lower ring with holes for collector pipes, joining the collector pipes and finishing the circular slits between pipes and the walls of the pit with resin oakum and waterproofing mastic, installation of the form for the gutter and concreting of the gutter, wiping the surface of the gutter with mortar after the form is removed, application of a two-centimeter layer of mortar to the upper cut of the bottom ring and installation of the second ring, then of the third and so on and wiping the joints between the rings on both sides.

The ring is backfilled after the hatch and cover have been installed.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 5. CONSTRUCTION OF FLEXIBLE PAVEMENT

[Text] 5.1. Construction of Pavement and Beds from Reinforced Soils

It is recommended when constructing pavements and beds from reinforced soils that the reinforced mixtures be prepared in mobile mixing units with forced mixing and in the case of mixing soil with binders that one-pass soil-mixing machine be used at the site.

Rotary hoes may be used to treat soils in construction of pavements and beds of airfields of classes E and F and in agricultural aviation. The plasticity number of argillaceous soils should not be more than 0.22 in this case.

Fractions coarser than 40 mm should be first screened when preparing reinforced mixtures from large-fragment soils of them in units.

Soils reinforced with binders by mixing on the site should not contain fractions coarser than 25 mm.

Argillaceous soils are pulverized prior to treating them with binders. The content of dust-clay clumps coarser than 5 mm should not exceed 25 percent by mass, including 10 percent of pieces coarses than 10 mm in the pulverized soil.

The mixture prepared in a unit is laid or soil with binder is treated on the site with optimum moisture content of the dirt trough.

The composition and sequence of performing the work when installing pavements and bases from reinforced soils are presented in Table 5.1.

The amount of water or salt solutions added to the mixture when preparing it in a unit or mixing it on the site are determined by the formula

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.1. Composition and Sequence of Performing Work When Installing Pavements and Bases of Reinforced Soils

Driving Machine	Composition and Sequence of Performing Work
Quarry mixing unit	Preparation of reinforced mixture in unit. Hauling, distribution and levelling of mixture. Packing of mixture. Maintenance of laid pavement or bed
Single-pass mixing machine	Excavation, hauling, levelling and grading of reinforced soil. Packing soil to density of 0.85-0.9 of maximum. Pulverization of soil (in the case of reinforcing argillaceous soils). Working soil with soil-mixing machine at working rate of 0.4-0.7 km/hr when treating large-fragment and sandy soils, 0.23 km/hr when treating sandy loams and light loams and 0.1 km/hr when treating heavy loams and clays. Packing of reinforced soil. Maintenance of laid pavement or bed
Rotary hoes	Excavation, hauling, levelling and grading of soil to be strengthened. Packing of soil to density of 0.85-0.9 of maximum. Pulverization of argillaceous soils with two-three passes of hoe on the same track and working speed of 0.23 km/hr when pulverizing sandy loam and light loam soil and 0.1 km/hr when pulverizing heavy loams and clays. Application of binder to soil. Mixing of soil and binder. Wetting mixture to optimum moisture content through the proportioning device of the hoe or by using water machines. Mixing the moistened mixture to homogeneous state. Shaping and packing of strengthened mixture. Maintenance of laid pavement or bed

Note. The soil should be moistened to the optimum moisture content prior to application of the binder to the soil when strengthening soils with organic binders by a single-pass soil-mixing machine or rotary hoes.

$$P_{\text{п}} = \frac{P}{1+\frac{W}{100}}\left(\frac{W_{\text{п}}}{100} - \frac{W}{100}\right),$$

where P is the mass of the soil subject to moistening, tons, W is the natural moisture content of the soil, percent by mass, and W_o is the optimum moisture content of the mixture, percent by mass.

The amount of organic binder added to the mixture and water contained in the asphalt emulsion are taken into account when determining the required amount of water.

It is recommended that the finished mixer prepared in quarry mixing units be laid by using a motorized universal placer (in strengthening with mineral binders) or asphalt laying machine (in strengthening with organic binders).

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The mixture is distributed and graded with motorized graders in the absence of placers and also in strengthening soils by the on-site mixing method.

It is recommended that motorized graders equipped with automated blade control system Profil' 1, which permits grading operations to be carried out by maintaining a specific angle of transverse profile without manual control of the blade angle.

The mixture is levelled and graded with a motorized grader equipped with the Profil' 1 system during three cycles by the shuttle scheme with no-load backwards pass.

Rough levelling of the mixture is carried out in the first cycle, which is performed in the manual mode of controlling two passes of the shaper on the same track (with overlapping of tracks by 0.7 meter).

Final levelling and preliminary grading of the mixture is carried out in the second cycle, performed in the automatic mode of controlling the blade with minimum sensitivity of the automatic system by a single pass of the shaper on the same track.

Final grading of the mixture to the design marks with regard to the margin for packing is carried out in the third cycle, performed in the automatic mode.

One is guided by the following rules when strengthening soils by the on-site mixing method:

additives of surfactants used to retard the setting of the mixture prove packing conditions or additives used in complex strengthening of soils are added to the soils prior to application of the main binder to it, they are mixed with the soil with a hoe and the soil is packed to density of 0.85-0.9 of maximum;

oil is first introduced to the soil and then cement and water are added in sequence when strengthening soils with cement having additives of crude petroleum;

the binder is applied to the soil at the full rate during the first pass of the hoe when treating soils with organic binders using rotary hoes.

Optimum wetted soil is packed with rollers or pneumatic tires with overlapping of each previous pass by not less than 20 cm.

The number of passes of the roller over the same track, which must be done to pack the mixture to the given density, is determined experimentally and it can be approximately taken equal to 12-18 when packing mixtures of soils and mineral binders, 10-15 when packing mixtures of soils and liquid asphalts, tars and emulsions with active additives and surfactants and 5-10 when packing mixtures of soils and asphalt emulsions or liquid asphalt together with cement.

Film-forming materials are applied to the surface using a motorized road oiler at the rate of 1-1.2 liters/m^2 upon completion of packing to maintain the wetted pavement or bed.

Operations to install pavements or beds of strengthened soils are performed in sections, the length of which are designated at 250-300 meters when treating

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

large-fragment and sandy soils using a single-pass soil-mixing machine and 150-200 meters in remaining cases.

The approximate laboriousness of work to install some types of pavements (beds) of strengthened soils, the brigade compositions and the need for basic machines, inventory and tools are presented in Tables 5.2-5.7.

Table 5.2. Laboriousness of Performing Work When Installing Soil-Cement Pavement or Bed From Mixture Prepared in Mixing Plant

(1) Технологические операции	(2) Единица измерения	(3) Объем работ	(4) Трудоемкость на весь объем работ, чел-ч
(5) Разбивочные работы, ограждение участка работ, прием смеси, ручная планировка, контроль ровности поверхности, уклона и толщины укрепляемого слоя	(6) чел/ч	—	16
(7) Подготовка автогрейдера к работе, ремонтная планировка грунтового основания перед устройством укрепляемого слоя, настройка САР автогрейдера, разравнивание и планировка укрепленной смеси	м²	1600	4,6
(8) Укатка грунтового основания после ремонтного профилирования и укатка укрепляемого слоя катком на пневматических шинах	м²	1600	3,9
Розлив пленкообразующих жидкостей автогудронатором (9)	т	1,6	0,8
Итого за сменную захватку 200 м (1600 м²) (10)			25,3

Note. The labor expenditures of road grader and roller operators for work performed in the absence of a work front are not included in the labor factor

Key:

1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness for entire volume of work, man-hours
5. Layout work, enclosure of work section, reception of mixture, manual levelling, checking the evenness of the surface, slope and thickness of the strengthened layer
6. Man/hours
7. Preparation of motorized grader to work, repair grading of dirt bed prior to installation of strengthened layer, adjustment of motorized grader automatic control system and levelling and grading of strengthened mixture
8. Rolling dirt bed after repair shaping and rolling of strengthened layer with roller on pneumatic tires
9. Pouring of film-forming liquids with road oiler
10. Total for shift section of 200 meters (1,600 m^2)

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.3. Laboriousness of Performing Work to Install Soil-Cement Pavement or Bed Using DS-16B (D-391-B) Machine

(1) Технологические операции	(2) Единица измерения	(3) Объем работ	(4) Трудоемкость на весь объем работ, чел-ч
(5) Профилирование автогрейдером грунтового основания	м²	1600	1,5
Подкатка грунтового основания пневмокатком (6)	м²	1600	1,7
Разбивочные работы (7)	(8) чел-ч	—	2
Разравнивание и планировка завезенного грунта автогрейдером (9)	м²	1600	0,7
Удаление из грунта посторонних включений (10)	чел/ч	—	4,7
Прикатка грунта катком (11)	м²	1600	1,4
Обработка грунта машиной ДС-16Б (Д-391-Б) (12)	м²	1600	16
Профилирование грунтоцементной смеси автогрейдером с исправлением дефектных мест вручную и проверкой профиля по шаблону (13)	м²	1600	8,0
Уплотнение грунтоцементной смеси (14)	м²	1600	2,0
Розлив пленкообразующей жидкости автогудронатором (15)	т	1,6	0,8
(16) Итого на сменную захватку 200 м (1600 м²)			38,8

Key:
1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness for entire volume of work, man-hours
5. Shaping dirt bed with motorized grader
6. Rolling dirt bed with pneumatic roller
7. Layout work
8. Man-hours
9. Levelling and grading of hauled-in soil with motorized grader
10. Removal of foreign objects from soil
11. Rolling soil with roller
12. Working soil with DS-16B (D-391-B) machine
13. Shaping soil-cement mixture with road grader with correction of defective points by hand and checking the shape by a template
14. Packing soil-cement mixture
15. Pouring film-forming liquid with road oiler
16. Total for shift section of 200 meters (1,600 m^2)

Strengthening soils with cement at reduced temperatures (from +5 to -10°C). The following requirements should be observed when constructing pavement or beds from soils strengthened with cement at reduced temperatures (from +5 to -10°C):

the moisture content of the soil to be treated should not be more than 0.7 of that on the flowability boundary;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.4. Laboriousness of Performing Work to Install Pavement or Bed 16 cm Thick From Soil Strengthened with Cement by On-Site Mixing Using Hoes

(1) Технологические операции	(2) Единица измерения	(3) Объем работ	(4) Трудоемкость на весь объем работ, чел-ч
(5) Подготовительно-заключительные работы	—	—	2,66
Профилирование автогрейдером грунтового основания (6)	м²	1500	0,92
Уплотнение катком грунтового основания (7)	(8) То же	1500	1,33
Разбивочные работы (9)	»	—	2,0
Удаление из грунта посторонних включений (10)	»	—	4,33
Разравнивание и планировка укрепляемого грунта автогрейдером (11)	»	1500	0,58
Размельчение грунта дорожными фрезами (12)	»	1500	13,5
Введение цемента в грунт распределителем цемента (13)	»	1500	6,66
Перемешивание смеси фрезами с одновременным увлажнением водой (14)	»	1500	9,5
Разравнивание и планировка смеси автогрейдером (15)	»	1500	1,67
Проверка поперечного профиля по шаблону с исправлением отдельных мест вручную (16)	—	—	5,67
Уплотнение цементогрунтовой смеси катком (17)	м²	1500	2,08
Розлив пленкообразующих материалов автогудронатором (18)	т	1,5	0,7
Итого на сменной захватке длиной 200 м (1500 м²) (19)			51,6

Key:

1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness for entire volume of work, man-hours
5. Preparatory-final operations
6. Shaping dirt bed with motorized grader
7. Packing dirt bed with roller
8. m^2
9. Layout work
10. Removal of foreign objects from soil
11. Levelling and grading of strengthened soil with motorized grader
12. Pulverization of soil with rotary hoes
13. Introduction of cement to soil with cement mixer
14. Mixing of mixer with hoes with simultaneous wetting with water
15. Levelling and grading of mixture with motorized grader
16. Checking transverse profile by template with correction of individual locations by hand

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]

17. Packing cement-soil mixture with roller
18. Pouring film-forming materials with road oiler
19. Total on shift section 200 meters long (1,500 m^2)

Table 5.5. Laboriousness of Performing Work to Install Pavement or Bed 16 cm Thick From Soil Strengthened with Asphalt Emulsion and Cement by On-Site Mixing Using Hoes

(1) Технологические операции	(2) Единица измерения	(3) Объем работ	(4) Трудоемкость на весь объем работ, чел-ч
Подготовительно-заключительные работы (5)	—	—	2,91
Профилирование поверхности основания автогрейдером (6)	м²	1600	0,91
Укатка грунтового основания катком (7)	(8) То же	1600	0,58
Разравнивание грунта по ширине 7 м автогрейдером (9)	»	1400	0,42
Удаление из грунта крупных комьев и посторонних включений (10)	»	1600	8,0
Укатка спланированного грунта катком (11)	»	1400	0,5
Размельчение грунта фрезой за два прохода по одному следу (скорость от 173 до 207 м/ч) (12)	»	1400	9,52
Введение в грунт битумной эмульсии фрезой за один проход по одному следу (скорость 207 м/ч) (13)	»	1400	3,5
Перемешивание грунта с битумной эмульсией двумя фрезами за два про- (14)	»	1400	4,0

Key:
1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness for entire volume of work, man-hours
5. Preparatory-final operations
6. Shaping surface of bed with motorized grader
7. Rolling dirt bed with roller
8. m^2
9. Levelling of soil to width of 7 meters with motorized grader
10. Removal of large clods and foreign objects from soil
11. Rolling graded soil with roller
12. Pulverization of soil with hoe within two passes on same track (speed from 173 to 207 m/hr)
13. Introduction of asphalt emulsion to soil with hoe during one pass on same track (speed of 207 m/hr)
14. Mixing soil with asphalt emulsion by two hoes during two passes on same track (speed of 360 m/hr)

[Table and key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.5 (Continued).

Технологические операции	Единица измерения	Объем работ	Трудоемкость на весь объем работ, чел-ч
хода по одному следу (скорость 360 м/ч)			
Наблюдение за распределителем цемента (15)	—	—	2,0
Сухое перемешивание смеси с цементом за один проход фрезы по одному следу (скорость 450 м/ч) (16)	м²	1400	1,6
Увлажнение смеси при помощи фрезы за один проход по одному следу (скорость 450 м/ч) (17)	м²	1400	2,07
Перемешивание увлажненной смеси фрезой за один проход по одному следу (скорость 450 м/ч) (18)	(8) То же	1400	2,07
Разравнивание и профилирование готовой смеси по всей ширине основания (8 м) автогрейдером под укатку (19)	»	1600	1,8
Проверка профиля основания и толщины слоя, исправление отдельных дефектных мест (20)	»	1600	5,17
Уплотнение смеси катком по всей ширине основания (21)	»	1600	1,5
Подача из автобитумовоза битумной эмульсии в распределительную систему фрезы (22)	т	41,7	3,75
Загрузка цементом распределителя цемента (23)	(28) То же	16,7	0,83
Распределение цемента по слою смеси грунта с битумной эмульсией (24)	м²	1400	0,67
Подача воды поливочными машинами в распределительную систему фрезы для увлажнения смеси (25)	м³	26	2,07
Розлив пленкообразующего материала автогудронатором (26)	т	1,65	0,8
Итого на сменной захватке длиной 200 м (1600 м²) (27)			54,67

[Key continued from preceding page]:

15. Observation of cement distributing machine
16. Dry mixing of mixture with cement during one pass of hoe on same track (speed of 450 m/hr)

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

17. Wetting mixture using hoe within one pass on same track (speed of 450 m/hr)
18. Mixing moistened mixture with hoe during one pass on same track (speed of 450 m/hr)
19. Levelling and shaping of finished mixture over entire width of bed (8 meters) with motorized grader for rolling
20. Checking shape of bed and thickness of layer and correction of individual defective points
21. Packing of mixture with roller over entire width of bed
22. Delivery of asphalt emulsion from asphalt truck to distrubting system of hoe
23. Loading cement distributor with cement
24. Distribution of cement along layer of soil and asphalt emulsion mixture
25. Delivery of water by water machines to distributing system of hoe to wet mixture
26. Pouring film-forming material with road oiler
27. Total on shift section 200 meters long (1,600 m^2)
28. Tons

Table 5.6. Compositions of Brigades and Need for Machines and Mechanisms When Installing Pavement and Beds of Strengthened Soils

Name of Work and Method of Strengthening	Composition of Brigade	Machines Used: Name	Machines Used: Number
Installation of dirt-cement pavement or bed from mixture prepared in a plant with distribution of mixture by motorized grader	Motorized grader operator, sixth rank--1 Pneumatic roller operator, sixth rank--1 Road workers: fourth rank--1 third rank--1	DZ-31-1-2 (D-557-1-2) motorized grader DU-31A (D-627A), DU-29 (D-624) pneumatic roller	1 1
Installation of dirt-cement pavement or bed using single-pass dirt-mixing machine	Soil-mixing machine operator, sixth rank--1 Assistant operator, fifth rank--1 Motorized grader operator, sixth rank--1 Pneumatic roller operator, sixth rank--1 Road workers: third rank--1 second rank--1	DS-16B (D-391B) Soil-mixing machine D3-31-1 (D-557-1) Motorized grader DU-31A (D-627A), DU-29 (D-624) Pneumatic roller	1 1 1

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.6 (Continued).

Name of Work and Method of Strengthening	Composition of Brigade	Machines Used: Name	Machines Used: Number
Installation of dirt-cement pavement or bed using rotary hoes	Motorized grader operator, sixth rank--1 Pneumatic roller operator, sixth rank--1 Rotary hoe operators, sixth rank--3 Cement distributing machine operator, fifth rank--1 Road workers: fourth rank--1 second rank--1	DS-18A (D-530A) Rotary hoe DS-9 (D-343B) Cement distributing machine DZ-31-1-2 (D-556-1-2) Motorized grader DU-31A (D-627A), DU-29 (D-624) Pneumatic roller	3 1 1 1
Installation of pavement or bed of soil strengthened with asphalt emulsion and cement using rotary hoes	Rotary hoe operators, sixth rank--3 Motorized grader operator, sixth rank--1 Pneumatic roller operator, sixth rank--1 Road workers: fourth rank--1 second rank--1	DS-18A (D-530A), DS-74 Rotary hoes DZ-31-1-2 (D-557-1-2) Motorized grader DU-31A (D-627A), DU-29 (D-624) Pneumatic roller DS-9 (D-343B), DS-72 Cement distributing machine	3 1 1 1

Note. Machines (dump trucks, scrapers, cement trucks, water trucks, road oilers and so on), the number of which is determined by calculation as a function of the hauling distance and the need for materials or which are assigned to a brigade for temporary work, for example, a road oiler for pouring film-forming liquids, are not taken into account in the table.

the soil-cement should harden at air temperature not below -10°C;

salt additives according to the data of Table 5.8 should be introduced to the soil to reduce the freezing point of the liquid phase;

strengthening a mixture of coarse-fragment and sandy soils should be prepared in mixing plants while strengthening argillaceous soils should be prepared with single-pass soil-mixing machines. In the latter case adding water-binding additives to the soil and mixing soil with them are carried out with a cement distributing machine and rotary hoe and the length of the section should not be more than 120 meters;

packing of the strengthened mixture should be completed no later than 5 hours after additives that reduce the freezing point of the liquid phase of the mixture have been introduced to the soil;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.7. Implements and Tools Used in Constructions of Pavements and Beds From Soils Strengthened with Binders

Наименование инвентаря и инструмента (1)	Количество (2)	Наименование инвентаря и инструмента	Количество
Нивелир (3)	1	Мерник толщины слоя (10)	1
Нивелирные рейки (4)	2	Визирки, комплект (11)	1
Лента мерная (5)	1	Рулетка измерительная (12)	1
Прибор Ковалева (6)	1	Вешки деревянные (13)	10
Уровень строительный длиной 1 м (7)	1	Лопаты строительные (14)	2
Шаблон для проверки профиля (8)	1	Комплект ограждения и сигнальных знаков (15)	1
Рейка длиной 3 м (9)	1		

Key:
1. Name of implement and tool
2. Quantity
3. Leveller
4. Levelling rods
5. Tape measure
6. Kovalev's device
7. One-meter construction length level
8. Template to check profile
9. Straight edge 3 meters long
10. Layer thickness gauge
11. Sighting devices, set
12. Measuring reel
13. Wooden stakes
14. Construction spades
15. Set of barriers and signal devices

the freshly laid soil-cement is maintained with a layer of sand 6-8 cm thick.

Table 5.8. Amount of Salt Additives That Reduce Freezing Point of Liquid Phase of Mixtures

(1) Температура воздуха и грунта, °С	Концентрация растворов солей в грунтоцементной смеси (содержание безводных солей), % по массе (2)		
	$CaCl_2$	NaCl	K_2CO_3
(3) От −1 до −5 (4)	8	9	10
» −5 » −7	13	15	17
» −7 » −10	17	20	19

Key:
1. Air and soil temperature, °C
2. Concentration of salt solutions in soil-cement mixture (content of anhydrous salts), percent by mass
3. From
4. To

Strengthening soils with moisture content above optimum. It is permitted to strengthen these soils with cement, lime or lime-slag binder if the following conditions are observed:

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

the moisture content of the soil to be strengthened should not exceed values presented in Table 5.9;

the dirt trough should be constructed from soil having optimum moisture content and packed to the required density;

the pavement or bed of overmoistened soil can be laid only in a single layer not more than 22 cm thick in a compact body;

the moisture content of the dirt trough overmoistened as a result of precipitation falling on the upper layer to a depth of not more than 25 cm should not exceed 1.6 W_o (0.9 W_t) for sands and light sandy loams, 1.4 W_o (0.8 W_t) for dusty and heavy dusty sandy loams and light loams and 1.3 W_o (o.7 W_t) for heavy loams and clays. Here W_o and W_t are the optimum moisture content and the moisture content of the soil on the flowability boundary, respectively;

the upper overmoistened layer of the dirt trough is treated with additives of crushed unslaked lime with CaO + MgO content not less than 50-60 percent or with portland cement of mark not above 300, the amount of which is designated according to the data of Table 5.10, to dry it.

Table 5.9. Maximum Permissible Moisture Content of Soils to be Strengthened

Грунты (1)	Допускаемая влажность (в долях от оптимальной) при коэффициенте уплотнения 1 0,98 (2)
Пески пылеватые (3)	1,35
Супеси легкие (4)	1,25
» пылеватые, тяжелые пылеватые, суглинки легкие (5)	1,15
Суглинки тяжелые, глины песчаистые и глины пылеватые (6)	1,1

Key:
1. Soils
2. Permissible moisture content (in fractions of optimum) with packing coefficient of 1-0.98
3. Dusty sands
4. Light sandy loams
5. Dusty and heavy dusty sandy loams and light loams
6. Heavy loams and sandy and dusty clays

5.2. Construction of Pavements and Beds From Crushed Stone Materials Treated With Organic Binders

Pavements from crushed stone materials treated with organic binders are used on airfields with normative loads of categories IV-VI in road-climatic zones I-V.

Construction of crushed-stone pavements and beds by the impregnation method. Impregnation in a layer 8-10 cm thick and semi-impregnation in a layer 4-7 cm thick are distinguished as a function of the thickness of the pavement or bed layer.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.10. Amount of Drying Additives Introduced to Soil

(1) Грунты	(2) Количество добав., вносимых в грунт при влажности его в относительных единицах от оптимальной				
	1,2	1,4	1,6	1,2	1,4
	(3) Добавки молотой негашеной извести, % массы грунта			(4) Добавки портландцемента марки 300, % массы грунта	
Пылеватые пески и супеси (5)	—	0,5	1	—	1,5
Суглинки легкие (6)	—	0,5	1,5	0,5	1,5
» тяжелые (7)	1,0	2	—	1	3
Глины песчанистые и пылеватые (8)	1,5	3	—	3	5

Key:
1. Soil
2. Amount of additives introduced to soil with moisture content in relative units of optimum
3. Additives of crushed unslaked lime, percent of soil mass
4. Additives of portland cement of mark 300, percent of soil mass
5. Dusty sands and sandy loams
6. Light clays
7. Heavy clays
8. Sandy and dusty clays

Pavement and beds are installed by the impregnation (semi-impregnation) method in the absence of rain during the warm season of the year at air temperature of not less than +5°C in spring and summer and not below +10°C in fall.

Installation of pavements and beds by the impregnation method includes preparatory work, installation of pavement or beds and maintenance of the finished pavement or bed during forming. Preparatory work includes acceptance of the bed, height and cross-sectional layout and installation of lateral supports. A binder is poured at the rate of 0.8-1.0 liters/m^2 on the finished surface if the pavement or bed thickness is not more than 6 cm in those cases when the state of the surface of the underlying layer does not provide adhesion to the new layer.

Pavement is installed from three or four fractions of crushed stone and the bed is installed from two or three fractions as a function of the thickness of the layer and the size of the coarsest fraction of crushed stone.

The maximum size of the crushed stone for pavement or bed should not exceed 0.9 the thickness in a dense body.

The consumption of crushed stone of the first (coarsest) fraction should be determined from calculation of 0.9 of the design thickness of the pavement with an increase of this volume by 1.25 for packing.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The second fraction of crushed stone when using two or three fractions or the second and third fraction when using four fractions are intended for wedging.

The last fraction of crushed stone when installing a pavement is intended to create a dense waterproof cover. Its consumption is 0.9-1.1 m^3 per 100 m^2.

The sequence of work in construction of pavements and beds from crushed stone materials treated with organic binders, the consumption of materials, the recommended marks of asphalt and their heating temperature are presented in Tables 5.11-5.12.

Table 5.11. Sequence of Work in Construction of Pavements and Beds and Consumption of Materials

(1) Последовательность работ	(2) Расход материалов при толщине покрытия или основания, см			
	8–10		4–7	
	(3) Покрытие	(4) Основание	Покрытие	Основание
(5) Распределение основной фракции щебня размером 40—70 мм, м³/100 м²	9–11	9–11	-	
(6) Уплотнение катком, число проходов по одному следу	5—6	5—7	-	-
Розлив вяжущего, л/м² (7)	6–8	8–10	-	-
(8) Распределение расклинивающей (для покрытия) или основной (для основания) фракции щебня размером 20—40 (25—40) мм, м³/100 м²	1–1,1	1—1,4	5,5—8,0	5,5—8,0
Уплотнение катком, число проходов по одному следу (6)	2,4	5—7	4—5	5—7
Розлив вяжущего, л/м² (7)	2,3	—	5—7	5—7
(9) Распределение второй расклинивающей фракции щебня размером 10—20 мм (15—25 мм), м³/100 м²	1–1,1	—	0,9–1,1	1,0–1,2
Уплотнение катком, число проходов по одному следу (6)	3—4	—	3,4	5—7
Розлив вяжущего, л/м² (7)	1,5—2	—	1,5—2	—
(10) Распределение замыкающей фракции щебня размером 5 (3) — 10 или 5 (3) — 15 мм, м³/100 м²	0,9—1,1	—	0,9—1,1	—
Уплотнение катком, число проходов по одному следу (6)	3—4	—	3—4	—

Note. The lowest norm of consumption of the main crushed stone fraction and binder during the first pouring is related to the least thickness of the pavement, while the highest norm of consuming these materials is related to the greatest thickness.

Key:

1. Sequence of work
2. Consumption of materials with pavement or bed thickness, cm
3. Pavement
4. Bed
5. Distribution of main crushed stone fraction measuring 40-70 mm, $m^3/100\ m^2$
6. Packing with roller, number of passes on same track
7. Pouring binder, liters/m^2
8. Distribution of wedging (for pavement) or main (for bed) fraction of crushed stone measuring 20-40 (25-40) mm, $m^3/100\ m^2$

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

9. Distribution of second wedging fraction of crushed stone measuring 10-20 mm (15-25 mm), $m^3/100\ m^2$
10. Distribution of closing fraction of crushed stone measuring 5 (3)-10 or 5 (3)-15 mm, $m^3/100\ m^2$

Table 5.12. Recommended Marks of Asphalts and Heating Temperature

(1) Климатическая зона	(2) Марка битума	(3) Температура нагрева, °С	
		(4) без добавки ПАВ	(5) с добавкой ПАВ
II, III	[illegible]	[illegible]	[illegible]
	[illegible]	100 120	90 100
	[illegible]	130 150	110 130
IV, V	[illegible]	[illegible] 120	90 100
	[illegible]	[illegible]	110 130

Note. 1. Asphalts of marks BND can be replaced with asphalts of marks BN with the same viscosity.

2. The consumption of asphalt comprises approximately 1-1.1 liter/m^2 per centimeter of pavement and additionally 1.5-2 liters/m^2 for pavement only.

3. The length of aging the binder at working temperature should not exceed 5 hours.

4. The road oiler should move at a constant speed during pouring of the binder.

Key:
1. Climatic zone
2. Mark of asphalt
3. Heating temperature, °C
4. Without additive of surfactants
5. With additive of surfactants

The length of a section is designated so as to complete an entire work cycle during a single day or at least to distribute and pack the first wedging fraction of crushed stone.

Crushed stone of mark 600 is packed only with light rollers up to six tons in mass. Crushed stone of low strength can be wetted at a normal rate of 8-10 liters of water per 1 m^2 of surface at air temperature above 20°C.

Construction of pavement and beds from mixtures prepared by on-site mixing. Pavement from mixtures prepared by on-site mixing is used on airfields with normative loads of categories V and VI.

Sandy, fine-grained and medium-grained mixtures are used in pavement constructed by the on-site mixing method and coarse- and medium-grained mixtures are used in beds.

The mixtures should be prepared and the pavement and beds should be installed during the dry and warm season of the year at air temperature not below +15°C.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The moisture content of the stone materials should not be above 4 percent by mass when using liquid asphalts. Stone materials dry out with higher moisture content and stone materials become wet prior to mixing in regions with dry and hot climate.

The stone material is placed on a section in fractions in individual piles and is then mixed with a motorized grader until a homogeneous mixture is achieved. The mixtures on the section are prepared in mobile (motorized) mixers or are mixed with motorized graders; fine-grained and sandy mixtures should be mixed using motor graders together with rotary hoes.

The use of a rotary hoe to mix large-fragment stone materials and binders is permissible if the rotational frequency of the cutter rotor is reduced to 75-100 rmp.

The binder material is poured by road oilers in several passes, mixing it with the stone material after each pouring. The amount of binder in one pass comprises 1.5-2.5 liters/m^2.

The approximate number of passes by the motorized grader for final mixing is as follows: 25-40 with volume of stone material in the dense body of 0.25-0.3 m^3 per meter and 50-65 with volume of 0.3-0.4 m^3. With joint operation of the motorized grader and hoe, 10-15 passes of the hoe are required for final mixing and the number of passes by the motorized grader is reduced by a factor of 1.5-2.

When preparing a mixture with a motorized grader jointly with a hoe or without it, it is recommended that the mineral powder be introduced to the mixture after the last pouring during final mixing.

The finished mixture is distributed by a placer or motorized grader in a layer of given width and thickness with regard to its packing.

The distributed mixture is packed by motorized rollers on pneumatic tires or with metal wheels 5-10 tons in mass within three-five passes along the same track, carrying out packing from the edges to the middle with overlap by one-third of the previous layer.

5.3. Construction of Asphalt Concrete Pavement

A pavement of asphalt concrete mixtures is installed on a dry, cleaned and unfrozen layer during dry weather at air temperature during laying not below +5°C in spring and summer and not below +10°C in fall and pavement from warm mixtures is installed at air temperature up to -10°C.

The surface of the bed or lower layer of the pavement is treated 3-5 hours prior to laying the mixture either with SG 130/200 liquefied or liquid asphalt or asphalt emulsion (Table 5.13).

The length of the shift section when installing pavement is determined with regard to the actual shift productivity of the mixing plants by the formula

$$L=\frac{Q\ 1000}{bq},$$

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.13. Normal Consumption of Binder When Treating Surface Prior to Laying of Mixture

(1) Вяжущие	(2) Норма розлива, л/м²	
	(3) по основанию	(4) по слою асфальтобетонного покрытия
(5) Вязкий битум	0,4—0,5	0,2—0,3
Разжиженный битум (6)	0,5—0,6	0,2—0,3
50%-ная битумная эмульсия (7)	0,6—0,9	0,3—0,4

Note. Treatment with binder materials cannot be done if the pavement is installed on a freshly laid bed constructed by using organic binder and also when laying the top layer onto a freshly laid lower layer.

Key:
1. Binders
2. Pouring norm, liter/m^2
3. For bed
4. For layer of asphalt concrete pavement
5. Viscous asphalt
6. Liquefied asphalt
7. 50 percent asphalt emulsion

where Q is the shift productivity of the mixing plants, tons, b is the width of the pavement, meters, and q is the consumption norm of the mixture, kg/m^2.

The mixture is laid in strips parallel to the axis of the pavement from the center to the edges with two-roller transverse profile and in the direction of the slope with one-roller profile.

It is recommended that the length of the laid strip be in the range indicated in Table 5.14 as a function of air temperature.

Table 5.14. Recommended Length of Laid Strip of Pavement

(1) Температура воздуха при отсутствии ветра, °С	(2) Длина укладываемой полосы покрытия, м	
	(3) на защищенных от ветра застроенных и лесных участках и в глубоких выемках	(4) на открытых участках
(5) (6) От +5 до +10	30—60	25—30
» +10 » +15	60—100	30—50
» +15 » +25	100—150	50—80
Более +25	150—200	80—100

Key:
1. Air temperature in absence of wind, °C
2. Length of laid strip of pavement, meters
3. On built sections protected from wind and forest sections and in deep excavations

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

4. On open sections
5. From
6. To
7. More than

The thickness of the layer should not be more than 10 cm when using sandy mixtures and not more than 20 cm when using granular mixtures during a single working pass. The width of the laying strip may be designated as a multiple of the width of the pavement.

The mixture may be laid with several placers arranged in benches one behind the other at a distance of 10-15 meters to ensure adjacent strips have no seams. It is recommended that an asphalt laying machine of new models on pneumatic wheels or caterpillar track be used to lay an asphalt concrete mixture with the width of the strip up to 7.5 meters (within one pass) and with an automatic system that ensures evenness of the pavement and precise adherence to the transverse profile.

The top layer of the pavement should be laid no earlier than 24 hours after the bottom layer has been laid.

The thickness of the unpacked layer of the asphalt concrete mixture is designated at 15-25 percent greater than the planned thickness to achieve the given thickness of the pavement or bed layer.

It is recommended that the temperature of hot asphalt concrete mixtures be taken from the data of Table 5.15 for effective packing.

Table 5.15. Recommended Temperature of Hot Mixtures

(1) Тип смеси	(2) Температура, °С	Тип смеси	Температура, °С
А. Многощебенистые (3)	140—160	Г. Песчаные из дробленого песка (6)	130—140
Б. Среднещебенистые (4)	120—140	Д. Песчаные из природного песка (7)	90—120
В. Малощебенистые (5)	100—300	Смеси для нижнего слоя (8)	120—140

Key:

1. Type of mixture
2. Temperature, °C
3. A. Multicrushed stone
4. B. Medium crushed stone
5. C. Small crushed stone
6. D. Sandy from crushed sand
7. E. Sandy from natural sand
8. Mixtures for bottom layer

The recommended temperatures should be reduced by 10-20 degress when using surfactants or activated mineral powder.

Asphalt concrete mixtures are packed with motorized smooth-wheeled rollers, rollers on pneumatic tires or vibrating rollers.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

To prevent adhesion of the asphalt concrete mixture to the wheels of the rollers, it is recommended that they be wetted with water, a mixture of water and kerosene (1:1) or a 1 percent aqueous solution of detergent wastes.

Defects determined during packing must be corrected immediately: mixture must be added to low points while high points must be ripped with rakes and the excess mixture must be removed with a shovel. Porous sections with disturbed continuity of the layer, discovered during the first passes of the rollers, should be corrected. Defective points (fatty, dry, gulleys and so on) detected on the pavement after the completion of rolling should be dug out, cleaned carefully, the edges smeared with hot viscous or liquid asphalt and replaced with a new high-quality mixture.

A support board or straight edge is placed at the end of the rolled strip to avoid unrolling of the mixture. The working joints should be perpendicular to the axis of the laid strip.

Pavement and beds should be packed in layers more than 8 cm thick with rollers on pneumatic tires and rolling should be completed with heavy smooth-wheeled rollers (Table 5.16).

Table 5.16. Operating Speed of Rollers

Тип катка (1)	(2) Рабочая скорость, км/ч
Гладковальцовые самоходные (легкого типа) массой 6 т и тяжелого типа массой 8—18 т (3)	1,5—2 (в начале укатки, а после пяти-шести проходов по одному следу — 3—5 км/ч) (4)
На пневматических шинах массой 8—18 т (5)	5—8
Вибрационные массой 4—8 т (6)	2—3

Key:
1. Type of roller
2. Operating speed, km/hr
3. Smooth-wheeled motorized (light type) with mass of 6 tons and of heavy type with mass of 8-18 tons
4. At beginning of rolling and after five-six passes on same track--3-5 km/hr
5. On pneumatic tires with mass of 8-18 tons
6. Vibrating rollers with mass of 4-8 tons

The number of passes is an average of two-four with light rollers and 16-18 with heavy rollers on the same track and is refined by test rolling.

It is recommended that pavement from mixtures of all types be packed with motorized rollers on pneumatic tires. The most important advantages of these rollers are the great depth of packing, the possibility of regulating the contact pressure and high productivity.

The procedure of packing with rollers on pneumatic tires is as follows: preliminary packing with a roller having smooth wheels (two-three passes), then with a

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

roller on pneumatic tires (8-10 passes) and final packing with a heavy-wheeled roller (2-4 passes).

The composition of the roller section is designated as a function of ABZ productivity and also as a function of the area of packing the pavement during the shift and the type of mixture. Three rollers--one light and two heavy--are recommended on the average to pack pavement to normalized density with plant productivity of 30-35 t/hr. The approximate area of rolling the pavement during a shift by this section is 2,700-3,000 m^2 for mixtures of types A and B, 2,500-2,700 m^2 for types C and E and 1,500-2,000 m^2 for type D. The number of rollers in the section must be increased to four with high plant productivity.

Packing the pavement is considered to be completed if no appreciable tracks remain on the pavement after a pass of a heavy roller.

The degree of packing of the upper layer of an asphalt concrete mixture, characterized by packing coefficient, should not be lessthan 0.99 from mixtures of types A and B and 0.98 for types C, D and E.

The packing coefficient of the lower layer of pavement and the bed is not less than 0.98.

The packing coefficient of an asphalt concrete pavement is determined as the ratio of the average density of specimens of pavement (notches or cores) to the average density of specimens reformed from the same notches or cores. The density of each specimen is calculated with an accuracy up to 0.01 g/cm^3. The average density of the specimens is determined as the mean value of the results of testing three-four specimens. A divergence between results for specimens sampled from pavement from the same location should not exceed 0.02 g/cm^3.

Mechanized sectons should be created to install asphalt concrete pavement (Figure 8) consisting of a motorized asphalt laying machine, motorized rollers, auxiliary machines and attachments.

The required number of trucks to haul the asphalt concrete mixture, the hourly hauling schedule and the need for machines, equipment and tools are presented in Tables 5.17-5.19.

The composition of the complex brigade to install asphalt concrete pavement with a DS-1 asphalt laying machine is as follows:

Asphalt laying machine operator, sixth rank	1
Heavy motorized roller operator, fifth rank	1
Heavy motorized roller operator, sixth rank	2
Pneumatic roller operators, fifth rank	1
Asphalt concrete laying machine, fourth rank	1
Asphalt concrete laying machine, third rank	2
Asphalt concrete laying machine, second rank	1

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 8. Process Flow Diagram of Installing Asphalt Concrete Pavement: I--cleaning the bed of dust and dirt; II--smearing edges with priming coat; III and III'--delivery of hot mixture and laying it in bottom and top layer with asphalt laying machine, respectively; IV and IV'--rolling bottom and top layers with light roller; V and V'--rolling bottom and top layers with heavy roller; VI--finishing of bottom layer for installation of top layer; VII--finished section of asphalt concrete pavement on shift section; 1--mechanical brush; 2--mobile asphalt boiler; 3--drying unit; 4--asphalt laying machine; 5--motorized roller with mass up to 8 tons; 6--roaster for tools (spades, rakes, tampers and drags); 7--motorized roller with mass up to 15 tons; 8--dump truck with asphalt concrete mixture; L--shift section; l_1, l_2 and l_3--partial sections to production process

Installation of beds from coarse stone. Mixers with periodic or continuous blades are recommended to prepare coarse stone no coarser than 15 mm while mixers with free mixing can be used to prepare coarse-grained coarse stone. The accuracy of proportioning the materials is +1.5 percent binder and $\pm$ 3 percent slag of each fraction by mass.

The temperature of the coarse stone and the normal consumption are presented in Tables 5.20-5.22.

A bed of coarse stone is installed by the principle of sequential wedging of coarser fractions of slag with less coarse fractions during dry weather at air temperature of not less than +5°C during spring and summer and not below +10°C in fall. Slag of fractions 20 (25)-40 mm and 10 (15)-20 (25) mm are used to install the beds. The process of installing the beds is:

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.17. Hourly Schedule for Hauling Asphalt Concrete Mixture (tons) to Asphalt Laying Machine at Laying Rate of 500 Meters (3,500 m^2) of One Layer per Shift

(1) Вид смеси	(2) Рабочие часы								(3) Всего за смену
	1	2	3	4	5	6	7	8	
(4) Крупнозернистая для нижнего слоя толщиной 5 см	37	60	60	60	60	60	60	30	427
Мелкозернистая (5) для верхнего слоя толщиной 3,5 см	26	42	42	42	42	42	42	23	301

Notes: 1. The consumption of mixture per square meter is 122 kg for the bottom layer and 86 kg for the top layer.

2. The amount of mixture is determined from the operating condition of the ABZ, having two D-597A (D-508) mixing units and D-617-2 unit with total shift productivity not less than 300 tons of fine-grained and sandy mixture or 427 tons of coarse-grained mixture.

Key:
1. Type of mixture
2. Working hours
3. Total for shift
4. Coarse-grained for bottom layer 5 cm thick
5. Fine-grained for top layer 3.5 cm thick

Table 5.18. Required Number of MAZ-205 Dump Trucks

(1) Расстояние возки в один конец, км	(2) Мелкозернистая смесь		(3) Крупнозернистая смесь	
	Средняя скорость движения, км/ч (4)			
	30	40	30	40
10	5	4	7	6
20	10	7	12	10
30	14	11	18	14
40	18	14	23	18

Notes. 1. The last dump truck with the mixture should leave the ABZ with the calculation of arriving at the laying site no later than 30 minutes before the end of the paving shift.

2. The time of transporting the mixture from the ABZ to the laying site should not exceed 1.5 hr.

Key:
1. One-way hauling distance, km
2. Fine-grained mixture
3. Coarse-grained mixture
4. Average speed, km/hr

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.19. Need for Machines, Equipment, Tools and Implements for Mixture-Laying Brigade

Required Equipment for Mixture-Laying Brigade	Number
DS-1 Asphalt laying machine	1
DU-9A (D-400A) Motorized wheeled roller	1
DU-31 (D-627) Pneumatic rollers with smooth tires	2
Dump trucks	By calculation
PES-4.5 Mobile electric power station	1
STU-277-62 Mobile asphalt boiler	1
Roaster for heating tools	1
Steel construction spades	5
Floats	2
Rakes	2
Drags	1
Levellers	1
Levelling straight edges	2
Manual steel tamper	1
Gauges	3
Check straight edge 3 meters long with measuring wedge	Complete set
Layer thickness gauge	1
Construction level 1 meter long	1
Thermometer	1
Twisted flax-hemp rope	1

Required Equipment for Mixture-Laying Brigade	Number
Metal measuring roller	1
Stakes	6
Buckets	2
Blunt-nose blacksmith sledgehammers	2
Steel construction sledges	2
Saws to cut asphalt concrete	2
Boards for working joints 3.5 by 20 by 400 cm and 5 by 20 by 400 cm	2
Metal nails to secure boards	10
Surveyors tape	1
Traffic control barriers	2
Road signs to enclose working section	Complete set
VO-8 shower car	1
VO-8 dining car	1
VO-8 car for foremen and stores	1
Mobile toilets	2
Towed water tanks with capacity of 2-5 tons	1
First aid supplies	1

delivery of the coarse stone;

distribution of the coarse stone of fraction 20 (25)-40 mm by a slag distributor in layers 25-30 percent thicker than the planned layer;

preliminary packing of the slag layer with four-six passes of a light roller on the same track;

distribution of coarse stone of fraction 10 (15)-20 (25) mm;

packing in three-four passes of a heavy roller on the same track.

The layer of coarse stone should be finely shaped by rolling with rollers on pneumatic tires or by running trucks over the entire area of the pavement. The number of passes on the same track depends on the thickness of the layer, the viscosity of the asphalt and air temperature and comprises approximately 4-8 on the same track.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.20. Temperature of Heating Coarse Stone When Discharged From Mixer

(1) Вид щебня и марка вяжущего	(2) Температура нагрева, °C	
	(3) без ПАВ	(4) с ПАВ
Горячий щебень (5)		
Битум нефтяной, вязкий БНД 90/130, БНД 60/90, БНД-40/60 (6)	140—160	120—140
Теплый щебень (7)		
Битум нефтяной, вязкий БНД 200/300, БНД 130/200 (8)	110—130	100—120
Битум нефтяной жидкий СГ 130/200, МГ 130/200 (9)	80—110	80—110
Холодный щебень (10)		
Битум нефтяной жидкий СГ 170/130, МГ 70/130 (11)	90—110	80—100

Note. The length of mixing the slag and asphalt in the mixing section with overflow cover closed for hot slag is 3 minutes and for warm slag is not less than 4 minutes.

Key:
1. Type of slag and mark of binder
2. Heating temperature, °C
3. Without surfactant
4. With surfactant
5. Hot slag
6. BND 90/130, BND 60/90 and BND 40/60 viscous petroleum asphalt
7. Warm slag
8. BND 200/300 and BND 130/200 viscous petroleum asphalt
9. SG 130/200 and MG 130/200 liquid petroleum asphalt
10. Cold slag
11. SG 170/130 and MG 70/130 liquid petroleum asphalt

Table 5.21. Temperature of Coarse Stone Prior to Laying, °C

(1) Температура воздуха, °C	(2) Горячий щебень	(3) Теплый щебень	(4) Холодный щебень
(5) Более 10	120	80—60	10
5—10	130	90—70	10
0—5	140	100—80	10
0—(—5)	—	110—90	—
5—(—10)	—	120—100	—

Note. The temperature of hot slag can be reduced by 20°C during laying if surfactants are used.

Key:
1. Air temperature, °C
2. Hot slag
3. Warm slag
4. Cold slag
5. More than

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.22. Normal Consumption of Coarse Stone

(1) Плотность каменного материала, г/см³	(2) Фракции 20(25)—40 мм, кг/м²		(5) Фракции 10(15)—20(25 мм) кг/м²
	(3) при толщине слоя 5 см	при большей толщине слоя прибавлять на каждый сантиметр толщины (4)	
2,5	88—94	18—19	9—11
2,6	91—97	18—19	9—11
2,7	94—100	19—20	10—12
2,8	98—104	20—21	10—12
2,9	100—106	20—21	11—13
3,0	104—110	21—22	11—13
3,1	107—113	22—23	11—14
3,2	111—126	22—23	11—14

Key:
1. Density of stone material, g/cm^3
2. Fractions of 20 (25)-40 mm, kg/m^2
3. With 5 cm thickness of layer
4. Add for each centimeter of thickness with greater thickness of layer
5. Fractions of 10 (15)-20 (25 mm) kg/m^2

Maintenance, which includes traffic control over the entire width of the strip and elimination of possible deformations, should be provided during the initial period of operating the bed of coarse stone. The time of final shaping of the coarse stone layer depends on weather conditions and traffic intensity and is in the range from 7 to 15 days. Pavement on a bed of coarse stone can be constructed within 8-10 days (after defects of the bed have been determined and corrected).

5.4. Construction of Sectional Metal Surfaces

Metal airfield surfaces are designed mainly to support the operation of aviation in difficultly accessibly regions during periods when roads are out of service and losses of carrying capacity by the soil.

PMP-1-53 and K-1D steel plates and AAP aluminum plates, the main characteristics of which are presented in Table 5.23, are now used to install metal airfield surfaces.

Metal airfield surfaces are delivered in a set by industry. Besides the main articles (plates, semiplates and fasteners), the set also includes installation tools and accessories (Table 5.24).

Plates and semiplates packaged in bundles are hauled by rail on flatcars and in gondolas and from the railroad to the installation site by stakebed trucks, dump trucks and trailers.

The approximate standard outputs for unloading and loading bundles of plates are presented in Table 5.25.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.23. Main Characteristics of Metal Airfield Plates

(1) Характеристика плиты	Тип плиты (2)		
	ПМП-1-53	К-1Д	ААН
1	2	3	4
(3) Габаритные размеры, мм:			
длина (4)	3042	3085	3095
ширина (5)	411	482	476
высота профиля (6)	21	31	42
Укладочные размеры, мм: (7)			
длина	3048	3000	3000
ширина (8)	381	420	400
Полезная площадь одной плиты, м²	1,16	1,26	1,2
Масса, кг: (9)			
длины	28	43	19
1 м² покрытия (10)	24	31	16
Крепление плит в покрытии (11)	Пружинными (12) чеками	Фиксаторами и торцовыми (13) планками	Фиксаторами (14) и торцовыми планками
Возможность извлечения отдельных плит из покрытия (15)	(16) Имеется		
Вид упаковки плит и полуплит (17)		(18) Пачки	
Габаритные размеры пачки плит, мм:			
длина (19)	3042	3085	3095
ширина	411	482	476
высота (20)	330	323—345	439—460
Количество плит в пачке, шт. (21)	30	20	25
Масса, кг:			
пачки плит (22)	850	866	496
» полуплит (23)	420	430	238
Полезная площадь плит одной пачки, м² (24)	34,8	25,2	30

Key:

1. Characteristic of plate
2. Type of plate
3. Overall dimensions, mm
4. Length
5. Width
6. Height of profile
7. Laying dimensions, mm
8. Useful area of one plate, m^2
9. Mass, kg
10. 1 m^2 of surface
11. Attachment of plates in surface
12. Spring-loaded pins
13. Fixers and end cleats
14. Fixers and end cleats
15. Possibility of removing individual plates from surface
16. Yes
17. Type of packaging of plates and semiplates
18. Bundles
19. Overall dimensions of bundle of plates, mm
20. Height
21. Number of plates in bundle, pieces
22. Of bundle of plates
23. Of bundle of semiplates
24. Useful area of plates of one bundle, m^2

The composition of work to assemble the metal surfaces include: unpacking the bundles of plates, delivery and laying of the plates, securing the plates with pins and end cleats and securing the edges of the laid surface.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.24. Composition of Installation Tools and Accessories

(1) Монтажный инструмент и приспособления	(2) Единица измерения	(3) Комплект из плит		
		ПМП-1-53	К-1Д	ААП
(4) Ломики монтажные	(15) шт.	100	50	50
Крюки длиной 1100 мм (5)	»	100	100	100
» » 300 » (6)	»	100	100	100
Молотки слесарные массой 0,8 кг (7)	»	—	50	—
» » » 1,5—2,0 кг (8)	»	—	—	50
Кувалды массой 6 кг (9)	»	—	10	10
Рычаги для торцовых планок ТП-4 (10)	»	—	50	—
» » фиксаторов (11)	»	—	20	20
Чекодеры (12)	»	20	—	—
Ножницы (13)	»	—	10	10
Такелажные приспособления (14)	»	—	10	10

Key:

1. Installation tools and accessories
2. Unit of measurement
3. Set of plates
4. Installation jimmies
5. Hooks 1,100 mm long
6. Hooks 300 mm long
7. Carpenters' hammers weighing 0.8 kg
8. Carpenters' hammers weighing 1.5-2.0 kg
9. Sledge hammers weighing 6 kg
10. Levers for TP-4 end cleats
11. Levers for fixers
12. Pin holders
13. Shears
14. Rigging attachments

Table 5.25. Production Outputs in Loading and Unloading Bundles of Plates with Truck-Mounted Cranes

(1) Вид работ	(2) Состав звена	(3) Норма выработки звена за 8 ч, пачки
(4) Погрузка краном КС-1562 (КС-1563) плит или полуплит на железнодорожные платформы:	(5) Шофер-крановщик — 1 чел. Такелажники — 4 чел.	
двухосные (7)	(6)	230
четырехосные (8)		330
(9) Выгрузка краном КС-1562 (КС-1563) плит или полуплит из железнодорожных платформ:	(6) То же	
двухосных		245
четырехосных		350
(10) Погрузка краном КС-1562 (КС-1563) плит или полуплит на автомобили или выгрузка из автомобилей	»	205

Key:

1. Type of work
2. Composition of section
3. Production output of section during 8 hours, bundles
4. Loading of plates or semiplates with KS-1562 (KS-1563) crane onto railroad flatcars

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

5. Driver-crane operator--1 person
6. Rigging operators--4 persons
7. Two-axle
8. Four-axle
9. Unloading plates or semiplates with KS-1562 (KS-1563) crane from railroad flatcars
10. Loading plates or semiplates with KS-1562 (KS-1563) crane onto trucks or unloading from trucks

Unpacking the bundles of plates and semiplates includes removing the T-shaped packing skids from the holes on which the plates rest. This work is performed by the plate unpackers included in the surface assembly brigade. Their number is established from calculation of one unpacker for two-three sections of haulers.

All the packing material (T-shaped steel skids, wooden spacer beams, lockpins and so on) must be collected and retained for subsequent reuse.

The plates are carried and laid on the bed of the surface by carriers who work in pairs. Two carriers transport one PMP-1-53 or K-1D plate each and two AAP plates with hooks, laying them on the bed with the long side perpendicular to the direction of assembly of the surface with the ends bound toward the semiplates. PMP-1-53 plates are laid so that the direction of the teeth of two adjacent rows of plates are opposite, while K-1D and AAP plates are laid so that the teeth are in the direction of the beginning of the front for assembly of the surface. Every seventh row of PMP-1-53 and K-1D plates laid first on the bed should be laid in two layers. This eliminates the gap between laid rows of plates and the assembly front formed due to overlapping of laid plates. Rows of AAP plates are laid on the bed in two layers at a distance of 30-35 cm from each other. A reserve of laid plates should always be maintained before the laying front in an amount required per hours of laying: 30-35 rows of PMP-1-53 plates, 40-45 rows of K-1D plates and 30-35 two-layer rows of AAP plates.

The approximate production output to carry and lay the plates is presented in Table 5.26.

The plates are laid in the surface in one or several fronts simultaneously.

Multifront laying can be departing, oncoming or convergent.

The number of laying fronts is established as a function of the presence of work force, transport equipment and the given deadline for constructing the metal surface.

Assembly of airfield surface from PMP-1-53 plates begins with laying of two marking rows.

They are laid strictly perpendicular to the longitudinal axis of the surface over its entire width by measn of a theodolite and a stretched cord. The marking rows

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.26. Production Outputs to Carry and Lay Plates on Bed

(1) Вид работ	(2) Состав звена	(3) Норма выработки на одного рабочего за 8 ч, шт.		
		ПМП-1-53	К-1Д	ААН
(4) Разноска и расстилка плит на подготовленное основание перед укладкой покрытия при ширине его, м:	(5) Разносчики — 2 чел.			
9		455 (570)	420 (500)	840 (960)
12		420 (520)	390 (480)	790 (930)
18		365 (460)	335 (420)	680 (840)
21		345 (430)	310 (410)	630 (810)
24		325 (420)	290 (390)	605 (790)

Notes. 1. The production outputs in unloading bundles of plates on both sides of the surface at a distance of 1-1.5 meter from each of them are given in the parentheses and the production outputs when unloading bundles of plates along one edge of the surface are given without parentheses.

2. The production outputs are reduced by 25-30 percent during nighttime work and by 15-20 percent during periods of bad roads.

Key:
1. Type of work
2. Composition of section
3. Production output per worker during 8 hours, units
4. Carrying and laying plates on prepared bed prior to laying surface with width, meters
5. Carriers--two persons

are secured to the bed with spikes after the plates have been secured with pins. Laying of subsequent rows of plates is begun after the correctness of laying the marking rows is checked.

A section of layers consisting of three layers and one pin installer lays the plates. Two layers, lifting a plate to be laid, insert its teeth into the grooves of the plate ahead of the laid row while the third layer moves the plate until the teeth butt tightly against the end walls of the grooves.

The plate is immediately lowered onto the bed and the pin installer fastens it with 3-4 pins.

The edges of the surface are secured in the following manner: the longitudinal edges are attached by tying the end of the outermost plate with a wire twist to a wooden anchor boat driven into the soil toward the inner wall of a triangular trench opened along the edge of the surface.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The plates are secured every other row on the end sections of a takeoff-landing strip (the length of each of them is equal to one-fourth the length of the takeoff-landing strip) and the taxiway and every fourth row on the average section of take-off-landing strip and parking apron.

The end edges of the surface of a takeoff-landing strip are secured by anchoring two rows of plates into the soil, while the end edges of a taxiway and parking apron are attached similar to attachment of the longitudinal edges.

The dug-out grooves or holes are filled in with soil and carefully packed upon completion of attaching the edges of the surface.

Assembly of a surface from K-1-D and AAP plates compared to assembly of a surface from PMP-1-53 plates has the following characteristics:

a) assembly begins with laying of one marker row of plates. In this case if it is suggested that laying be carried out only in one direction, the marker row is laid from ordinary plates (with one-sided arrangement of grooves). If the surface is assembled in two directions (on both sides of the marker row), the marker row is laid from plates with two-sided arrangement of the grooves for the teeth. All the plates of the marker row should be secured to each other by end cleats immediately after laying;

b) laying of subsequent rows should be accompanied by careful checking. One must follow that the plate fasteners of each laid row enter the groovers of the laid plates designed for them;

c) laying is carried out with continuous shifting of the rows of plates: one row to the right and the other to the left;

d) the plates are attached in end joints with end cleats which are inserted into combined end grooves of connected plates. The expanded part of each cleat is bent downward with a special lever or hammer, its end is inserted into the end groove and is then bent until the projections stop in the wall of the corrugation;

e) the plates are laid by sections consisting of two layers. If deformed plates are being laid, each section of layers is supplemented by one auxiliary worker. A section consisting of three layers installs the end plates when laying K-1D plates and one consisting of two installers when laying APP plates.

The approximate production outputs to assemble a metal surface from PMP-1-53, K-1D and AAP plates are presented in Table 5.27, while the compositions of the brigades and the need for implements and auxiliary materials are presented in Tables 5.28 and 5.29.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.27. Production Outputs in Assembly of Surface

(1) Вид работ	(2) Единицы измерения	(3) Состав звена	(4) Норма выработки на одного рабочего в смену за 8 ч при сборке покрытия из плит		
			ПМП-1-53	К-1Д	ААН
(5) Укладка плит в покрытие с креплением чеками	(6) шт.	(7) Укладчики — 4 чел.	230	—	—
(8) Укладка плит в покрытие	»	(9) Укладчики — 2 чел.	—	510	800
(10) Установка торцовых планок	»	Монтажники — 2 чел.	—	1140	1000
(12) Крепление торцовых кромок покрытия с заготовкой колец и скруток и отрывкой траншеи вручную	(13) пог. м	(11) Крепильщики кромок — 4 чел.	15	15	15
То же, продольных кромок с отрывкой приямков через каждый ряд (15)	»	(14) То же, — 3 чел. (16)	31	33	31

Notes. 1. Laying of new plates in dry weather during daylight is provided by the norms; the soil is of medium density.

2. The production output is reduced by 25 percent when assembling a surface during nighttime hours and by 15-20 percent when working in seasons without roads.

3. The production output to secure the edges of the surface is increased threefold with mechanized digging of trenches.

4. The production output to lay the plates is reduced to 165 units when assembling a surface from PMP-1-53 plates that have been used.

5. The section of layers consists of three persons when assembling a surface from previously used K-1D plates and the production output per worker is reduced to 340 plates.

Key:

1. Type of work
2. Unit of measurement
3. Composition of section
4. Production output per worker during 8-hour shift with assembly of pavement from slabs
5. Laying plates in pavement with fastening by pins
6. Pieces
7. Layers--4 persons
8. Laying slabs in pavement
9. Layers--2 persons
10. Fastening of end cleats
11. Installers--2 persons
12. Fastening end edges of pavement with preparation of rings and twists and digging trench by hand
13. Running meters
14. Edge fasteners--4 persons
15. Fastening longitudinal edges with digging of holes every second row
16. Edge fasteners--3 persons

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.28. Standard Composition of Brigades for Assembly of Surface on a Single Front

(1) Вид работ	(2) Состав звена	(3) Число звеньев в бригаде при ширине укладываемого покрытия в м:				
		9	12	18	21	24
	Плиты ПМП-1-53 (4)					
(5) Руководство работами	(6) Бригадир — 1 чел.	1	1	1	1	1
Распаковка пачек плит (7)	Распаковщик — 1 чел. (8)	1	1	1	1	2
Разноска и расстилка плит перед укладкой в покрытие (9)	Разносчики — 2 чел. (10)	1	1	2	2	4
Укладка плит в покрытие с креплением чеками (11)	(12) Укладчики — 1 чел.	1	1	2	2	3
Геодезический контроль (13)	(14) Геодезист — 1 чел.	1	1	1	1	1
Крепление кромок покрытия (15)	Крепильщики — 3 чел. (16)	2	2	2	2	2
(17) Итого в бригаде человек (включая бригадира)		15	15	21	21	30
	(18) *Плиты К-1Д*					
Руководство работами	Бригадир — 1 чел.	1	1	1	1	1
Распаковка пачек плит	Распаковщик — 1 чел.	1	1	2	2	3
Разноска и расстилка плит перед укладкой в покрытие (19)	Разносчики — 2 чел.	1	2	3	4	5
Укладка плит в покрытие	(20) Укладчики — 2 чел.	1	1	2	2	3
Геодезический контроль	Геодезист — 1 чел.	1	1	1	1	1
Постановка торцовых планок (21)	(22) Постановщики планок — 2 чел.	1	1	2	2	3
Крепление кромок покрытия	Крепильщики — 3 чел.	3	3	3	3	3
(23) Итого в бригаде человек		18	20	27	29	36
	(24) *Плиты АЛП*					
Руководство работами	Бригадир — 1 чел.	1	1	1	1	1
Распаковка пачек плит	Распаковщик — 1 чел.	1	1	1	2	2
Разноска и расстилка плит перед укладкой в покрытие	Разносчики — 2 чел.	1	1	2	3	4

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.28 (Continued).

Укладка плит в покрытие	Укладчики — 2 чел.	1	1	2	2	3
Геодезический контроль	Геодезист — 1 чел.	1	1	1	1	1
Постановка торцовых планок	Постановщики планок — 3 чел.	1	1	1	1	2
Крепление кромок покрытия	Крепильщики — 3 чел.	4	4	4	4	4
Итого в бригаде человек		21	21	26	29	36

Note. One additional person is added to each section laying the plates when assembling a surface from previously used plates.

Key:

1. Type of work
2. Composition of section
3. Number of sections in brigade with width of laid surface in meters
4. PMP-1-53 plates
5. Supervision of workers
6. Brigade leader--one person
7. Unpacking bundles of plates
8. One unpacker
9. Carrying and arranging plates prior to laying in surface
10. Two carriers
11. Laying plates in surface with attachment with pins
12. One layer
13. Geodetic control
14. One surveyor
15. Attaching edges of surface
16. Three attachers
17. Total persons in brigade (including brigade leader)
18. K-1D plates
19. Laying plates in surface
20. Two layers
21. Delivery of end cleats
22. Two cleat installers
23. Total in brigade
24. AAP plates
25. Three cleat installers

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.29. Implements and Auxiliary Materials Used in Assembly of Surfaces from Metal Plates

Type of Work	Implements and Auxiliary Materials: Name	Implements and Auxiliary Materials: Number
Unloading bundles of plates from transport equipment at airfield	Rigging attachment	One set per truck-mounted crane
	Fitters hammers	One piece per section of riggers
	Installation jimmies	One piece per section of riggers
Unpacking bundles of plates	Fitters hammers	One piece per worker
	Axes	One piece per worker
Carrying and placing plates prior to laying of surface	Hooks 300 mm or 1,100 mm long	One piece per worker
Laying plates in surface	Installation jimmies	One piece per section
	Sledgehammers	One piece per section
	Levers for fasteners	One piece per section
	Hooks 300 mm long	Two pieces per section
Installing end cleats or driving in pins	Fitters hammers	One piece per worker-cleat installer
	Jimmies for fasteners	"
	Wooden hammer	One piece per section of layers
	Jimmies-pin holders	Two pieces of PMP-1-53
Joining the oncoming assembly front of the surface or points where taxiway meets the takeoff-landing strip and parking apron	Hooks 300 mm long	One piece per worker
	Hooks 1,100 mm long	"
	Sledgehammers	One piece per section
	Installation jimmies	"
	Levers for fasteners	One piece per worker
	Cutting along metal	One piece per section
	Reinforcement shears	"
	Tension wire 3-5 mm in diameter	As needed
Attaching edges of surface with preparation of spikes, wire twists and digging of holes	Shovels	Two pieces per section
	Cross-cut saws	"
	Axes	One piece per section
	Sledgehammers	"
	Reinforcement shears	"
	Tension wire 3-5 mm in diameter	60 kg per 100 running meters of edge
	Stretcher d = 8-10 cm	0.45 m^3 per 100 running meters of edge

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 5.29 (Continued).

Type of Work	Implements and Auxiliary Materials		
	Name	Number	
Checking correctness of assembling the surface	Theodolite	One piece	
	Leveller	One "	
	Stakes	25 pieces	Per section of Surveyors
	Levelling straight edges	Two "	
	Measuring tape	Two "	
	Steel roller tape	Two "	

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 6. CONSTRUCTION OF RIGID AIRFIELD PAVEMENT

[Text] 6.1. General Data on Rigid Pavement

Rigid pavement includes monolithic (concreted on the site) cement-concrete, armored concrete and reinforced concrete ordinary and pre-stressed pavement and also precast pavement installed from finished reinforced concrete slabs manufactured by a plant.

Rigid pavement is usually laid on artificial beds of materials treated with inorganic or organic binders.

A separating interlayer consisting of roofing materials or a layer of sand-asphalt mixture is laid between the artificial bed and the monolithic pavement and also between the lower and upper layers of two-layer pavement.

A levelling layer of sand-cement mixture 4-6 cm thick is installed between the slabs and all types of artificial beds except sand when constructing precast pavement and the separating interlayer is not laid in this case.

Monolithic pavement is divided into individual slabs with compression and expansion joints.

Compression joints are oblique and the slabs in the them have vertical edges formed during concreting by the mold and false edges which are achieved as a result of forming a crack in the cross-section weakened by cutting a groove.

Besides compression and expansion joints, monolithic pavement has production joints, installation of which is determined by the restriction on the width of the section of the concrete laying machines and by forced interruptions in concreting.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The distances between the transverse compression joints are equal to 5 meters for single-layer and the upper layer of two-layer cement-concrete pavement, 7-15 meters for armored concrete pavement, 15-20 meters for ordinary reinforced concrete pavement and 10 meters for the lower layer of two-layer pavement.

The distances between the transverse expansion joints in monolithic pavement are taken in the range of 40-90 meters according to existing norms as a function of the thickness of the pavement and the climatic regions of the region in which the facility is constructed. However, a tendency toward rejection of installing them has recently been noted with regard to the fact that expansion joints are the main focal points of breakdown of the pavement.

Therefore, expansion joints in monolithic pavement, except pre-stressed joints, are not installed in those cases when climatic conditions permit.

Expansion joints are not installed in the lower layer of two-layer pavement in all climatic zones.

The distances between longitudinal compression joints are equal to 3.5-5.0 meters for cement-concrete pavement and 7.0-7.5 meters for other types of pavement. They are usually combined with production joints.

Butt joints in the form of pins or keys are installed in joints to reinforce the edge sections of slabs. The edge sections of slabs can be reinforced with reinforcing or thickening of them.

Monolithic pre-stressed pavement has biaxial compression (in two mutually perpendicular directions) and uniaxial compression (only in a single longitudinal direction). In the latter case the pavement is reinforced in the transverse direction by ordinary unstressed reinforcing. Uniaxial-compressed cross-braced pavement, the pre-stressing in the concrete of which is created by high-strength wire 3-5 mm in diameter stretched prior to concreting, is mainly used in Soviet practice of airfield construction. Anchor supports in the form of reinforced concrete slabs with lugs sunk into the soil are installed to receive the forces from the stress of the reinforcement on the edges of sections, the length of which is in the range of 500-700 meters. However, monolithic pre-stressed pavement has achieved limited application in our country and is now not used with regard to the complexity of the installation technique and the great laboriousness.

Modern airliners place high requirements on the cleanliness of the pavement surface, which depends to a significant degree on the strength and operational stability of the surface layer of concrete, by which the mean cycles between repair and the total service life of the pavement are determined in most cases.

A promising trend in increasing the life and operational qualities of rigid monolithic pavement may be installation of it with the upper layer 6-7 cm thick from high-strength concrete with tensile bending strength of 60-70 kgf/cm^2.

In this case the separating interlayer is not installed between the upper and lower layers and the upper layer of concrete is laid immediately after the lower layer.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Monolithic pavement is constructed by the mechanized method, using for this special sets of rail-travelling or railless concrete laying machines. In the first case the machines move on special rails (rail-forms) which at the same time are the side form and in the second case the machines have caterpillar track and move on a prepared bed while the side edges of the slabs are shaped by a sliding form.

A railless set of machines is considerably more productive than a rail set and provides better evenness of the pavement.

The pavement is concreted at average daily air temperatures above +5°C. If it becomes necessary to work in lower temperatures, special measures are taken to ensure the concrete hardening process and to achieve its design strength.

Standard pre-stressed reinforced concrete slabs of types PAG-14 and PAG-18 (smooth airfield slab) 14 and 18 cm thick, respectively, are usually employed when constructing precast pavement. Drawings of these slabs have been confirmed by USSR Gosstroy and an album of the detail plans is published by TsITP [Central Institute of Standard Designs], USSR Gosstroy (classification number 3.506-3).

Pre-stressed road slabs of type PDG (smooth road slab) may also be used for airfield pavement designed for load categories V and VI.

The main characteristics of airfield and road slabs of types PAG and PDG are presented in Table 6.1.

Table 6.1. Main Characteristics of PAG and PDG Slabs

(1) Тип плиты	(2) Толщина, см	(3) Размеры в плане, м	(4) Масса, т	(5) Объем бетона, м³	(6) Расход арматуры на плиту, кг/м²		
					(7) напрягаемой	(8) ненапрягаемой	(9) общий
ПАГ-14	14	2×6	4,2	1,68	72,6 / 6,05	72,1 / 6,0	144,7 / 12,05
ПАГ-14-Т-1	14	2×6	4,2	1,68	72,6 / 6,05	72,1 / 6,0	144,7 / 12,05
ПАГ-14-Т-2	14	2×6	4,2	1,68	64,0 / 5,33	72,1 / 6,0	136,4 / 11,33
ПАГ-18	18	2×6	5,4	2,16	87,1 / 7,25	91,8 / 7,65	178,9 / 14,9
ПАГ-18-Т	18	2×6	5,4	2,16	87,1 / 7,25	91,8 / 7,65	178,9 / 14,9
ПДП-2-6	14	2×6	4,2	1,68	50,4 / 4,2	66,9 / 5,6	117,3 / 9,8
ПДП-1,5-6	14	1,5×6	3,15	1,26	39,2 / 4,35	53,7 / 5,95	92,9 / 10,3

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Type of slab
2. Thickness, cm
3. Cross-sectional dimensions, meters
4. Mass, tons
5. Volume of concrete, m^3
6. Consumption of reinforcing per slab, kg/m^2
7. Stressed
8. Unstressed
9. Total

6.2. Installation of Master Strings and Rail-Forms

Installation of master strings. The characteristic feature of a set of railless machines is that the height and cross-sectional position of the working members is determined automatically during work by the tracking system with respect to previously established master strings. The strings are installed on one or both sides of the row.

Strings are installed on both sides when installing the marker row or when there is no confidence that the bed is sufficiently rigid and has no deviations from the design marks.

The optimum distance between strings when installing them on both sides of a row is 14 meters. The line of each string should be strictly parallel to the axis of the row. The strings are located above the bottom of the trough at a height of not less than 30 cm and not more than 125 cm and the recommended height is 45-100 cm.

The length of installing the strings should not exceed 700 meters to ensure the required tension of the strings with tightening winches, which is required for accurate operation of the machines.

The composition of the work is installation of levelling pegs, installation of posts with brackets, transverse rods and screw clamps, tightening the string and final straightening of it in cross-section and in height and removal of the master strings, posts and levelling pegs.

A diagram of installing master strings is shown in Figure 9.

The installed levelling pegs are at the same time points that show the cross-sectional line of the string and datum points for installing the string in height. The levelling pegs are installed so that a line passing through the top of the pegs coincides with a line passing through the edge of the row or is parallel to this line on each transverse section. The distance between levelling pegs, as between posts, is usually equal to 15 meters in the longitudinal direction.

Levelling pegs are initially installed on transverse sections driven into the edges of a section and all the intermediate pegs are then installed in the line of site of the first and last pegs using a theodolite and measuring tape.

The posts are installed in assembled form (with brackets and screw clamps attached) from the outside of the levelling pegs at a distance of 25-30 cm from them and are firmly driven into the bed.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 9. Diagram of Installing Master Strings: 1--tightening drums; 2--string; 3--levelling pegs; 4--brackets; 5--posts

The bracket is installed perpendicular to the tension line of the string by moving the screw clamp along the post and the bracket in the screw clamp so that the notch is always precisely above the center of the levelling pegs and at the accepted height, using a theodolite and special template for this (Figure 10).

The string is tightened after installation of the posts in the following order: the tensioning drums are installed in front of the first and behind the last post at a distance of approximately 10 meters from them and in the cross-section along the line of the levelling pegs, the string is laid along the tensioning line and its ends are secured to the drums with clearance (10-12 meters of string) for splicing in case of a possible break, the string is pre-tightened to a state so that it can be easily set in the notch of the brackets but so that it does not jump out of them without application of force and the string is aligned in cross-section and height and is finally tightened.

The string must frequently be installed on several sections simultaneously with regard to the fact that the length of the tightening section of the string should not exceed 700 meters. The scheme shown in Figure 11 is used to ensure continuity in installation of the string of adjacent sections. The string of the next adjacent section is inserted in the notch of the bracket of the last post of the previous section. Thus, the boundary post is common for adjacent sections and two strings are suspended on it.

Operations to install the master strings are performed by a section consisting of:

Surveyor-engineer	1
Road workers:	
fourth rank	1
third rank	1
second rank	2
Auxiliary worker, first rank	1

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.2. Volumes and Laboriousness of Work to Install Master Strings (for 700 meters of string)

(1) Технологические операции	(2) Единица измерения	(3) Объем работы	(4) Трудоемкость, чел.-ч
(5) Подготовительно-заключительные работы, установка и снятие знаков ограждения участков работ	—	—	2,5
(6) Разбивка пикетажа и установка нивелирных колышков в плане по теодолиту	м	700	8,75
(7) Забивка нивелирных колышков под отметку	(8) шт.	50	7,5
(9) Контрольное нивелирование нивелирных колышков	»	50	4,6
(10) Установка и забивка металлических стоек с кронштейнами	»	52	3,9
(11) Установка кронштейнов над нивелирными колышками по теодолиту и шаблону	»	52	3,5
(12) Раскладка, натяжение и заводка струны в прорези кронштейнов	м	700	3,0
(13) Проверка установки струны в плане и по высоте	»	700	2,0
Снятие струны (14)	»	700	1,5
(15) Демонтаж стоек (при необходимости и нивелирных колышков), очистка и погрузка их для доставки на новый участок	шт. (8)	52	2,75
Итого на 700 м (16)			40

Key:
1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness, man-hours
5. Preparatory-final operations and installation and removal of barrier signs of work sections
6. Driving stakes and installing levelling pegs in cross-section by theodolite
7. Driving levelling pegs for marker
8. Pieces
9. Control levelling of levelling pegs
10. Installation and driving of metal posts with brackets
11. Installation of brackets above levelling pegs by theodolite and template
12. Laying, tightening and winding up string in bracket notch
13. Checking installation of string in height layout
14. Removal of string
15. Disassembly of posts (and of levelling pegs if required) and cleaning and loading them for delivery to new section
16. Total for 700 meters

The laboriousness of installing master strings and the need for implements and tools are presented in Tables 6.2 and 6.3.

Installation and removal of rail-forms. The evenness of the pavement surface and the linearity of the longitudinal edges of the slabs depend on the accuracy of

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 10. Template to Check Height of Tightening String: 1--upper shelf; 2--rod with divisions; 3--metal tube; 4--handle; 5--stop screw; 6--bottom shelf

Figure 11. Diagram of Tightening String on Adjacent Sections: 1--tensioning drums; 2--bracket; 3--post

Key:
1. Previous section
2. Next section

installing the rail-forms when using the rail-travel set of concrete laying machines. Therefore, the work to install the rail-forms should be carried out especially carefully. The rail-forms are installed only during daylight. On this basis the rate of installation is designated as equal to a two-shift rate of work of concrete laying machines.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.3. Complete Set of Implements and Tools to Install 700 Meters of String in One Line

(1) Инвентарь и инструмент	(2) Единица измерения	(3) Количество	Инвентарь и инструмент	Единица измерения	Количество
Натяжные барабаны (4) и лебедки	(5) шт.	4	Деревянные (15) шаблоны (линейки)	»	2
Нивелирные колышки (6)	»	50	Лента мерная с комплектом шпилек (16)	»	1
Стойки в сборе с кронштейнами и струбцинами (7)	»	52	Рулетка тесемочная 20 м (17)	»	1
Струна полиэтиленовая (8)	м	725	Шнур трассировочный 20 м (18)	»	1
Катушки для струн (9)	шт.	2	Кувалды 3-4 кг (19)	»	2
Теодолит с треногой (10)	»	1	Лом (20)	»	1
Нивелир с треногой (11)	»	1	Лопаты (21)	»	2
Рейки нивелирные (12)	»	2	Топоры (22)	»	2
Эккер (13)	»	1	Сигнальные знаки для ограждения участка работ (23)	Комплект (24)	1
Вешки (14)	»	10			

Key:

1. Implements and tools
2. Unit of measurement
3. Number
4. Tensioning drums and winches
5. Pieces
6. Levelling pegs
7. Posts assembled with brackets and screw clamps
8. Polyethylene string
9. Reels for string
10. Theodolite with tripod
11. Leveller with tripod
12. Levelling rods
13. Cross-staff
14. Stakes
15. Wood templates (straight edges)
16. Measuring tape with set of pins
17. 20-meter ribbon tape measure
18. 20-meter surveyor's cord
19. Sledge hammers, 3-4 kg
20. Crowbar
21. Spades
22. Hammers
23. Signal signs to enclose work section
24. Complete set

The sequence of work is:

the direction of installing the rail-forms is laid out by theodolite and it is secured with pins or pegs which are driven to the design mark of the top of the pavement, wooden spacers are laid according to a template at the joints of rail-forms, the rail-forms, previously checked for quality and cleaned of concrete and dirt, are installed with a crane on wooden spacers and they are straightened in cross-section and height positions, the rail-forms are joined to each other with lugs, secured to the bed with pins and the cavities are filled with sand, the rail-form is rolled with a shaper or concrete distributing machine, the height position in each joint of the rail-forms is checked with a level after rolling and detected deviations from the design position are corrected by tapping.

The rail-forms are removed no earlier than 24 hours after the concrete has been laid at ambient air temperature below +15°C and within 18 hours at higher temperatures.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

It is recommended that templates and the attachments presented in Figures 12-14 be used when installing and removing rail-forms.

Figure 12. Template to Install Pad Under Rail-Form: 1--template; 2--pin installed by level; 3--pad; 4--levelling layer; 5--soil-cement bed

Key:
1. Mark of rail-forms

Figure 13. Implement to Raise Rail-Forms During Straightening: 1--handle; 2--frame; 3--hook

The need for machines, tools and accessories is presented in Table 6.4. The section to install rail-forms consists of:

Truck-mounted crane operator, fourth rank	1
Rigger, second rank	1
Road workers:	
fourth rank	1
third rank	2
second rank	1

The section to disassemble the rail-forms and to deliver them to the installation point consists of:

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Truck-mounted crane operator, fourth rank 1
Rigger, second rank 1
Road worker, third rank 1

Figure 14. Implement to Pull Out Pins of Rail-Forms: 1--cap; 2--fork; 3--post; 4--section of channel iron; 5--handle; 6--collar; 7--pin of rail-form

Table 6.4. Machines, Tools and Implements Used to Reinstall Rail-Forms

(1) Машины, инструмент и приспособления	(2) Количество	Машины, инструмент и приспособления	Количество
Автокран К-51 (3)	1	Ломы обыкновенные (11)	1
Двухосный автомобильный прицеп (4)	1	Лом с лапой (12)	1
Шаблон для контроля уровня подкладок под рельс-формы (5)	2	Приспособление для подъема рельс-форм при рихтовке (13)	1
Контрольная рейка длиной 4 м (6)	1	Приспособление для выдергивания штырей (14)	2
Шаблон для разбивки линии установки рельс-форм (7)	1	Деревянные гладилки с длинной ручкой (15)	2
Лопаты подборочные (8)	5	Захват для строповки рельс-форм (16)	1
Подшипники деревянные (9)	2	Скребки-лопаточки для очистки рельс-форм (17)	2
Кувалды кузнечные (10)	2		

Key:
1. Machines, tools and implements
2. Number
3. K-51 truck-mounted crane
4. Two-axle truck trailer

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

5. Template to check level of pads under rail-form
6. Control rod 4 meters long
7. Template to lay out line for installation of rail-forms
8. Assorted shovels
9. Wood mallets
10. Blacksmith hammers
11. Ordinary crowbars
12. Crowbar with claw
13. Implement to raise rail-forms during straightening
14. Implement to draw out pins
15. Wood smoothers with long handle
16. Clamp for securing rail-forms
17. Spade scrapers to clean rail-forms

The main engineering and economic indicators of installation and removal of rail-forms are:

Laboriousness per 1,000 m^2 of pavement (with construction of adjacent rows), man-days	4.02
Average rank of workers	3
Output per worker per shift of reinstalled rail-forms, meters	35.6

6.3. Final Grading of Dirt Bed

When constructing rigid pavement using a railless set of machines, final grading of the dirt bed is carried out with a DS0108 subgrader immediately prior to installation of the artificial bed.

Excavation work is carried out in this case in channels with underexcavation of the soil by 5-8 cm and in fills with overexcavation by 5-8 cm.

The subgrader has four working members: a cutter with cutting teeth to rip the soil and helical blades of the screw to move and distribute it, a front blade for the first cut and to level the soil, a screw conveyer for uniform distribution and moving of excess soil and a rear blade for final grading of the soil.

Preparatory work, which includes restoration of the longitudinal axes of rows, levelling of the dirt bed, removing foreign objects from the path of the shaper, enclosing the work section and installation of the master string, are carried out prior to the beginning of operation of the shaper.

Final grading of the dirt bed can be performed without cutting the soil or with cutting (ripping) it.

Grading by the first method is done in those cases when there is no prolonged interruption between excavation work and grading of the dirt bed. Grading of the dirt bed with cutting of the soil is done to create a dirt bed of equal strength in those cases when it has considerable deformations and nonuniform packing.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

When grading a dirt bed without cutting the soil, the position of the working members of the subgrader should be as follows: the front blade is raised, the cutting edge of the rear blade should be on the planned mark of the dirt bed and the screw conveyer should be 2-2.5 cm above it.

A cutter which is installed 0.5-1 cm above the planned mark of the bed is used in dense heavy soils.

The bed is usually graded in one pass of the subgrader at a speed of 5-10 m/min. I If there are points with lack of soil after one pass of the subgrader, then the required amount of soil is delivered to these points and a second grading is carried out at a working speed of 15-20 m/min.

The bed is rolled after grading with pneumatic rollers of type D-627 in 2-3 passes on the same track.

The following operations are performed when grading the dirt bed with cutting of the soil: "outlining" (marking), cutting the soil, distribution and grading of the soil, packing the soil, clean (precision) grading of the dirt bed and rolling the bed.

"Outlining" is carried out during the first pass of the subgrader to cut bumps and to even the surface of the bed. The rear blade and cutter are set somewhat higher than the planned mark of the dirt bed during "outlining." Dirt is hauled and levelled with a motorized grader or bulldozer to points where fill is required.

The soil is cut to a depth of 10-12 cm with the reverse pass of the subgrader with the cutter only (with the remaining members raised) a a speed of 10-15 m/min.

The soil is moistened by the distrubuting system also installed on the subgrader if necessary.

The ripped soil is distributed and graded with loading of excess soil onto transport equipment during one pass of the subgrader at a speed of 5-10 m/min.

The position of the working members is as follows: the rear blade is set higher than the planned mark of the dirt bed by the margin for packing with rollers and for cutting the soil during clean grading, which are established experimentally;

the screw conveyer of the blade is set 2-2.5 cm higher than the cutting edge of the blade;

the cutter and front blade are raised to the transport position.

The flaps of the central opening of the rear blade are opened to dump excess soil onto the feeder of the loader-conveyer and the side openings of the screw conveyer and the doors of the cutter are closed.

The soil is packed with rollers on pneumatic tires immediately after the pass of the subgrader. Rolling is carried out from the edges of the road to the middle with overlapping of each track by 30-50 cm. The work front should not be less than 25 meters for motorized rollers and 150 meters for towed rollers.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The required number of passes of the roller on the same track is established by test rolling and it comprises approximately 6-8.

The first two passes of the rollers on the same track are made at minimum speed and speed is increased to 12-15 km/hr with subsequent passes.

The first passes are made with pressure of 2-3 kgf/cm^2 if the air pressure in the roller tires can be regulated and subsequent passes are made at pressure of 4-5 kgf/cm^2.

The soil is moistened to optimum moisture content when it is being packed during dry and hot weather.

Clean grading of the dirt bed is carried out with the shaper immediately after the soil has been packed by rollers. The correctness of installation and tension of the master string is checked prior to the beginning of grading.

The work is carried out with the rear blade, the cutting edge of which is set precisely at the level of the planned mark of the top of the dirt bed, and with a screw conveyer set 2-2.5 cm higher than the cutting edge of the rear blade. The cutter and the front blade are raised. The flaps of the opening on the rear blade are opened and the side flaps of the screw conveyer are closed.

Table 6.5. Laboriousness of Work to Grade Dirt Bed Without Cutting Soil

Технологические операции (1)	Трудоемкость, чел-ч (2)	Технологические операции	Трудоемкость, чел-ч
Подготовка машины к работе, прицепка (навеска) конвейера-перегружателя, регулировка рабочих органов профилировщика (3)	1,5	Очистка и мойка профилировщика и конвейера-перегружателя в конце работы; смазка и заправка горючим (6)	2
Планировка грунтового основания профилировщиком с погрузкой грунта в транспортные средства (4)	20,5	Подготовка катка к работе, заправка топливом, смазка, уход за машиной в конце работы (7)	0,8
Подкатка грунтового основания катком на пневматических шинах (5)	7,2	Итого на захватку длиной 1600 мм, шириной 8,4 м (13440 м^2) (8)	32
		На 1000 м^2 (9)	2,38

Key:
1. Production operations
2. Laboriousness, man-hours
3. Preparation of machine to work, attachment (suspension) of conveyer-loader and adjustment of working members of shaper
4. Grading dirt bed with shaper with soil being loaded into transport equipment
5. Rolling dirt bed with roller on pneumatic tires
6. Cleaning and washing of shaper and conveyer-loader at end of work; lubrication and refuelling
7. Preparation of roller to work, refuelling, lubrication and maintenance of machine at end of work
8. Total for section 1,600 mm long and 8.4 meters wide (13,440 m^2)
9. For 1,000 m^2

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Grading is carried out in one pass of the subgrade at working speed of 10-15 m/min.

After the dirt bed has been cleanly graded, it is rolled with rollers on pneumatic tires of type D-627 in two-three passes on the same track.

The dirt bed is graded by a brigade consisting of:

Shaper operator, sixth rank	1
Assistant operator, fifth rank	1
Roller operator, sixth rank:	
when grading without cutting	1
when grading with cutting	2
auxiliary worker, second rank	1

The length of a shift section is equal to 1,600 meters when grading the dirt bed without cutting and 900 meters when grading with cutting of the soil.

When grading the bed with cutting of the soil, the shift section is made for two equal sections along the length to create the work front for rollers. Work on the sections is organized alternately.

The laboriousness, engineering and economic indicators and need for machines, implements and tools in grading the dirt bed are presented in Tables 6.5-6.8.

Table 6.6. Laboriousness of Work to Grade Dirt Bed With Cutting of Soil

(1) Технологические операции	Трудоемкость, чел-ч (2)	Технологические операции	Трудоемкость, чел-ч
(3) Подготовка профилировщика к работе, прицепка (навеска) конвейера-перегружателя, регулировка рабочих органов профилировщика (4)	1,5	(9) Заключительные работы, чистка и мойка профилировщика и конвейера-перегружателя, заправка горючим и смазка	2
Прочерчивание (разметочный ход)	3	Уплотнение грунта катками после фрезерования и планировки его профилировщиком (10)	8,6
Фрезерование грунта при (5) обратном ходе профилировщика	4,5	Подкатка грунтового основания катками после чистовой планировки (11)	2,7
Распределение и планировка грунта с погрузкой лишнего грунта в транспортные средства (6)	8	Подготовка катков к работе, смазка и заправка горючим, очистка машин в конце работы (12)	1,5
Переход профилировщика к началу участка (обратный ход) (7)	1,5	Технологические перерывы (13)	3,2
Чистовая планировка грунтового основания после укатки с погрузкой грунта в транспортные средства (8)	3,5	Итого на захватку длиной 900 м, шириной 8,4 м² (7560 м²) (14)	40
		На 1000 м² (15)	5,29

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Production operations
2. Laboriousness, man-hours
3. Preparation of subgrader to work, attachment (suspension) of conveyer-loader and adjustment of working members of subgrader
4. Outlining (layout pass)
5. Cutting soil during reverse pass of subgrader
6. Distribution and grading of soil with loading of excess soil into transport equipment
7. Run of subgrader to beginning of section (reverse pass)
8. Clean grading of dirt bed after rolling with loading of soil into transport equipment
9. Final work, cleaning and washing of subgrader and conveyer-loader, refuelling and lubrication
10. Packing soil with rollers after cutting and grading it with subgrader
11. Rolling dirt bed with rollers afer clean grading
12. Preparation of rollers to work, lubrication and refuelling and cleaning machines at end of work
13. Production interruptions
14. Total for section 900 meters long and 8.4 m^2 wide (7,560 m^2)
15. For 1,000 m^2

Table 6.7. Engineering and Economic Indicators of Grading Dirt Bed

(1) Показатели	Планировка основания (2)	
	без фрезерования грунта (3)	с фрезерованием грунта (4)
Трудоемкоть на 1000 м² грунтового основания, чел.-дни (5)	0,3	0,66
Средний разряд рабочих (6)	4,8	5,0
Коэффициент использования профилировщика по времени в течение смены (7)	0,86	0,86

Key:
1. Indicators
2. Grading of bed
3. Without cutting soil
4. With cutting soil
5. Laboriousness per 1,000 m^2 of dirt bed, man-days
6. Average rank of workers
7. Utilization factor of shaper during shift

6.4. Installation of Artificial Beds

The dirt bed should be graded to the marks, rolled, certified and accepted by the representative of engineering inspection prior to installation of artificial beds.

Reliable drainage should be provided on all work sections.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.8. Machines, Implements and Tools Used in Grading Dirt Bed

(1) Наименование	(2) Количество	Наименование	Количество
Профилировщик ДС-108 (3)	1	Лента мерная стальная с комплектом шпилек, компл. (13)	1
Конвейер-перегружатель ДС-98А (4)	1		
Катки на пневматических шинах: (5)		Шнур трассировочный 20 м (отрезок струны), шт. (14)	1
при планировке без (6) фрезерования грунта	1	Линейка мерная, шт. (15)	1
при планировке с фре- (7) зерованием грунта	2	Рейка металлическая трехметровая (16)	1
Автомобили-самосвалы для отвоза грунта (8)	По (9) расчету	Мерник зазоров клиновидный, шт. (17)	1
Поливо-моечные машины (при необходимости) (10)	По расчету	Лопаты штыковые, шт. (18)	½
Нивелир с треногой и комплектом реек, компл. (11)	1	» подборочные, шт. (19)	2
Вешки, шт. (12)	10	Топор, шт. (20)	1
		Комплект ограждения (21)	1

Key:

1. Name
2. Number
3. DS-108 subgrader
4. DS-98A conveyer-loader
5. Rollers on pneumatic tires
6. When grading without cutting soil
7. When grading with cutting soil
8. Dump trucks to haul dirt
9. By calculation
10. Watering-washing machines (if necessary)
11. Level with tripod and set of rods, complete set
12. Stakes, pieces
13. Steel measuring tape with set of pins, complete set
14. 20 meters of surveyor's tape (section of string), pieces
15. Measuring straight edge, pieces
16. Metal three-meter straight edge
17. Wedge-shaped clearance gauge, pieces
18. Bayonet spades, pieces
19. Assorted spades, pieces
20. Hammers, pieces
21. Set of barrier

A DS-108 subgrader or DS-109 materials distributing machine equipped with a vibrating beam is used to install artificial beds when constructing pavement with a railless set of machines. The soil-cement and sand-cement mixtures are usually prepared in this case in mixing plants.

A DS-502 (D-345) subgrader is usually employed to install artificial beds from soil-cement and sand-cement mixtures prepared in plants when constructing pavement with a rail-travel set of machines. Artificial beds of other types are installed by the same machines and methods as flexible pavement (see Chapter 5).

Installation of a crushed stone base using the DS-108 subgrader. The work to install a crushed stone bed includes hauling the crushed stone, levelling it,with a bulldozer and grading with a motorized grader, rolling with rollers, grading the crushed stone with a subgrader, packing the stone with rollers and treating the surface with asphalt or an asphalt emulsion (if it is provided by the plan).

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Crushed stone is hauled to a prepared dirt bed by dump trucks. The distance between unloading points is determined by calculation on the basis of the given thickness of the bed with regard to a 30-35 percent margin for packing and the capacity of the body of the transport equipment.

The crushed stone is rolled to create a sufficiently strong bed for subsequent operation of the subgrader. It is performed by light rollers of type DU-50 in five-six passes on the same track at a speed of 1.5-2 km/hr. The rolling is completed when a wave no longer forms in front of the wheels of the roller and the crushed stone is not shifted when the roller moves.

A crushed stone base is usually graded with a subgrader in one pass at a speed of 5-7 m/min.

The cutting edge of the rear blade of the subgrader is set above the planned mark of the top of the bed by the margin during subsequent packing with rollers for grading the crushed stone layer, while the screw conveyer is set 1-2 cm higher than the cutting edge of the rear blade.

The crushed stone layer is initially packed with heavy wheeled rollers of type DU-48A in five-six passes after it has been graded with the shaper and then with rollers on pneumatic tires of type DU-31A (D-627A) within 10-12 passes on the same track.

The speed of the rollers during the first two-three passes on the same track is 3 km/hr for wheeled rollers and 5-6 km/hr for pneumatic-tire rollers. The speed is 4-5 km/hr for wheeled rollers and 10-23 km/hr for pneumatic-tire rollers during subsequent passes.

Rolling is done from the edges of the row to the middle with overlapping of tracks by 30-50 cm. Rolling is carried out with wetting at a rate of 15-25 liters/m^2. Wetting is considered normal if there is moisture on the bottom surface of the top crushed stone bed.

The crushed stone bed is treated with asphalt or asphalt emulsion using a road oiler immediately after rolling. The asphalt is distributed in one procedure and the asphalt emulsion is distributed in two procedures: the first half of the total rate is first distributed and the second is distributed after 2-3 hours of drying.

The work to install a crushed stone bed is conducted in sections approximately 800 meters long. A diagram of organizing the work is shown in Figure 15. Complex brigades are organized to perform the work (Table 6.9).

Engineering and Economic Indicators for Installation of Crushed Stone Bed

Laboriousness per 1,00 m^2 of bed, man-days	2.05
Average rank of workers	4.8
Output per worker per shift, m^2	480

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.9. Composition of Complex Brigade to Install Crushed-Stone Base

Type of Work Performed	Composition of Sections
Levelling, grading and rolling crushed stone	Bulldozer operator, sixth rank--1 Motorized grader operator, sixth rank--1 Motorized roller operators, fifth rank--3 Road worker, third rank--1
Grading crushed stone with subgrader	Subgrader operator, sixth rank--1 Assistant operator, fifth rank--1 Bucket loader operator, fifth rank--1 Roadworker, second rank--1
Packing crushed stone	Pneumatic-tire roller operator, sixth rank--1 Heavy wheeled roller operator, fifth rank--1
Treating crushed stone layer with asphalt or asphalt emulsion	Road oiler operator, fifth rank--1 Assistant operator, fourth rank--1

Figure 15. Diagram for Organizing Work to Install Crushed Stone Bed: 1--motorized grader;2--dump truck with crushed stone; 3--light rollers; 4--bulldozer; 5--DS-108 subgrader; 6--bucket loader; 7--dump truck; 8--heavy wheeled roller; 9--pneumatic-tire roller; 10--road oiler; 11--master string

Key:

1. Name of work on sections A, B, ... E
2. A--hauling, distribution and rolling of crushed stone
3. B--rolled crushed stone section
4. C--final grading of crushed stone with shaper and packing with heavy rollers
5. D--section prepared for treatment with asphalt emulsion
6. E--treatment with asphalt emulsion
7. Axis of VPP
8. Flow diagram

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The need for machines, equipment and implements to install a crushed-stone base is presented in Table 6.10.

Table 6.10. Machines, Equipment and Implements to Install Crushed-Stone Base

Machines, Equipment and Implements	Number
DS-108 subgrader	1
Bucket loader	1
DZ-31-1 (D-557-1) motorized grader	1
DZ-18 (D-493A) bulldozer	1
DU-50 motorized wheeled rollers	3
DU-48A motorized wheeled roller	1
DU-31A (D-627A) pneumatic-tire roller	1
DS-39A (D-640A) road oiler	1
DS-10 (D-351) tank truck-asphalt hauler	1
Wetting-washing machine with 5,000 liter capacity	1
Dump trucks to haul crushed stone	By calculation
Foreman's office car	1
Towed water tank (3,000-5,000 liters)	1
Level with tripod and set of levelling rods	1
Stakes, pieces	10
Steel tape measure, 20 meters	1
Wood measuring straight edge, 80 cm	1
Joint spades	2
Shovels	2
Hammer	1
Capron brushes on long handles	2
Funnels to distribute emulsion by hand	2
Set of barriers and signal signs	1

Installation of a soil-cement bed using a DS-108 subgrader. The composition of work to install the bed is as follows: preparation of the work section, hauling of the strengthened mixture and levelling of it with a motorized grader, grading the strengthened mixture with a subgrader, packing the mixture with rollers, clean grading of the bed by a subgrader with cutting of the edges and distribution of film-forming materials to maintain the bed. The process flow diagram of installing the bed is shown in Figure 16.

The bed is installed by marker rows every other one. The bed is installed on intermediate rows after the strengthened soil of the marker rows achieves the strength required for passage of the shaper.

The soil-cement mixture prepared at the mixing plant is hauled to the prepared dirt bed by dump trucks and it is initially levelled with a motorized grader to increase the productivity of the subgrader. In this case the mixture is not distributed over the entire width of the row to the installed forms but 20-30 cm is left to the edges. The mixture is distributed over the entire width (8.4 meters) of the row with subsequent grading by the subgrader.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The position of the working members of the subgrader during grading is as follows: the cutter and front blade are raised, the cutting edge of the rear blade is set higher than the planned mark of the top of the bed by the margin for packing (15-25 percent) and the margin for cutting during clean grading of the bed (0.5-1 cm), the screw conveyor is set 2-2.3 cm higher than the cutting edge of the rear blade and the side openings of the screw conveyer and cutter are closed.

The strengthened mixture is usually graded during one pass of the subgrader at a speed of 10-15 m/min.

Figure 16. Process Flow Diagram of Installing Bed with DS-108 Subgrader: I--hauling strengthened soil with dump trucks and levelling it with motorized grader; II--distribution and grading of strengthened soil with subgrader; III--packing strengthened soil with rollers; IV--clean grading of bed with subgrader; V--distribution of film-forming materials to maintain bed; 1--dump trucks; 2--motorized grader; 3--subgrader; 4--pneumatic rollers; 5--road oilers; 6--master string

The strengthened mixture is wetted to optimum moisture content in hot and dry weather when it loses moisture intensively during laying. In this case a water distribution system is installed on the subgrader and the work is performed in the following sequence.

The screw conveyer and rear blade are raised to the transport position and the cutter is lowered without it reaching the bottom of the bed by 1-2 cm after the first pass of the subgrader.

The strengthened mixture is mixed with water by the hoe during the return pass of the subgrader (with the distributing system connected to the water carrier). The speed of the subgrader is 5-10 m/min during this operation. Final levelling of the mixture by a roller is then carried out with a second pass of the subgrader, which operates similar to the first pass.

Packing, which should be completed no later than 3 hours after preparation of the mixture, begins immediately after levelling of the strengthened mixture with the subgrader (no later than 5 hours at air temperature below +10°C).

Packing is carried out by pneumatic-tire rollers of type DU-31A (D-627A) or DU-29 (D-624). Rolling is done from the edges of the installed row to the middle with overlapping of strips by 20-30 cm. The approximate number of passes by the roller on the same track is 12-18 and it is finally established by test rolling.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The speed of the rollers during the first two passes on the same track is 7.5 km/hr, it is gradually increased to 12-15 km/hr during subsequent passes and the final two passes on the same track are also made at a speed of 7.5 km/hr. If the air pressure in the tires can be regulated, it is regulated at 4-5 kgf/cm^2 during the first passes and is increased by 1 kgf/cm^2 for each two subsequent passes; the final passes are made with maximum pressure permitted by the tires.

Clean grading of the bed with the subgrader is carried out immediately after packing of the strengthened mixture with rollers, after which it should take on the given planned marks and transverse profile. Therefore, the working member of the subgrader to perform this operation should be set and regulated especially carefully.

The cutting edge of the rear blade is set at the level of the planned mark of the top of the bed, while the remaining working members are arranged above it: the hoe by 0.5-1 cm, the cutting edge of the front blade by 1 cm and the screw conveyer by 2-2.5 cm.

Clean grading is carried out at a speed of 8-10 m/min during a single pass of the subgrader. The edges of the bed are cut during clean grading on the marker rows, installing special devices on the subgrader for this. The service of the bed is covered with film-forming materials immediately after clean grading.

The film forming materials are distributed by using a road oiler or an ENTs-3M machine, modified to operate on pneumatic tires.

The distributing systems of the machines are supplemented with devices for treating the edges of the bed.

When using a road oiler, the work is first carried out on one and then on the second half of the row.

Installation of the pavement or passage of production machines and transport equipment over the bed after distribution of the film-forming materials is authorized no sooner than 14 days.

The work to install beds is carried out in shift sections approximately 800 meters long. Because of the limited periods permitted to pack the mixture after preparation, the shift section is divided into four sections, performing the work with a shaper in the following sequence. The first section (200 meters) is graded for rolling and then a second section is graded. The shaper returns to the beginning of the section and performs clean grading of the two sections, completing packing of the strengthened mixture on them by this time. The work on the next two sections is carried out in the same sequence.

The composition of the brigade to install the bed is as follows:

Subgrader operator, sixth rank	1
Assistant operator, fifth rank	1
Motorized grader operator, sixth rank	1
Roller operators, sixth rank	2
Road workers, third rank	2

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

A road oiler, road oiler operator, fifth rank and assistant road oiler operator, fourth rank are given to the brigade for temporary work.

The laboriousness of the work and the need for machines, equipment and implements during installation of a soil-cement bed using a DS-108 subgrader are presented in Tables 6.11 and 6.12.

Installation of a sand-cement bed with a DS-109 concrete distributing machine. When installing a sand-cement bed with a concrete distributing machine, a vibrating beam is attached to it to pack the mixture and the sliding side form is lengthened. A stock towed pneumatic-tire hopper can be used for preliminary proportioning of the mixture.

The bed is arranged with marker rows every second row. The tracks of the distributing machine pass over the sand-cement marker rows that have achieved sufficient strength when performing work on intermediate rows. The sliding form is removed in this case and master strings are not installed. The surface of the bed of the marker rows serves as the level indicator and their lateral edges serve as the course indicator.

The work to install a sand-cement bed includes preparation of the distributing machine for operation, reception, distribution and packing of the sand-cement mixture and distribution of film-forming materials to maintain the sand-cement.

A process flow diagram of installing a bed is shown in Figure 17.

The position of the working members of the distributing machine when installing a sand-cement bed is as follows: the cutting edge of the blade is set higher than the planned mark of the sand-cement bed by the margin for packing, the screw conveyor-hoe working member is set 5 cm above the cutting edge of the blade and the vibrating beam is set at the level of the planned mark of the top of the sand-cement bed.

The rear wall of the towed hopper is raised with the calculation that the transverse area of the triangle of the sand-cement mixture laid by the hopper was equal to the transverse area of the sand-cement bed of the row laid in the broken layer.

The scheme for installation of a sand-cement bed is as follows: a dump truck delivers the sand-cement mixture to the hopper on one trip and unloads it, the mixture is proportioned in volume by the rear wall of the hopper during movement of the distributing machine, is distributed over the entire width of the row by the screw conveyer-rotary hoe working members, is levelled with a blade and is packed with a vibrating beam.

The speed of the distributing machine is 1-1.5 m/min; it is established on the basis of providing the required density of the mixture.

The film-forming materials for maintaining the sand-cement bed are distributed by a DS-105A machine included in the set of concrete laying machines or by a road oiler. The chassis with the DS-105A distributing machine is installed so that the

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.11. Laboriousness of Work to Install Soil-Cement Bed 15 cm Thick

(1) Технологические операции	(2) Единица измерения	(3) Объем работ	(4) Трудоемкость, чел-ч
(5) Приемка и учет укрепленной смеси	м³	1400	8
Разравнивание смеси автогрейдером (6)	»	1400	8
Подготовка профилировщика к работе (7)	—	—	1
Планирование смеси профилировщиком (8) (1-й проход)	м²	6720	5,5
Обратный ход профилировщика с доувлажнением смеси (9)	»	6720	5,0
Планировка смеси под укатку (2-й проход) (10)	»	6720	4,6
Переход профилировщика к началу участка (11)	м	800	1,8
Чистовая планировка основания профилировщиком с обрезкой краев (12)	м²	6400	4,6
Очистка и мойка машины, смазка узлов, заправка горючим (13)	—	—	1,6
Уплотнение смеси катками (14)	м²	6720	16
Распределение пленкообразующих материалов (15)	»	6670	2,8
Итого на сменную захватку длиной 800 м (16)	(6400 м²)		58,8

Note. The laboriousness of work to deliver the strengthened mixture, film-forming materials and water to wet the mixture was not taken into account.

Key:

1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness, man-hours
5. Acceptance and accounting for the strengthened mixture
6. Levelling of mixture with motorized grader
7. Preparation of subgrader for operation
8. Grading of mixture with subgrader (first pass)
9. Return pass of subgrader with wetting of mixture
10. Grading mixture by roller (second pass)
11. Run of subgrader to beginning of section
12. Clean grading of bed by subgrader with cutting of edges
13. Cleaning and washing the machine, lubrication of assemblies and refuelling
14. Packing mixture with rollers
15. Distribution of film-forming materials
16. Total for shift section 800 meters long

distance from the nozzles to the surface of the sand-cement bed is equal to 45-50 cm. The pressure in the distributing system should be 4-6 kgf/cm^2. The film-forming materials are distributed in two processes to half the norm during each process. The speed of the machine is 14-16 m/min with normal pouring of 0.4 liter/m^2 during each process and 9-11 m/min during normal pouring at 0.5 liter/m^2.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.12. Machines, Equipment and Implements for Installation of Soil-Cement Bed

Name of Machines, Equipment and Implements	Number
DS-108 subgrader	1
DS-98A conveyer-loader	1
DZ-98 motorized grader	1
DS-53A (D-772) road oiler for temporary work	1
Dump trucks	By calculation
DU-31A (D-627) pneumatic-tire rollers	2
Water-washing machines to deliver water (if necessary)	By calculation
Car and storehouse (for foremen)	1
Towed tank truck for water for technical needs	1
Level with tripod and set of rods	1
Stakes, pieces	10
Steel tape measure, 20 meters, pieces	1
Surveyor's tape, 20 meters (segment of string), pieces	1
Measuring straight edge, 80 cm	1
Three-meter straight edge, pieces	1
Layer thickness gauge, pieces	1
Template to measure transverse slope, pieces	1
Kovalev's device (density meter), pieces	1
Shovels, pieces	3
Assorted shovels, pieces	3
Hammers, pieces	1
Capron brushes on long handles, pieces	2
Funnels to distribute film-forming materials, pieces	2
Set of barriers and signal signs, complete set	1

The length of a shift section in installation of a sand-cement bed with a DS-109 distributing machine is 350-500 meters; the work is usually carried out in two shifts.

Table 6.13. Laboriousness of Work to Install Sand-Cement Bed With DS-109 Spreader

(1) Технологические операции	Трудоемкость на весь объем работ, чел-ч (2)	Технологические операции	Трудоемкость на весь объем работ, чел-ч
(3) Подготовка распределителя к работе	1,7	(6) Подготовка машины ДС-105А к работе	0,5
Прием, предварительное дозирование, распределение, выравнивание и уплотнение смеси (4)	75	Распределение пленкообразующих материалов (7)	14,8
		Очистка машины и распределительной системы (8)	0,7
Заключительные работы, очистка машины (5)	3,3	(9) Всего на 800 м (6000 м²)	96

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Production operations
2. Laboriousness for entire volume of work, man-hours
3. Preparation of spreader for operation
4. Acceptance, preliminary proportioning, distribution, levelling and packing of mixture
5. Final operations and cleaning of machine
6. Preparation of DS-105A machine for operation
7. Distribution of film-forming materials
8. Cleaning machine and spreading system
9. Total for 800 meters (6,000 m^2)

Table 6.14. Need for Machines to Install Sand-Cement Bed

(1) Наименование машин	(2) Количество	Наименование машин	Количество
Распределитель бетона ДС-109, оборудованный вибробрусом и приемным бункером (3)	1	Прицеп двухосный для бочек с пленкообразующими материалами (5)	1
Машина ДС-105А (4)	1	Автомобили-самосвалы для доставки пескоцементной смеси (6)	(7) По расчету

Note. The need for equipment and implements when installing a sand-cement bed is the same as when installing a dirt-cement bed (see Table 6.12).

Key:
1. Name of machines
2. Number
3. DS-109 concrete spreader equipped with vibrating beam and receiving hopper
4. DS-105A machine
5. Two-axle trailer for barrels with film-forming materials
6. Dump trucks to deliver sand-cement mixture
7. By calculation

The composition of the section to install the bed is:

Spreader operator, sixth rank	1
Assistant operator, fifth rank	1
Road workers, third rank	2
Road workers, second rank	1

The laboriousness of work and the need for machines when installing a sand-cement bed using a DS-109 spreader are presented in Tables 6.13 and 6.14.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 17. Process Flow Diagram of Installing Sand-Cement Bed: 1--dump truck; 2--DS-109 distributing machine; 3--DS-105A film-forming distributing machine; 4--master string; 5--sliding form; 6--vibrating beam; 7--receiving hopper-proportioning device

Key:
1. Direction of flow
2. Section of 500 meters

Engineering and Economic Indicators for Installing a Sand-Cement Bed With a DS-109 Spreader

Laboriousness per 1,000 m^2 of bed, man-days	2
Average rank of workers	4
Output per worker during 8-hour shift, m^2	500

6.5. Formation of Pavement

Formation of pavement when using a railless set of machines. When using a railless set of machines, pavements are formed with a DS-109 concrete spreader and a DS-111 concrete placer and final finishing of the pavement surface and imparting roughness to it are accomplished with DS-104A and DS-105A machines.

A layer of asphalt-polymer or asphalt mastic is applied to the edge of the slabs of the adjacent row prior to the beginning of pavement forming work and the bodies of the butt joints are installed at the points where transverse deformation seams and rebar grids (in reinforced concrete pavement) are located.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The asphalt-polymer mastic is applied to the edge of the slabs of the adjacent row with stiff brushes in a layer 2-3 mm when it is hot (approximately 100°C). In this case the surface of the edge is first cleaned of dirt and dust and is primed with liquefied asphalt. The mastic is applied no sooner than 1.5 hours after priming is completed.

The bodies of the butt joints and the rebar grids are transported to the installation point in packets on specially equipped frame-hauling trucks. The rebar grids are unloaded and installed on the bed with a crane having a boom of not less than 10 meters.

Before installing the rebar grids, the location points of the transverse seams are marked off and the butt joint frames are installed strictly along their line. The rebar grids are then installed. The grids must be welded to each other (in the gaps between transverse joints) if the distance between transverse joints is more than 10 meters. In this case the grids are installed with overlap of 25-30 cm and the ends of the longitudinal rods are welded, first having cleaned them of dirt and rust.

The concrete mixture is received and spread by a DS-109 concrete spreader, which has reloading equipment in the form of a hopper with belt conveyer to receive the mixture from the side and to move it to the row to be concreted.

The machine is equipped with a snake conveyer with a working member and blade to spread the concrete mixture over the entire width of the row and to ensure the required thickness of the layer and it is equipped with a side moving form to ensure the width of distributing the mixture.

The position of the working members of the machine after adjustment is:

the lower point of the snake-conveyer working member should be 5 cm lower while the cutting edge of the blade should be 2-3 cm higher than the planned mark of the top of the installed pavement.

The concrete mixture can be hauled to the spreader more easily as concreting proceeds from the side of the concrete placer.

The sequence of performing the production operations on reception and spreading of the concrete mixture is as follows: a large-capacity dump truck of type KrAZ-256B with the concrete mixture travels somewhat ahead of the spreader, the hopper-conveyer moves, the truck feeds it while travelling in reverse, the mixture is unloaded, which is moved by a belt conveyer within the row to be concreted, the conveyer-hopper retracts inside the frame to permit the next truck to pass and after two trucks have been unloaded spreading of the concrete mixture by the snake-hoe working member and levelling of the spread layer with the blade begin.

The shift productivity of the spreader is approximately 600 meters of pavement, which is considerably below the possible productivity of the DS-111 concrete placer, with the data and the machine time utilization factor during a shift equal to 0.85 presented in Table 6.15.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

One should bear in mind that the length of a work cycle in spreading the concrete mixture is frequently considerably higher in practice than that presented in Table 6.15, reaching 400 seconds or more. In this case approximately 50 percent of the working time is expended to clean the bodies of the dump trucks of the remains of the concrete mixture. A reserve for a significant increase of spreader productivity is to use higher capacity dump trucks to transport the concrete mixture and dump trucks equipped with special devices for fast complete unloading of the concrete mixture.

Table 6.15. Approximate Time Distribution to Perform Production Operations That Affect the Length of the Work Cycle of a DS-109

(1) Технологические операции	(2) Продолжительность, с	Технологические операции	Продолжительность, с
(3) Подход автомобиля к приемному бункеру	30	(9) Очистка кузова второго автомобиля от остатков смеси	20
(4) Разгрузка бетонной смеси автомобилем в бункер	25	Отход второго автомобиля (10)	7
(5) Очистка кузова от остатков смеси	20	Распределение 10,6 м³ бетонной смеси на 5 м покрытия (толщина покрытия 28 см) (11)	46
Отход автомобиля (6)	7		
(7) Подход к приемному бункеру второго автомобиля	30	(12) Итого	210
Разгрузка смеси вторым автомобилем (8)	25		

Key:

1. Production operations
2. Length, seconds
3. Approach of truck to receiving hopper
4. Unloading concrete mixture by truck into hopper
5. Cleaning body of remains of mixture
6. Departure of truck
7. Approach of second truck to receiving hopper
8. Unloading mixture by second truck
9. Cleaning body of second truck of remains of mixture
10. Departure of second truck
11. Spreading of 10.6 m^3 of concrete mixture per 5 meters of pavement (pavement thickness of 28 cm)
12. Total

After the concrete mixture has been spread, all subsequent treatment of it (packing, shaping the final profile, forming and finishing the edges and smoothing the surface) is performed by a DS-111 concrete placer.

To do this, the machine is equipped with the following working members: distributing screw conveyer, proportioning blade, package of deep vibrators, vibrating proportioning beam, two rocking beams, edge formers and smoothing beam.

The concrete placer is equipped with side forms approximately 5 meters long which serve as a travelling form. The forms are hinged to the frame and they are raised and lowered by hydraulic cylinders.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The position of the working members after adjustment is as follows: the blade is set 3-4 cm higher than the planned top mark of the pavement to be laid, the vibrating beam is installed 0.3-0.4 cm above the lower edge of the frames with angle of attack of 1-2° and the second is in talled 0.1-0.3 cm above it with angle of attack of 1° and the vibrators should be 3-5 cm above the reinforcing.

The work of the concrete placer begins at minimum speed. After the space under the vibrators is filled with the concrete mixture, they are lowered to the working position, the machine makes the final placement and it is changed to working speed and automatic work mode.

During the work one sees that the deep vibrators are completely submerged in the concrete mixture, that there are no foreign objects on the smoothing beam and that there are no obstacles in the path of the concrete placer tracks.

If defective points are discovered on the surface of the pavement after the concrete placer has passed, they are corrected with smoothers on long handles, while edge defects are corrected by using an attached form and metal smoother.

To shape the pavement normally, there must always be a ridge of concrete mixture 20-25 cm high in front of the first rocking beam and 10-20 cm high in front of the second rocking beam during operation of the machine. The vertical structure of the slab edges is achieved by the appropriate setting of the side (travelling) form and edge-shapers: the upper edge of the form should be moved 1-2 cm inside the row to be laid while the edge of the edge former is raised 1-3 cm above the pavement surface.

It is very important when laying concrete with a railless set of machines to ensure smooth operation of the concrete placer and spreader and constant mobility of the concrete mixture. One must try to see that there be no stops with minimum production break between the concrete placer and spreader since this leads to disturbance of pavement evenness.

Nonuniform mobility of the concrete mixture makes it necessary to constantly regulate the working members of the concrete placer and leads to disturbance of the configuration and vertical nature of the lateral edges.

After the concrete has been laid, the spreader and concrete placer are moved forward and are prepared for work during the next shift: the sensor-master cam is removed and the working members are cleaned and flushed with water and the surface of the deep vibrators is cleaned especially carefully.

The working joint is installed at the end of the concreting section: a board with butt joints is installed perpendicular to the row to be concreted.

An accessory side form is installed along the edge of the final section and the final section is concreted with small machinery.

The surface of the pavement is finished with the DS-104A machine, whose working members are two smoothing pipes and a smoothing blade after the concrete placer has passed.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The surface is finished in two procedures.

The surface of the pavement is first finished by shuttle passes of the machine (forward-backward) within two or four passes depending on weather conditions and the properties of the concrete mixture. The surface is finished in sections 30-50 meters long. Prior to the beginning of finishing, the pipes are installed so that their lower edges are on the planned markeof the top of the pavement and the pipes are then removed and rotated in the horizontal plane by an angle so that their external ends lack 10-20 cm of reaching the edges of the pavement. The pipes are then lowered until they touch the concrete surface while the machine is travelling at low speed and the machine is then changed to working speed.

At the end of the section the pipes are raised, rotated by 90° and are lowered to the pavement surface while moving smoothly backward. The speed of the machine is 14-18 m/min during the first pass, 17-24 m/min during the second pass and 25-30 m/min during the third and fourth passes.

The pipes are sprinkled with water through the spreading system during hot windy weather; it is not permitted to sprinkle the concrete surface with water.

The concrete surface is finally finished with the smoothing pipes and blade during one pass of the machine at a speed of 16-18 m/min. In this case the smoothing pipes are set in cross-section by an angle so that their ends protrude 10-15 cm beyond the edges of the row of pavement. The productivity of the DS-104A concrete finishing machine is approximately 1,000 meters of pavement per shift.

After final finishing of the pavement surface, roughness is created on it by using the DS-105A machine, with which film-forming fluids to maintain the hardening concrete are also applied to the pavement surface.

The working members of the machine are a transverse brush to create roughness and a spreading system to apply the film-forming fluids.

The machine is prepared for operation at the beginning of the shift, it is installed with respect to the string, the linearity of the guides to move the brush is checked and they are set parallel to the pavement surface, the spray nozzles are selected according to the diameter of the outlet opening and the distributing system frame is set so that the height of the nozzle is 45-50 cm.

After the machine has been prepared, creation of surface roughness begins: the brush is set 1-2 cm from the left edge of the pavement and its ends are introduced into the concrete to a depth of 3-4 mm by means of hydraulic cylinders, the brush is moved to the right edge of the pavement and is returned to the initial position, the brush is raised and the machine moves forward by the width of the brush and the operation is repeated. Having completed the work to create surface roughness on a section 150-200 meters long, the machine returns to the beginning of the section to apply the film-forming material to the pavement surface.

The work to form pavement is usually organized in two shifts, performing it in two (when concrete pavement is installed) or three (when reinforced concrete pavement is installed) sections (Figure 18). Work to prime the edges of the slabs of the

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

adjacent row and to apply the asphalt-polymer mastic to them is carried out on section No 1; the butt joint frames and rebar are installed on section No 2, the concrete mixture is spread and packed, the pavement profile is shaped, the surface is finished and roughness is imparted to it on section No 3.

Figure 18. Process Flow Diagram of Installing Reinforced Concrete Airfield Pavement with a Railless Set of Machines: 1--mobile boiler for heating asphalt and tank for preparation of primer; 2--mobile boiler for preparation of mastic; 3--frame-hauling truck; 4--rebar; 5--crane; 6--sand-asphalt cover; 7--ASB-300 welding machine; 8--master string; 9--KrAZ-256B dump truck; 10-DS-109 concrete spreader; 11--DS-111 concrete placer. The rank of workers and operators is shown in the circles; the DS-105 machine is not shown.

Key:
1. Type of work
2. Priming the edges of the slabs and application of mastic
3. Installation of rebar and welding of joints
4. Spreading and laying of cement-concrete mixture
5. Flow diagram
6. Number and length of section

The composition of the brigade, the laboriousness of installing the reinforced concrete pavement and the need for machines, equipment and implements are presented in Tables 6.16 and 6.17.

The main engineering and economic indicators to install reinforced concrete pavement from slabs measuring 7.5 X 7.5 meters and 26 cm thick are the following:

Labor expenditures to install 1,000 m^2 of pavement, man-days . .	5.6
Average rank of workers	3.63
Output of one worker per shift, m^2	178.5

Forming pavement with a rail-travel set of concrete-spreading machines. The following operations should be carried out before laying the concrete mixture: the

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

levelling or distributing interlayer should be constructed, the rail-forms should be installed and checked, the edges of the slabs of the adjacent row should be coated with an asphalt-polymer mastic or asphalt, the butt joints frames should be installed and the rebar or reinforcing frames should be installed when constructing armored and reinforced concrete pavement.

Receiving the concrete mixture from the dump trucks, spreading it over the width of the row to be laid and proportioning are carried out by means of a DS-503 (D-375) hopper concrete spreader. The hopper is set in height with regard to the packing reserve.

The concrete mixture is spread in transverse rows with overlapping of the laid row by one-third the width of the lower opening of the hopper.

When constructing unreinforced cement-concrete pavement, if horizontally arranged cylindrical bars are provided as butt joints, they can be installed in the planned position by using a special loading device (Figure 19) with which the concrete spreader is equipped.

The work is performed in the following sequence: the spreader is stopped near the compression seam, a rod with loading forks is installed 3-5 centimeters from the concrete surface with hydraulic cylinders, rods are set under the forks, the working member is installed in a floating position and the electric vibrator is switched on, submerging the rods to the planned depth.

The concrete mixture is packed and the surface of the pavement is finished with a DBO 7-7.5 long-base concrete finishing machine or DS-504 (D-376) concrete finishing machine.

The working members of the machines are adjusted prior to the beginning of work.

Figure 19. Diagram of Device to Submerge Rods: 1--welded bracket (welded to DS-503 machine); 2--hydraulic cylinder; 3--loading fork; 4--vibrating straightedge of R65 rail; 5--adapter coupling

The diagonal vibrating beams of the DBO machine are set at the level of the rail-form heads and regulate their angle of attack. The position of the smoothing vibrating beam, the lower surface of which is set on the same level with the rear edge of the vibrating packing beam for a concrete mixture with cone settling up to 1.5 cm and it is set 2-3 mm below it for more elastic mixtures. The required angle of attack of the smoothing beam is set, which is determined experimentally.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.16. Composition of Brigade and Laboriousness of Performing Work to Install Armored Concrete Pavement

Production Operations	Unit of Measurement	Volume of Work	Laboriousness for Entire Volume of Work, man-hours	Composition of Sections
1	2	3	4	5
Priming the edges of slabs and application of asphalt-polymer mastic:				
preparatory-final operations	man-hours	3	3	Road workers, second rank--3
priming with liquefied asphalt	meters	1,000	18	
application of asphalt-polymer mastic	meters	1,000	27	
Installation of butt joint frames and rebar grids measuring 7.34 X X 7.34 meters:				
preparatory-final operations	man-hours	4	4	Crane operator, fifth rank--1
installation of butt joint frames every 7.5 meters	frame	133	15	Riggers, third rank--2
installation of rebar grids	grid	133	45	Road worker, third rank--1
Reception and spreading of cement-concrete mixture:				Spreader operator, sixth rank--1
preparatory-final operations	man-hours	10	10	Assistant operator, fifth rank--1
spreading the mixture	m^2	7,500	70	Concrete workers, second rank--2 Auxiliary worker, second rank--1

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 6.16 (Continued).

Production Operations	Unit of Measurement	Volume of Work	Laboriousness for Entire Volume of Work, man-hours	Composition of Sections
1	2	3	4	5
Formation of concrete mixture:				Concrete spreader operator, sixth rank--1
preparatory-final operations	man-hours	16.8	16.8	Assistant operator, fifth rank--1
formation of mixture with concrete spreader	m^2	7,480	93.3	Concrete spreaders, fourth rank--2
concreting the final section with small machinery	m^2	20	1.9	Construction fitter, fourth rank--1
Final finishing of pavement surface with DS-104A machine, creation of surface roughness and application of film-forming fluid with DS-105A machine	m^2	7,500	32	DS-104A and DS-105A machine operators, fifth rank--2
Total for 7,500 m^2	man-hours		336	

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.17. Machines, Equipment and Implements Used to Install Armored Concrete Pavement

Name of Machines, Equipment and Implements	Number
For priming edges of slabs and application of mastic	
Mobile boiler for heating mastic	1
Mobile boiler for heating asphalt	1
Tank to mix primer	1
Pails	4
Master forms to prevent liquefied asphalt or mastic from falling on edge of pavement	2
Wire brushes	2
Soft flat brushes	2
Hard brushes	2
To install butt joint frames and rebar grids	
GKM-7.5 crane	1
Crosspiece to install rebar grids	1
To spread concrete mixture	
DS-109 concrete spreader	1
Long-handled shovels	2
To place concrete mixture	
DS-111 concrete placer	1
Deep vibrators (type I-116)	2
Checking metal straight edge 3 meters long	1
Long-handled smoother	2
Shaped metal smoothers to finish edges of pavement	2
Metal smoothers to finish grooves	2
Assorted shovels	2
Polyethylene rope or steel wire	20 meters
Ten-meter spool	1
Sledge hammers	2
Carpenters hammers	1
For final finishing of pavement surface, creation of surface roughness and application of film-forming fluid	
DS-104A concrete spreading machine	1
Metal control straightedge 3 meters long	1
DS-105A machine	1
Pistol-grip sprayer	1
Metal brushes	2
Galvanized pail	1

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The DS-504 (D-376) machine has the following: the blade shaft (the lower edges of the blades) are set 2-3 cm higher than the heads of the rail-forms, the rear edge of the bottom of the packing beam and the lower surface of the smoothing beam are set at the level of the rail-form heads and the lower edges of the packing and smoothing beams should be strictly parallel; the angles of attack of the working members are selected experimentally.

The height of the concrete mixture or mortar roller should be equal to 10-15 cm in front of the blade shaft, 8-10 cm in front of the vibrating packing beam and 1-3 cm in front of the vibrating levelling and smoothing beams if the working members of the machines are set correctly.

The spread concrete mixture near the walls of the rail-forms is first packed with deep vibrators or the concrete-finishing machines are equipped with special attachments for this purpose (designed by SU [Construction administration]-910 of the Yuzhdorstroy Trust, Glavdorstroy), the electric circuitry of which provides submergence of the vibrators, vibration for 30 seconds, raising of the vibrators to the initial position and automatic repeating of the process and also automatic emergency raising of the vibrators with the machine stopped and during repeated passes.

The pavement surface should be even after the concrete finishing machine has passed (the gap under a three-meter straightedge should not exceed 3 mm) and there should be no grooves on it deeper than 5 mm.

Small cracks and air pours are finished by hand using a long-handled wood smoother.

The cement milk is removed from the pavement by capron brushes with long handles.

The outer edge of the pavement of the row to be concreted is worked with a metal smoother with rounded rib.

The compositions of the sections and the need for machines, tools and accessories when installing armored concrete (reinforced concrete) pavement with a rail-travel set of machines are presented in Tables 6.18 and 6.19.

The approximate engineering and economic indicators when installing armored concrete pavement with shift productivity of 160 meters (1,120 m^2) are as follows:

Laboriousness per 1,000 m^2 of pavement, man-days	13.4
Average rank of workers	3.6
Output of worker per shift, m^2 of pavement	74.6

6.6. Maintenance of Hardening Concrete

The designation of measures to maintain hardening concrete consists in the following:

do not permit water evaporation from the concrete since this leads to a reduction of its density, strength and cold resistance, especially in the surface layer;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.18. Compositions of Sections and Work Performed by Them When Installing Armored Concrete (Reinforced Concrete) Pavement with Rail-Travel Set of Machines

Name of Work	Composition of Section	Number of Workers
Installation of butt joint frames and rebar grids (frames)	Crane operator, fifth rank	1
	Riggers, third rank	2
Reception and spreading of concrete mixture	Spreader operator, sixth rank	1
Packing of concrete mixture and finishing the surface of pavement with concrete finishing machine	Concrete worker, second rank	1
	Concrete-finishing machine operator, sixth rank	1
	Assistant operator, fifth rank	1
	Concrete workers:	
	third rank	2
	second rank	2
Final finishing of pavement surface by hand and treatment of edges	Concrete workers:	
	fourth rank	2
	third rank	2

Table 6.19. Machines, Tools and Accessories Used to Install Armored Concrete (Reinforced Concrete) Pavement with Rail-Travel Set of Machines

Name of Machines, Tools and Accessories	Number
DS-503 concrete spreader	1
DBO 7-7.5 or DS-504 concrete finishing machine	1
GKM-7.5 crane	1
Crossbar to install rebar grids	1
I-116 vibrators with flexible shaft	2
Rope, meters	30
Sledge hammers (blacksmith's and blunt-nosed)	2
Shovels (assorted)	4
Hand brushes	4
Brooms	2
Long-handled wooden smoothers	2
Long-handled capron brushes	2
Shaped metal smoothers	2
Floats	1
Control straightedge 3 meters long	1

reduce the tensile stresses occurring in the concrete due to a temperature drop, which may cause the appearance of temperature cracks in the pavement.

Maintenance of concrete should begin immediately after the final surface finishing and removal of the cement milk from it.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Various methods of concrete maintenance have been used in the practice of airfield pavement construction. The most widespread recently is a method of maintenance that includes covering the pavement surface with waterproof films. To do this, film-forming fluids--pomarol, ethynol laquer, synthetic latex and asphalt emulsions--are applied uniformly to the surface of freshly poured concrete over the entire pavement area. It is recommended that the film-forming fluid be applied to the pavement surface in two layers, expending half the normal rate of application on each layer, which is used according to Table 6.20. The first layer is applied immediately after the pavement surface has been finished and moisture has disappeared from it and the second layer is applied 20-40 minutes later when the first layer has set up.

Table 6.20. Norms for Pouring Film-Forming Fluids

(1) Пленкообразующая жидкость	Температура воздуха во время бетонирования покрытия, °C (2)	
	(3) до +25	(4) +25 и выше
	Норма розлива на два слоя, г/м² (5)	
(6) Помароль	400	600
Лак этиноль (7)	600	1000
Битумные эмульсии (8)	600	1000
Синтетический латекс (9)	300	400

Key:
1. Film-forming fluid
2. Air temperature during concreting of pavement, °C
3. Up to
4. Or more
5. Norm for pouring in two layers, g/m2
6. Pomarol
7. Ethynol varnish
8. Asphalt emulsions
9. Synthetic latex

When using black films, they are lightened by pouring an aqueous lime solution (one part powdered lime and four parts water) or they are sprinkled with a layer of sand 1-2 cm thick to reduce the effects of solar radiation.

A heat-insulating layer of sand (sandy loam) not less than 6 cm thick is laid on the concrete surface above the films immediately after they set up when constructing pavements in dry and hot climates and also sharply continental climate (frequency of daily temperature drops of more than 12°C more than 50 times per year). Straw or reed mats, the thickness of which is not less than 6 cm, can be used instead of sand.

The concrete surface must be protected against the direct effects of wind and solar rays before the film-forming fluids are applied to it when concreting pavements in windy or in hot and dry weather (air temperature above +25°C with

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

relative humidity less than 50 percent). To do this, the pavement surface is covered with standard tents or thin roll films, which should lie tightly against the surface of the slabs over the entire contour and should be vapor- and water proof.

The film-forming fluids are applied to the pavement surface by the mechanized method.

The film-forming fluids are applied with a DS-105A machine when constructing pavements using a railless set of machines, alternating performance of this work with creation of surface roughness. Having performed the work to create roughness on a section 150-200 meters long, the machine returns to the beginning of the section to apply the film-forming fluids to the pavement surface. The speed of the machine when spreading the materials in two layers is 28-32 m/min with pouring norm of 400 g/m^2 and 16-20 m/min with pouring norm of 600 g/m^2.

Table 6.21. Duration of Performing Production Operations With DS-105A Machine on Section 150 Meters Long

(1) Технологические операции	(2) Время, мин	Технологические операции	Время, мин
(3) Заполнение бака помаролью насосом машины	26	(6) Первый розлив помароли на скорости 18 м/мин	9
(4) Нанесение шероховатости на поверхность бетона	22	(7) Возвращение машины к началу участка со скоростью 25 м/мин	6
(5) Возвращение машины к началу участка со скоростью 25 м/мин	6	(8) Второй розлив помароли на скорости 18 м/мин	9
		(9) Итого	78

Key:
1. Production operations
2. Time, min
3. Filling tank with pomarol by machine pump
4. Application of roughness to concrete surface
5. Return of machine to beginning of section at speed of 25 m/min
6. First pouring of pomarol at speed of 18 m/min
7. Return of machine to beginning of section at speed of 25 m/min
8. Second pouring of pomarol at speed of 18 m/min
9. Total

The pressure in the spreading system should be equal to 4-6 kgf/cm^2.

The productivity of the DS-105A machine in creation of roughness and application of the film-forming materials with utilization factor of 0.75 in time during a shift comprises approximately 700 meters.

The duration of performing the production operations with a DS-105A machine is presented in Table 6.21.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

When constructing pavement with rail-travel machines, the film-forming fluids are applied to the surface of freshly poured concrete with an ENTs-3M self-propelled machine or with a road oiler.

6.7. Installation of Deformation Joints

Installation of deformation joints in rigid monolithic pavement consists in cutting grooves and filling them with sealing materials.

The joints are usually cut in monolithic pavement in hardened concrete after it has gained strength of 80-100 kgf/cm^2. The timeliness of the cutting the transverse grooves is very important in this case.

If the grooves are cut prematurely when the concrete has not yet gained the required strength, the edges of the concrete shear in the joint zone and if they are cut late, formation of spontaneous temperature cracks in the pavement concrete is possible. The time required for the concrete to gain the strength indicated above is dependent on the ambient air temperature, the composition of the concrete, the properties of the cement and the type and quantity of additives introduced to the concrete mixture. It should be determined by the construction laboratory based on the results of testing control speciments of cubes of different age. It can be determined approximately from Table 6.2 .

The depth of cutting the groove should not be less than one-fourth the thickness of the pavement and the recommended depth is one-third the thickness of the pavement.

It is recommended that the cutting be done with diamond disks, which permit a significant increase of productivity and reduction of the laboriousness and cost of work compared to carborundum disks.

Table 6.22. Approximate Time for Concrete to Gain Strength of 80-100 kgf/cm^2

(1) Средняя температура окружающего воздуха, °С	(2) Время, ч, необходимое для набора прочности 80–100 кгс/см²	Средняя температура окружающего воздуха, °С	Время, ч, необходимое для набора прочности 80–100 кгс/см²
25–30	6–8	5–15	15–20
15–25	10–12	5 и ниже (3)	24–30

Key:
1. Average ambient air temperature, °C
2. Time, hours, required to gain strength of 80-100 kgf/cm^2
3. Five and below

The practice of constructing airfield and highway pavement shows that in some cases, especially under continental climate conditions, cracks form in the pavement before the concrete has achieved a strength of 80-100 kgf/cm^2.

Under these conditions the joints in the hardened concrete must be cut in two stages or they must be installed by a combination method.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

When cutting joints in hardened concrete in two stages, when the concrete has initially achieved a strength of 50-70 kgf/cm^2, narrow notches are cut in control joints every 20-25 meters. The cutting must be done with diamond disks at a rotational speed of not less than 4,600 rpm. After the concrete has achieved a strength of 80-100 kgf/cm^2, the upper part of the groove of the control joints is then cut to the required width and joints are cut in the gaps between the control joints.

When the joints are installed by the combination method, the grooves in the control joints or in all the joints are initially installed in freshly laid concrete and grooves are then cut in the hardened concrete in all the joints after the concrete has attained the required strength.

The joints are cut by using cutters of different types. The most productive are DS-112 cutters for cutting transverse joints and DS-115 cutters for cutting longitudinal joints. Transverse and longitudinal joints are also cut in hardened concrete with DS-510 (D-903), D-433A and D-432A modified cutters. Joints are cut in freshly laid concrete with a DNShS-60-3M cutter.

Cutting transverse joints with a four-disk DS-112 cutter. The work includes laying out the joints and preparation of the cutter for operation, cutting the joints and final operations.

The joint cutting lines are laid out prior to cutting the joints and the line of motion of the cutter wheels are laid out at a distance of 1.52 meters from one of the longitudinal edges of the pavement. The line of motion of the cutter wheels is laid out on both sides if there is a heat-insulating sand layer on the pavement. The pavement is cleaned of sand along the lines of motion of the wheels to a width of 50-60 cm and along the lines of the joints to a width of 15-20 cm as the cutter moves along.

When the cutting disks are installed or replaced, the carriages are regulated so that the disks on all four spindles are strictly on the same straight line.

To ensure accurate setting of the cutting disks above the line of the joint, the carriages are centered above the joint alternately: the right carriage is initially set on the line of the joint with pads placed under the left wheels and then, having placed the pads under the right wheels, the left carriage is set on the line of the joint.

The outriggers are set after the cutting disks have been aimed, the hose with the cooling fluid is switched on and the joints are cut. The cutting speed is set depending on the depth of cutting the joint and the strength of the concrete. It is approximately 0.8-1.2 m/min.

After the joint has been cut, the cutting disks are switched off and raised to the transport position, the cooling fluid feed valve is closed, the outriggers are raised and the cutter is moved to the next joint, at the same time moving the carriages to the extreme righthand position.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The work of cutting joints is usually conducted in two shifts. The composition of the section includes a cutter operator, fifth rank, and assistant operator, fourth rank. The section includes one or two road workers, first rank, if there is a heat-insulating sand layer.

Main Engineering and Economic Indicators of Cutting Transverse Joints with DS-112 Machine (Distance of 7.5 Meters Between Joints)

Laboriousness of work per 1,000 meters of joints, man-days:	
with absence of heat-insulating sand layer	2.61
with presence of heat-insulating sand layer.	5.22
Average rank of workers:	
with absence of heat-insulating sand layer	4.5
with presence of heat-insulating sand layer.	2.75
time utilization factor of cutter during shift	0.85

Note. Labor expenditures to supply water to the cutter are not taken into account.

The length and laboriousness of performing production operations in cutting transverse joints with a DS-112 machine and the need for machines, equipment and implements are presented in Tables 6.23-6.25.

Cutting joints with DS-510 (D-903) two-disk cutter. The sequence of performing the oprations are: the cutter is aimed on the line of the joint so that the indicators located on a rotating disk along its diameter coincide with the layout line when travelling on this line, the cutter is raised to the rotary disk and rotated by an angle so that the indicator of longitudinal symmetry coincides with the layout line of the joint, the cutter is lowered to the travel wheels and the joint is cut, gradually increasing the feed rate (using the choke of a hydraulic engine) from minimum to maximum possible for given strength of concrete and given depth of cut.

Transverse joints are cut on adjacent rows during a single procedure and on marker rows during two procedures: part of the joint is initially cut on a length of 1.5-2.0 meters from the edge in the direction of this edge and the working member of the cutter is then raised to the transport position, the cutter is raised on the rotary disk, rotated by 180° and the remaining part of the joint is cut.

A longitudinal joint is cut after all the transverse joints on the section have been cut.

The work section includes a cutter operator, fourth rank, and a road worker, first rank.

The number of sections is determined on the bases of the overall rate of constructing the pavement, the length of the joints and the productivity of the cutter.

The approximate laboriousness of operations to cut joints with a DS-510 (D-903) cutter with diamond disks with distance of 5 meters between transverse joints and need for machines, equipment and implements are presented in Tables 6.26 and 6.27.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.23. Length of Performing Production Operations of One Cycle with Joint Cut to Length of 7.5 Meters with Distance of 7.5 Meters Between Joints

(1) Технологические операции	(2) Продолжительность, с	Технологические операции	Продолжительность, с
(3) Установка нарезчика в рабочее положение	85	(6) Перемещение нарезчика к линии следующего шва на расстояние 7,5 м с одновременным перемещением кареток в исходное правое положение	30
Заглубление режущих кругов (4)	15		
Нарезка шва с подъемом режущих кругов после нарезки (5)	110		
		(7) Итого	240

Key:
1. Production operations
2. Length, seconds
3. Setting cutter to working position
4. Submerging cutting disks
5. Cutting joint with raising of cutting disks after cutting
6. Moving cutter to line of next joint by a distance of 7.5 meters with simultaneous movement of carriages to initial righthand position
7. Total

Table 6.24. Laboriousness of Performing Operations in Cutting Transverse Joints with DS-112 Cutter per Shift Volume of Work

(1) Технологические операции	(2) Единица измерения	(3) Объем работ	Трудоемкость на сменный объем работ, (4) чел-ч
(5) Подготовка нарезчика к работе, заправка горючим, установка режущих кругов, опробование на холостом ходу	(6) Подготовка	1	1
Установка нарезчика на линию шва, нарезка шва, переход нарезчика к следующему шву (7)	Швов/м (8)	102/765	13,6
Мелкий крепежный ремонт, смена режущих кругов, заключительные работы (9)	—	—	1,4
(10) Итого	Швов/м (8)	102/765	16

Key:
1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness per shift volume of work, man-hours
5. Preparation of cutter for work, fuelling, setting cutting disks and checking on idle

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

6. Preparation
7. Setting cutter on line of joint, cutting of joint and moving cutter to next joint
8. Joints/meter
9. Minor fastening repair, changing cutting disks and final operations
10. Total

Table 6.25. Machines, Equipment and Implements

Наименование машин, оборудования и инвентаря (1)	Количество (2)	Наименование машин, оборудования и инвентаря	Количество
Нарезчик поперечных швов ДС-112 (3)	1	Шнур капроновый диаметром 5 мм, длиной 20 м (6)	1
Шланг резиновый диаметром 50 мм, длиной 20 м (4)	1	Линейка стальная сантиметровая (7)	1
Рейки для разметки швов (5)	2		

Key:
1. Name of machines, equipment and implement
2. Number
3. DS-112 transverse joint cutter
4. Rubber hose 50 mm in diameter and 20 meters long
5. Straightedges for marking off joints
6. Capron rope 5 mm in diameter and 20 meters long
7. Steel centimeter tape measure

Main Engineering and Economic Indicators for Cutting Joints with DS-510 (D-903) Cutter

Laboriousness of operations without regard to supplying water to cutter on 1,000 meters of joint (580 meters of transverse and 420 meters of longitudinal joints), man-days	12.9
Average rank of workers	2.5
Time utilization factor of cutter during shift	0.8

Cutting joints with D-432A modified cutter. Manual control is replaced by automatic control in the D-432A modified cutter. It is set on a self-travelling crossbar of a DS-502 (D-345) subgrader on which two guide frames--a transverse 9 meters long and longitudinal 10 meters long--are mounted to move the cutter when cutting joints.

The end of the longitudinal frame rests on a two-wheeled chassis. An electric power station with output of 30 kW, a telpher line for adjusting the cutter on the guide frames, a mechanism for raising and lowering the frame and water tanks are installed on the crossbar.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.26. Laboriousness of Work to Cut Joints with DS-510 (D-903) Cutter

(1) Технологические операции	Единица измерения (2)	Сменный объем работ (3)	Трудоемкость на сменный объем работ, чел-ч (4)
(5) Подготовка нарезчика к работе (осмотр, прочистка форсунок, подсоединение шлангов подачи воды, запуск и прогрев двигателя, проверка работы механизмов)			0,67
Установка алмазных кругов (6)			0,23
Разметка поперечных швов (7)	м	90	0,73
Нарезка » » (8)	»	90	8,4
Переезд к началу захватки для нарезки продольного шва (9)	—	—	0,23
Разметка продольного шва (10)	м	65	0,48
Нарезка » » (11)	»	65	2,40
Мелкий крепежный ремонт, заправка горючим, отдых рабочих, заключительные работы (12)	—	—	2,86
(13) Итого			16

Key:

1. Production operations
2. Unit of measurement
3. Shift volume of work
4. Laboriousness per shift volume of work, man-hours
5. Preparation of cutter for operation (inspection, cleaning nozzle, connecting water delivery hoses, starting and warming up of engine and checking operation of mechanisms)
6. Setting diamond disks
7. Layout of transverse joints
8. Cutting of transverse joints
9. Moving to beginning of section to cut longitudinal joint
10. Layout of longitudinal joint
11. Cutting of longitudinal joint
12. Minor fastening repair, refuelling, rest of workers and final operations
13. Total

When cutting joints with the D-432A modified cutter, the transverse joints are laid out by cuts while the longitudinal joint does not have to be laid out.

To cut a transverse joint, the cutter is set on the edge of the transverse frame, the cutting disks are lowered to the pavement by means of a screw, they are submerged, simultaneously switching on the water supply and the mechanism for moving the cutter along the frame. The speed of the cutter is 0.83 m/min.

Having cut the joint, the cutter is stopped, the diamond disks are raised with a screw, the cutter is returned to its initial position, the frame is raised to the transport position and the unit is moved to the next joint.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.27. Machines, Equipment and Implements When Cutting Joints with DS-510 (D-903) Cutter

Наименование машин и инвентаря (1)	Количество (2)	Наименование машин и инвентаря	Количество
Нарезчик швов ДС-510 (Д-903) (3)	1	Рейка для разметки швов (6)	1
Емкость для СОЖ или воды (2—4 м³) на прицепе (4)	1	Лопата (7)	1
Набор слесарных инструментов (5)	1 комп.	Шланг резиновый диаметром 30 мм, длиной 45 м (8)	1

Key:

1. Name of machines and implements
2. Number
3. DS-510 (D-903) joint cutter
4. Tank for lubricants or water (2-4 m^3) on trailer
5. Set of fitting tools
6. Straightedge for laying out joints
7. Shovel
8. Rubber hose 30 mm in diameter and 45 meters long

A longitudinal joint (if it is provided by the plan) is cut after the transverse joints on the entire section have been cut. To do this, the cutter is reinstalled with the telpher line from the transverse frame to the beginning of the longitudinal frame. The joint is cut in sections 8.5 meters long, determined by the length of the longitudinal frame.

Having cut a joint 8.5 meters long, the cutter is stopped, it is moved to the initial position, the unit is raised to the transport position and is moved to the end of the cut joint. A cut is then made on the next section 8.5 meters long.

An operator, fifth rank, performs the work on cutting the joints with the D-432A modified cutter.

The laboriousness of work to cut joints with the D-432A modified cutter using diamond disks in concrete pavement with distance of 5 meters between transverse joints and the need for machines, equipment and implements are presented in Tables 6.28 and 6.29.

Main Engineering and Economic Indicators for Cutting Joints with D-432A Modified Cutter

Laboriousness of work per 1,000 meters of joint (580 meters transverse and 420 meters longitudinal), man-days 6.45
Average rank of workers 5
Time utilization factor of cutter during shift 0.81

Cutting longitudinal joints in concrete pavement with DS-115 three-disk cutter. To cut a longitudinal joint, the joint line is laid out and if there is a heat-insulating sand layer on the pavement it is cleaned along the lines of motion of

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.28. Laboriousness of Work to Cut Joints with D-432A Modified Cutter

(1) Технологические операции	(2) Единица измерения	(3) Сменный объем работ	Трудоемкость на сменный объем работ, чел-ч (4)
(5) Подготовка нарезчика к работе			0,28
Установка алмазных кругов (6)			0,17
Нарезка поперечных швов (7)	м	90	3,6
Перестановка нарезчика с поперечной рамы на продольную (8)			0,1
Нарезка продольного шва (9)	м	65	2,53
Переезд нарезчика на новую захватку в конце рабочей смены, мелкий крепежный ремонт, заправка топливом, заключительные работы (10)			1,32
(11) Итого			8

Key:
1. Production operations
2. Unit of measurement
3. Shift volume of work
4. Laboriousness per shift volume of work, man-hours
5. Preparation of cutter for operation
6. Installation of diamond disks
7. Cutting transverse joints
8. Reinstalling cutter from transverse to longitudinal frame
9. Cutting longitudinal joint
10. Moving cutter to new section at end of working shift, minor fastening repair, refuelling and final operations
11. Total

Table 6.29. Machines, Equipment and Implements in Cutting Joints with D-432A Modified Cutter

(1) Наименование машин, оборудования и инвентаря	(2) Количество	Наименование машин, оборудования и инвентаря	Количество
(3) Агрегат конструкции Киевдорстроя для нарезки швов	1	(8) электростанция ЖЭС-30	1
В том числе: (4)		(9) тельфер	1
модернизированный нарезчик швов Д-432А (5)	1	Набор слесарных инструментов (10)	1
рама для нарезки поперечных и продольных швов (6)	1	Шланг резиновый диаметром 20 мм, длиной 15 м (11)	(13) компл. 1
мостик профилировщика ДС-502 (Д-345) (7)	1	Лопата (12)	1

Key:
1. Name of machines, equipment and implements
2. Number

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

3. Unit designed by Kievdorstroy for cutting joints
4. Including
5. D-432A modified joint cutter
6. Frame for cutting transverse and longitudinal joints
7. Crossbar of DS-502 (D-345) subgrader
8. ZhES-30 electric power station
9. Telpher line
10. Set of fitters tools
11. Rubber hose 20 mm in diameter and 15 meters long
12. Shovel
13. Complete set

the cutter wheels to a width of 40-50 cm and along the joint line to a width of 15-20 cm. The cutter is set so that the cutting disks and the course indicator are precisely on the joint line. Therefore, the speed of the machine when cutting a joint is 1.4-1.7 meters/min and can be increased to 2-2.5 meters/min.

A section consisting of an operator, fourth rank, and assistant operator, third rank, performs the work.

The laboriousness of work to cut a longitudinal joint with the DS-115 cutter and the need for machines and implements are presented in Tables 6.30 and 6.31.

Table 6.30. Laboriousness of Work to Cut Longitudinal Joint with DS-155 Cutter

(1) Технологические операции	(2) Единица измерения	(3) Объем работ	(4) Трудоемкость на сменный объем работ, чел-ч
(5) Подготовка нарезчика к работе, включая заправку горючим, установку режущих кругов, опробование на холостом ходу	м	600	0,7
(6) Нарезка шва			14
(7) Смена режущих кругов, текущий ремонт и заключительные работы			1,3
(8) Итого			16

Key:
1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness per shift volume of work, man-hours
5. Preparation of cutter for operation, including refuelling, installation of cutting disks and testing at idle
6. Cutting the joint
7. Changing cutting disks, routine maintenance and final operations
8. Total

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.31. Machines and Implements When Cutting Joints with DS-115 Cutter

Наименование машин и инвентаря (1)	Количество (2)	Наименование машин и инвентаря	Количество
Нарезчик швов ДС-115 (3)	1	Шнур льнопеньковый диаметром 5 мм длиной 80 м (6)	1
Шланг резиновый диаметром 50 мм, длиной 20 м (4)	1	Шаблон для замера ширины и глубины шва (7)	1
Рулетка измерительная металлическая (5)	1		

Key:
1. Name of machines and implements
2. Number
3. DS-115 joint cutter
4. Rubber hose 50 mm in diameter and 20 meters long
5. Metal measuring tape
6. Hemp rope 5 mm in diameter and 80 meters long
7. Master form for measuring width and depth of joint

Main Engineering and Economic Indicators for Cutting Longitudinal Joint with DS-115 Cutter

Laboriousness per 1,000 meters of joint, man-days	3.33
Average rank of workers	3.5
Time utilization of cutter during shift	0.88

Cutting joints in freshly laid concrete with the DNShS-60-3M cutter. A groove is cut with the DNShS-60-3M joint cutter is freshly laid concrete and at the same time a polyethylene or isol spacer is laid in it. The operating principle of the working member of the machine is based on vibrating movement of a plate in freshly laid and packed concrete when it has not yet begun to set.

Being forcibly moved and vibrating, the vibrating plate opens and separates the concrete, forming grooves and introducing the spacer into it. Joints are cut slowly in freshly laid concrete after the pavement has been finished with a concrete finishing machine and the interval should not be more than 10-30 min (depending on air temperature).

The vibrating plate and rubber smoother must be cleaned of concrete and flushed with water periodically both during breaks and at the end of the shift and one should also see that the electric vibrator of the working member operates at the calculated voltage.

The spacer should be embedded in the concrete by no less than one-fourth the thickness of the pavement and should protrude above the pavement surface by 0.5-1 cm.

Possible defects in operation of the DNShS-60-3M cutter, methods of correcting them, the duration and laboriousness of performing the production operations and the need for machines and implements in cutting joints are presented in Tables 6.32-6.35.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.32. Possible Defects in Operation of Working Member of DNShS-60-3M Cutter and Methods of Correcting Them

Defects in Operation	Possible Causes	Methods of Correction
The tape is torn when it is being placed in the concrete	The notch of the vibrating plate has barbs or has been clogged with drying concrete	Eliminate barbs and clean the notch
	The tape is too wide	Reduce the width of the tape to the required width
	The tape is incorrectly inserted in the notch	Feed the tape from the right side and check the correctness of winding it
The tape is poorly connected to the concrete	Insufficient vibration of the vibrating plate due to malfunction of electric vibrator motor, breaking of flexible hose, insufficient voltage, incorrect installation of rubber shock absorbers on column shaft	Check for malfunctions in electric vibrator motor or in flexible hose, adjust voltage, correct setting of rubber shock absorbers
	Extremely high speed of working member	Reduce speed of working member
The concrete is ripped by the working member, the concrete slips and is broken and the tape is not one piece with the concrete	Delay in cutting seam (the concrete has begun to set)	Cut joints on section concrete has begun to set up, stop, move cutter to section of freshly laid concrete
	The vibrating plate has become misaligned or is clogged with hardened concrete	Set the plate vertically, clean it of hardened concrete and wash it
The electric motor roars when starting and the rotor shaft does not rotate or rotates slowly	There is no voltage in one of the phases or there is weak contact in the switch	Check the mains and contact connections
The electric motor does not operate when turned on	The ring brushes have become worn or contaminated	Clean the brushes and reset them against the ring, replace the brushes if necessary

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.32 (Continued).

Defects in Operation	Possible Causes	Methods of Correction
The knife switch of the electric vibrator motor becomes strongly heated	The vibrator bearings have worn out or there is no lubricant or it is contaminated	Change the bearings, check lubricant and add or replace it
The vibrator body has voltage on it	Short-circuiting of the conducting parts to the body	Correct short-circuit
The flexible shaft is twisted	Centering between the electric motor and vibrator has been disturbed	Correct centering of electric motor and vibrator

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.33. Time to Perform Production Operations of One Cycle When Cutting Transverse Joints with DNShS-60-3M Cutter

(1) Технологические операции	(2) Продолжительность, с	Технологические операции	Продолжительность, с
(3) Заправка ленты в прорезь вибропластины, закрепление конца ленты в фиксаторе, опускание вибропластины и фиксатора в бетон	168	(5) Подъем вибропластины и извлечение фиксатора	60
		Переезд к следующему шву на расстояние 10 м (6)	72
Нарезка поперечного шва длиной 7,5 м (4)	120		
		(7) Итого	420

Key:
1. Production operations
2. Length, seconds
3. Loading tape into notch of vibrating plate, securing end of tape in fastener, lowering vibrating plate and fastener in concrete
4. Cutting transverse joint 7.5 meters long
5. Raising vibrating plate and removing fastener
6. Moving to next joint by distance of 10 meters
7. Total

Table 6.34. Laboriousness of Performing Work in Cutting Transverse Joints with DNShS-60-3M Cutter with Distance of 10 Meters Between Joints

(1) Технологические операции	(2) Единица измерения	(3) Объем работ	Трудоемкость на сменный объем работ, чел-ч (4)
(5) Подготовка нарезчика к работе	(6) чел-ч	-	0,33
Нарезка поперечных швов (7)	(8) м швов / шт. швов	442,5 / 59	13,77
Заключительные работы, отдых (9) рабочих	(6) чел-ч		1,9
Итого на захватку 600 м покрытия (10)			16

Key:
1. Production operations
2. Unit of measurement
3. Volume of work
4. Laboriousness per shift volume of work, man-hours
5. Preparation of cutter for operation
6. Man-hours
7. Cutting transverse joints
8. Meters of joints/units of joints
9. Final operations and rest of workers
10. Total for pavement section of 600 meters

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The work in cutting joints with the DNShS-60-3M cutter is performed by a section consisting of a cutter operator, fourth rank, and concrete worker, fourth rank.

Filling the joints with sealing materials. Before the joints are filled with sealing materials, they are prepared to ensure reliable adhesion of the filler to the concrete. It is recommended that the joints be carefully flushed with water immediately after they have been cut, that they be covered with a film or pergamyn and that they be kept clean before filling with the sealer.

Table 6.35. Machines and Implements Used in Cutting Joints with DNShS-60-3M Cutter

(1) Наименование машин и инвентаря	(2) Количество	Наименование машин и инвентаря	Количество
Нарезчик швов ДНШС-60-3М (3)	1	Металлическая лопатка (8)	1
Металлическая фигурная гладилка (4)	1	Фиксатор (9)	1
Металлический мастерок (5)	1	Металлическая щетка (10)	1
Крючок для извлечения ленты (6)	1	Металлический щиток с прорезью (11)	1
Нож или ножницы для резки ленты (7)	1	Ведро (12)	1

Key:

1. Name of machines and implements
2. Number
3. DNShS-60-3M joint cutter
4. Shaped metal smoother
5. Metal trowel
6. Hook to remove tape
7. Knife or shears to cut tape
8. Metal shovel
9. Fastener
10. Metal brush
11. Metal brush with notch
12. Pail

If this condition is not fulfilled, then the joints should be cleaned immediately prior to filling with a steel hook mounted on the air duct sleeve of the compressor, simultaneously blowing them with compressed air, and then flushed; the walls of the joint are cleaned with a steel brush and again blown with compressed air.

The sequence of operations in filling the joints with mastics based on asphalt is: a cotton or jute rope is placed in the joint, the walls of the joints are primed with liquid asphalt, the joint is filled with mastic using a pourer or tapered funnel first to two-thirds the depth of the groove and then flush with the pavement. After the mastic in the joint has cooled, the excess and spillovers are cut away with a trowel.

When joints are filled with cold-hardened sealing materials, the work is usually performed with a special set of equipment in the following sequence:

the sealer is prepared immediately prior to filling the joints by mixing for 5-6 minutes in the cold state in the pourer tank of the sealing and vulcanizing paste;

the walls of the joint grooves are wiped with acetone;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

cotton or jute rope or a rubber tube is placed in the lower part of the joints;

the joint is filled with sealer in one procedure, without reaching the pavement surface by 3-5 mm.

The work to fill joints with sealing materials is usually performed in one shift. The composition of the sections is taken with regard to the filler material and the means of mechanization as follows:

when filling joints with asphalt-based mastics using the DS-67 joint filler:

joint filler operator, fifth rank		1
road workers:	third rank	1
	second rank	1

when filling joints with asphalt-based mastics using tapered funnels:

compressor operator, fourth rank		1
road workers:	third rank	2
	second rank	1

when filling joints with thiokol sealer using the Soyuzdornii unit:

mixing unit operator, fourth rank		1
road workers:	third rank	1
	second rank	1

The length of one shift is 600-700 meters of joint per shift.

The need for machines, equipment and implements to fill joints with sealing materials is presented in Table 6.36.

6.8. Characteristics of Constructing Monolithic Pavement at Negative Temperatures

When constructing monolithic pavement during negative temperatures, measures must be implemented that protect the hardening concrete from freezing until it gains no less than 50 percent of design strength. To do this, it is recommended that the thermos or electrothermos method be used.

With the thermos method, positive temperatures are ensured in the hardening concrete during the period required for it to gain minimum permissible strength by warming the pavement immediately after its surface is finished with a layer of heat-insulating material (sand, slag, sawdust, straw, reed mats and so on). This layer is maintained on the pavement surface during the entire period of negative temperatures and for not less than 15 days after the onset of stable positive temperatures.

Waterproof roll materials are laid before the insulating material is laid to protect the pavement surface against damage and to eliminate moisture erosion.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.36. Machines, Equipment and Implements Used in Filling Joints (Per Section)

(1) Наименование машин, оборудования и инвентаря	(2) Количество		
	при заполнении мастиками на битумной основе (3)		(6) при заполнении тиоколовым герметиком
	залившиком ДС-67 (4)	конусными лейками (5)	
Заливщик ДС-67 на автомобиле УАЗ-452Д (7)	1	—	--
Компрессор ЗИФ-55 (8)	—	1	—
Передвижной котел вместимостью 350 л (9) для разогрева мастики	—	1	—
Конусные лейки вместимостью 100 л (10) для разогрева битума	—	1	—
Емкость для бензина (11)	—	1	—
» » воды (12)	1	1	--
Стальные крючки (13)	1	1	—
» щетки (ерши) (14)	1	1	--
Шпатели (15)	2	2	2
Ведра (16)	2	2	2
Кисти (17)	2	2	—
Веревка (18)	25 м	25 м	25 м
Метлы (19)	1	1	1
Лопаты (20)	1	1	1
Комплект оборудования (конструкции Союздорнии) (21)	—	—	1
В том числе: (22)			
смесители (23)	—	—	1
заливщики швов (24)	—	—	2
Приспособление для очистки швов от щебня и грунта (25)	—	—	1
Приспособление для очистки швов от песка и пыли (26)	—	—	1
Приспособление для просушки швов (27)	—	—	1
» » заклейки швов бумагой (28)	—	—	1
Мерные емкости (29)	—	—	2

Key:

1. Name of machines, equipment and implements
2. Number
3. When filling with asphalt-based mastics
4. DS-67 filler
5. Tapered funnels
6. When filling with thiokol sealer
7. DS-67 filler mounted on UAZ-452D truck
8. ZIF-55 compressor
9. Mobile boiler with capacity of 350 liters to heat mastic
10. Tapered funnels with capacity of 100 liters to heat asphalt
11. Gasoline tank
12. Water tank
13. Steel hooks
14. Steel brushes
15. Putty knives

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

16. Pails
17. Brushes
18. Rope
19. Brooms
20. Shovels
21. Set of equipment (designed by Soyuzdornii)
22. Including
23. Mixers
24. Joint fillers
25. Device to clean joints of rock and soil
26. Device to clean joints of sand and dust
27. Device to dry joints
28. Device to glue paper to joints
29. Measuring tanks

With the electrothermos method, the concrete mixture is heated to 45-55°C after laying, using standard plate electric panels or reinforcing bars laid in the concrete with distance between them of 15-20 cm. After being heated, the pavement is kept under a layer of insulator until the concrete gains the required strength. Regardless of the method used for winter concreting, the upper layer of the bed not less than 10 cm thick, being a thermal cushion, should be in an unfrozen state at the moment the concrete mixture is laid, for which it is first heated or thawed.

When installing pavement on a sand base, the upper layer of the thawed sand is poured immediately prior to laying the concrete mixture. The type and thickness of the insulator during winter concreting is designated on the basis of heat engineering calculation by selecting the appropriate thermophysical characteristics at which the required rate of hardening of the concrete is achieved.

One is guided by the following rules when constructing monolithic pavement during negative temperatures.

The materials used to prepare the concrete mixture must be stored in large stacks.

When using unheated materials, the moisture content should not exceed 3 percent by mass for sand and 4 percent by mass for crushed stone. The sand should be screened prior to use to remove frozen clumps coarser than 10 mm.

The concrete mixture is transported in dump trucks with heated bodies covered with insultating panels or covers and if the outside air temperature is below -10°C, the bottoms of the bodies are also heated with the engine exhaust gases.

The concrete mixture is laid with a set of rail-travelling machines, reducing to the minimum possible the interval between spreading the concrete mixture and finishing the surface. The concrete mixture cannot be laid during a snow storm and the surface of the pavement also cannot be covered with water or a salt solution.

If the insulator is laid on pavement without waterproof materials, the concrete must be maintained for 15 days by wetting the insulating layer with water with the onset of stable positive temperatures.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The temperature of the hardening concrete is checked during 15 days from the time of concreting, for which pipes are installed in the middle of the pavement and on the edge of the slab every 150-200 meters during concreting into which a saline solution that does not freeze at -20°C is poured.

6.9. Characteristics of Constructing Pavement with Upper Layer of High-Strength Concrete

The concrete mixture for the upper layer of pavement should be prepared at cyclically operating cement-concrete plants in concrete mixtures with forced mixing. To do this, a special concrete mixture designed to prepare the concrete only for the upper layer is allocated at the TsBZ [Cement-concrete plant].

The length of mixing the components of materials when preparing the concrete mixture for the upper layer is determined experimentally and it is approximately assumed to be 180 seconds with a concrete mixer tank up to 1,000 liters and 240 seconds with a larger tank.

Table 6.37. Maximum Permissible Time Interval Between Laying Upper and Lower Layers

(1) Температура окружающего воздуха, °C	(2) Максимально допустимый разрыв по времени, мин					
	(3) при солнечной погоде			(4) при пасмурной погоде		
	(5) Содержание трехкальциевого алюмината в цементе, %					
	(6) до 6	7—10	>10	до 6	7—10	>10
5—10	120	90	90	120	120	90
>10—15	120	60	60	120	90	60
>15—20	90	60	45	90	60	60
>20—25	45	30	20	60	45	30
>25—30	30	20	15	45	30	20

Key:
1. Ambient air temperature, °C
2. Maximum permissible time interval, min
3. During sunny weather
4. During cloudy weather
5. Tricalcium aluminate content in cement, percent
6. Up to

The concrete mixture for the upper layer is transported in dump trucks with bodies that exclude the loss of moisture from the concrete mixture during transportation. To do this, the rear of the body is sealed with rubber gaskets and the mixture is covered with a waterproof tarpaulin on top regardless of the weather.

Thermal insulation of the bodies should be used and they should be painted on the outside in light tones when concreting pavement in hot weather (at air temperature above +25°C).

The sequence of work to form pavement with the upper layer of high-strength concrete is as follows: the concrete mixture of the lower layer is spread from

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

ordinary concrete, the concrete mixture of the lower layer of ordinary concrete is spread, the concrete mixture of the lower layer is packed, the concrete mixture of the upper layer of high-strength concrete is spread, the upper layer is packed, the pavement surface is levelled and finished, the freshly laid concrete is maintained and the joints are installed.

The concrete mixture of the lower layer can be spread and packed with a DS-109 concrete spreader equipped with a vibrating beam when constructing pavements using a railless set of machines.

The concrete mixture of the lower and upper layers is spread with two DS-503 (D-375) concrete spreaders when using a rail-travel set of machines, while the concrete mixture of the lower layer is packed with a DS-504 (D-376) concrete placer or DS-502 (D-345) subgrader. A DBO-7-7.5 or DS-504 (D-376) machine is used to pack the upper layer and to finish the surface. The upper layer is laid before the concrete of the lower layer begins to set.

The time interval between laying the upper and lower layers should be minimum and should not exceed the values presented in Table 6.37.

The freshly laid concrete is maintained and the joints are installed by ordinary methods.

6.10. Construction of Precast Pavement from Reinforced Concrete Slabs

The following operations are carried out (with a prepared artificial bed) when constructing precast pavement from reinforced concrete slabs: unloading and storing of the slabs (to create the required reserves), grading the slabs and control tests of them for crack resistance, installation of the levelling layer of sand-cement mixture, placing the slabs in the pavement while ensuring close contact with the bed, welding the steel cleats and finishing the joints.

Unloading and storing the slabs. The slabs are delivered to the construction facilities from the manufacturing plants usually by rail on flatcars or in gondolas. The slabs are unloaded from the railcars into stacks or are transloaded to trucks that deliver them to the installation point or to the storage area next to the facility.

The stacks of slabs are arranged on one or both sides of the roadbed at the railroad warehouse, maintaining a distance of not less than 6 meters from the first row of stacks to the nearest rails.

The railroad and facility warehouses are arranged on graded and packed soil platforms with artificial surface. Usually 10 slabs each are laid in each stack. The bottom slab is laid on wood pallets located 1 meter from its ends, not less than 15 cm thick with dirt pads and not less than 10 cm thick with pads of artificial surface. The last slabs in the stack are laid on two wood pallets 2.5-4.0 cm thick, which are arranged along the vertical strictly above the pallets of the bottom slab.

It is not permitted to lay the slabs on unlevelled and unpacked dirt pads and also on three or more pallets (spacers).

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The distance between stacks is not less than 80 cm so that the slabs can be inspected and the lateral edges can be primed.

It is recommended that loading-unloading operations at the rail and facility storage areas be carried out with motorized pneumatic-tire cranes having capacity of not less than 10 tons.

The work is performed using crossbars in the form of a rectangular steel frame with vertical arrangement of the straps.

The composition of the section that services one crane is:

Crane operator, sixth rank	1
Riggers, second rank	4
Productivity of section	120-130 slabs per shift

Grading and control tests of slabs. All the slabs coming to the construction facility are inspected, the conformity of their quality to specifications (Table 6.38) is checked and they are graded into three categories according to the data of Table 6.39.

Table 6.38. Specifications for Finished Slabs of Type PAG

Parameters of Slabs to be Checked	Requirements
Geometric dimension	Deviations from planned dimensions should not exceed: ± 6 mm in length and ± 5 mm in width, ± 3 mm in thickness of the protective layer of concrete for the lower and upper reinforcement; by arrangement of joining cleats: ± 5 mm in cross-section, ± 3 mm in height and ± 2 mm by protrusion beyond the edge of the slab
Geometric shape	The difference of the lengths of diagonals should not exceed 12 mm. Lack of smoothness (greatest deviation of one of the corners from the plane passing through the three other corners) and also the concavity and convexity of the slab surfaces and lateral edges should not exceed 5 mm
External appearance and quality of surface	The working surface of the slabs should be even and have some roughness formed with a capron brush or burlap tape or should have corrugation. No more than three cavities or open air bubbles up to 5 mm in diameter and up to 3 mm deep is permitted on 1 m^2 of working surface. Local unevennesses should not exceed 3 mm in height. The total length of splitoffs of the concrete ribs more than 5 mm deep on the working surface and 8 mm deep on the nonworking surface should not exceed 50 mm per meter of length (width) of the slab. Peeling of the surface and cracks of any origin (temperature, shrinkage, stress and so on) are not permitted

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.39. Grading Slabs by Quality

Category of Slabs	Qualitative Condition of Slabs	Recommendations on Use of Slabs
I	Slabs completely correspond to specifications	Used according to direct designation on all pavement sections
II	Slabs have the following deviations from specifications: splitoffs of concrete corners and edges not exceeding one-fourth the height of the slab, individual cavities, slight temperature-shrinkage cracks not more than 20 cm long, insufficient quality of surface finishing, buildups of concrete near the ends up to 10 cm high and deviation of geometric dimensions and arrangement of joining cleats above the established tolerances	Used according to direct designation but laid on secondary sections: outer rows of VPP, platforms and MS and auxiliary RD
III	Slabs having significant defects: through cracks, extensive splitoffs of concrete, destruction of the surface layer of concrete with exposure of reinforcement and so on	Not used for airfield pavement

One of 500 slabs is sampled and tested for crack resistance according to the diagrams presented in Figure 20.

Slabs similar to those tested (PAG-14 or PAG-18) are used as loading ballast.

Figure 20. Diagram for Field Tests of PAG-14 and PAG-18 Slabs for Crack Resistance: a--lower zone; b--upper zone; 1--PAG-14 or PAG-18 slab used as loading ballast; 2--slab to be tested; 3--test load of two PAG-14 or PAG-18 slabs

The loading slab must be lowered smoothly onto the slab to be tested without permitting jolts and impacts.

The slab is held under load for not less than 30 minutes and it is assumed to pass the test if visual inspection reveals no cracks in the tension zone. The slab is

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

initially tested for crack resistance of the lower zone according to the diagram of Figure 20, a and this same slab is then tested for crack resistance of the upper zone according to the diagram of Figure 20, b. Distances a and b are taken according to Table 6.40.

Table 6.40. Distances a and b (to Figure 20)

(1) Тип испытываемой плиты	(2) Расстояния, мм		Тип испытываемой плиты	Расстояния, мм	
	a	*b*		*a*	*b*
(3) ПАГ-14	1000	800	ПАГ-18	2100	1000
ПАГ-14 Т-1	600	900	ПАГ-18Г	2000	1100
ПАГ-14 Т-2	800	850			

Key:
1. Type of slab to be tested
2. Distances, mm
3. PAG

Device for levelling the layer of sand-cement mixture. The levelling layer of the sand-cement mixture is installed to improve contact of the slabs with the bed. The sand-cement mixture is prepared in plants and is delivered to the installation point by dump trucks. The mixture is levelled and shaped with a DS-502 (D-345) subgrader in two passes: the subgrader spreads the mixture during the first pass and finely shapes it during the second pass. A ridge of mixture 6-8 cm high should be constantly in front of the blade of the subgrader during the second pass.

Placing the slabs in the pavement. The slabs are placed into pavement with the long side along the basic direction of motion of the aircraft. The lateral sides of the slabs are first primed at the facility or rail storage area to ensure good adhesion of the sealing material of the joints to them.

The slabs are delivered to the installation point by sidebed trucks, trucks with semi-trailers, tractor-trailers and so on.

The slabs are laid in the pavement by motorized cranes on pneumatic tires. The cranes usually operate from laid pavement, laying strips in front of them consisting of three slabs in width. The placement is carried out using crossbars with vertical arrangement of the straps.

The highest productivity is achieved by using the following placement procedure: a slab is removed from the truck by the crane and is carried to the placement point by rotating the boom, the slab is lowered to a level so that its bottom is 3-5 cm below the surface of adjacent placed slabs, the longitudinal edge is brought into contact with the longitudinal edge of an adjacent slab already placed by rotating the boom, the transverse edge of the slab to be laid is brought into contact with that already placed by the crane moving backward and the slab is lowered onto the bed.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Benches in the joints of adjacent slabs should not exceed 5 mm after placement, the longitudinal and transverse joints should be linear and their width should be 8-10 mm.

If the bench exceeds 5 mm, the slab is raised, it is moved aside, the bed is additionally levelled with smoothers and the slab is again placed.

To ensure close contact of the bottom of the slabs and the bed (the levelling layer), the slabs are seated by vibration or the pavement is rolled with heavy trucks in two-three passes.

Vibrating placement is performed using the AM-66 vibrating placement machine. The machine is installed alternately on each slab for vibrating placement. The vibrating time is determined experimentally as a function of the type of slab (its mass) and the thickness of the levelling layer. The vibrating time is taken as the minimum time at which complete contact to the surface of the levelling layer is provided and the contact area is determined visually by the impression of the slab after it is raised.

No fewer than five slabs should be subjected to experimental vibrating placement to determine the optimum vibration time.

Welding the connecting cleats. The connecting cleats are welded after vibrating placement (rolling) of the pavement, first having cleaned them of dirt, dust and rust with scrapers and steel brushes with blasting by compressed air.

Welding is performed with E-42A or E-34 electrodes 4-5 mm in diameter using welding machines of type ASB-300 and so on. The length of the weld seam is equal to the length of the cleats, the width is one-half the diameter of the cleat and the height is one-fourth the diameter of the cleat.

If the gap between the cleats to be welded does not exceed 4 mm, welding is performed with a single continuous seam.

If the gap between cleats exceeds 4 mm, an additional bar 2-3 mm greater in diameter than the width of the gap is placed on them and welding is performed in two seams (on both sides of the bar).

Finishing the joints. The joints in precast pavement are finished after the connecting cleats are welded. To save sealing materials, the lower part of the joints (except expansion joints) are filled with a sand-cement mixture to two-thirds the thickness of the slab.

The upper part of the joints and the expansion joints are filled to the entire depth with sealing materials, preferably with rubber-asphalt and asphalt-polymer mastics.

Before filling the joints with the sand-cement mixture, they are carefully cleaned of dirt and sand and are blasted with compressed air. After they have been filled with the mixture, the joints are flushed with water to accelerate the hardening of the sand-cement mixture and to clean the upper part of the lateral edges of the slabs.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Before filling the joints with mastic, they are blasted with compressed air and the upper part of the lateral edges of the slabs is primed.

The joints are filled with mastic by a DS-67 joint filler or tapered funnels.

Operations to install precast pavement are usually organized in two shifts. It is recommended that the rail-forms be installed (finally straightened and checked) only during the daytime shift.

The work section is divided into four shift sections: installation of rail-forms, installation of the levelling layer, placement and vibrating placement (or rolling) of the slabs and welding the connecting cleats and finishing the joints.

The length of the shift section when laying in three rows is designated as 200-240 meters (100-120 slabs). The length of the first section is equal to double the length of the remaining sections.

The work is performed by a complex brigade whose composition and also the laboriousness of performing individual types of work are presented in Table 6.41.

Work to install and remove the rail-forms and to fill the joints with mastics is performed when constructing precast pavement by using the same machines, equipment and implements as when constructing monolithic pavements (see Tables 6.4 and 6.36).

A list of the machines, equipment and implements used to install the levelling sand-cement layer, to place the slabs and to weld the connecting cleats is presented in Table 6.42.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 6.41. Laboriousness of Performing Work and Composition of Sections to Install Precast Pavement for Two Shift Sections--200 Slabs (2,400 m^2 of Pavement)

Name of Work	Unit of Measurement	Volume of Work	Laboriousness for Entire Volume of Work, man-hours	Composition of Sections
Installation and removal of rail-forms	Meters of section	400	80	Truck crane operator, fourth rank--1 Rigger, second rank--1 Road workers: fourth rank--1 third rank--1 second rank--1
Installation of levelling sand-cement layer with DS-502 subgrader	m^2	2,400	24	Subgrader operator, fifth rank--1 Road workers, second rank--2
Placement of slabs in pavement	Slab/m^2	200 2,400	80	Crane operator, sixth rank--1 Installers: fourth rank--1 third rank--1 second rank--1
Vibrating placement of slabs	Slab	200	15	Vibrating placement machine operator, fifth rank--1 Assistant operator, fourth rank--1
Welding of connecting cleats with preliminary cleaning of them of concrete and rust with metal brushes	Slab	200	96	Electric welder--fourth rank--1 Road worker, second rank--2

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 6.42. Machines, Equipment and Implements Used to Install Levelling Layer, to Place Slabs and to Weld Cleats

Наименование машин, оборудования и инвентаря (1)	Количество (2)	Наименование машин, оборудования и инвентаря	Количество
Профилировщик ДС-502 (Д-345) с комплектом рельсоформ (3)	1	Компрессор ЗИФ-55 (8)	1
Пневмоколесный кран КС-4362 (4)	1	Электросварочные агрегаты АСБ-300 (9)	4
Виброплощадочная машина АМ-66 (5)	1	Шаблоны для обеспечения требуемой ширины швов (10)	4
Автомобили-самосвалы для доставки пескоцементной смеси (6)	По расчету	Багры укороченные (11)	4
Автомобили бортовые или с полуприцепом для доставки плит (7)	То же	Лом-лапа (12)	1
		Уступомер (13)	2
		Рейка для контроля ровности покрытия длиной 3 м (14)	1
		Стальные щетки (15)	2
		Скребки для расчистки швов (16)	2

Key:

1. Name of machines, equipment and implements
2. Number
3. DS-502 (D-345) subgrader with set of rail-forms
4. KS-4362 pneumatic-tire crane
5. AM-66 vibrating placement machine
6. Dump trucks to deliver sand-cement mixture
7. Sideboard or semitrailer trucks to deliver slabs
8. ZIF-55 compressor
9. ASB-300 electric welding machines
10. Master forms to ensure required width of joints
11. Short hooks
12. Clawfoot crowbar
13. Bench gauge
14. Straightedge 3 meters long to check evenness of pavement
15. Steel brushes
16. Scrapers to clean joints

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 7. PRODUCTION ENTERPRISES IN AIRFIELD CONSTRUCTION

[Text] 7.1. Bases of Organic Binder Materials

Incoming binder materials of different marks and types on asphalt bases or in shops of asphalt-concrete plants undergo a number of mechanical and thermal effects reflected in their quality to one degree or another. The processes related to preparation of the binder should proceed with the corresponding temperature modes while adhering to the established production requirements.

Liquid binder materials (asphalt and tar) and liquefying agents are transported in special railroad cars or trucks. Railroad tank cars with capacity of 50-60 tons or more or hopper gondolas with capacity of 40-60 tons (four-six sections of 10 tons each) and also road oilers with tanks having capacity of 3,600-5,000-7,000 liters or asphalt haulers with saddle-type tanks having useful capacity of 7,000-14,000-22,000 liters are used as transport equipment. Railroad tank cars and tank trucks and hopper gondolas usually have heat insulation and devices to heat the asphalt (steam with coils or live steam, furnace gases and electric heating elements).

Hopper gondolas for passage of steam have double walls with distance of 40-50 mm between them.

If the temperature of the viscous materials is 80-90°C upon arrival to the unloading point, they can be poured immediately into the asphalt storage tanks. If the asphalt has congealed, it must be heated to flowability temperature prior to pouring. Liquid asphalts are poured without heating at air temperature above 10°C, while it is heated to +40-50°C during the cold season.

When pouring, the asphalt is also heated by steam, which is passed through steam coils or the chambers of the tank car and to the steam sleeve of the hopper. The length of pouring and the consumption of steam for heating are presented in Table 7.1.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.1. Time for Pouring Asphalt and Consumption of Steam for Heating

(1) Время года	(2) Вязкий битум			(3) Жидкий битум, деготь, мазут	
	(4) Продолжительность слива, ч	(5) Расход пара, кг/ч, при сливе из железнодорожных		(4) Продолжительность слива, ч	(8) Расход пара при сливе из железнодорожных цистерн (50—60 т), кг/ч
		(6) цистерн (50—60 т)	(7) бункерных вагонов		
(9) Весна	2—3	(13) До 90	—	<1	(14) Без подогрева
Лето (10)	1—2	—	8—10	<1	То же (14)
Осень (11)	3—4	До 130	—	<1	До 40—60
Зима (12)	2	—	15—20		(13)

Key:

1. Season of year
2. Viscous asphalt
3. Liquid asphalt, tar and mazut
4. Length of pouring, hours
5. Consumption of steam, kg/hr, when pouring from railroad cars
6. Tank cars (50-60 tons)
7. Hopper rail cars
8. Steam consumption when pouring from railroad tank cars (50-60 tons), kg/hr
9. Spring
10. Summer
11. Fall
12. Winter
13. Up to
14. Without heating

Asphalt storage tanks are of the closed type. They should be protected against both outside and ground moisture by installation of special buildings or suspensions.

Asphalt storage tanks are equipped with a heating system (steam, gas, oil or electric) and asphalt pumps.

7.2. Asphalt Concrete Plants

Asphalt concrete plants for preparation of hot and warm asphalt concrete mixtures should be located from the placement point by a distance so that the time of transporting the finished hot mixtures does not exceed 1.5 hours and that of transporting warm mixtures does not exceed 2-2.5 hours.

Asphalt concrete plants are divided by arrangement into rail (Figure 21), on whose territory there is a railroad siding and facility plants located near the airfield under construction.

Asphalt concrete plants have been equipped in recent years with heated storage bunkers for temporary storage of the finished mixture, which permits a reduction in the time required to find transport equipment for loading and thus makes it possible to reduce their requirement.

There are two plant schemes in the deployment of machines and equipment at the plant--tower and pit, determined by the layout of moving the materials in the mixing plant--vertical and horizontal.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 21. Versions of Production Lines for Preparation of Asphalt Concrete Mixtures: Version 1--arrangement of asphalt-mixing equipment without feed unit; Version--arrangement of asphalt-mixing equipment with feed unit; 1--railroad siding; 2--receiving device with hopper at railroad; 3--storage area for fractionated stone materials; 4--portable conveyer; 5--radio-stacking conveyer; 6--silo mineral powder storage depot; 7--closed asphalt storage area; 8--equipment for preparation of surfactants or polymer-asphalt binders; 9--asphalt-mixing equipment; 10--conveyer belt; 11--hopper; 12--feed unit; 13--front loader

Key:
1. Version

Asphalt concrete mixers are divided into two groups--periodic (Figure 22) and continuous--by the principle of preparing the mixtures, distinguished from each other by the methods of proportioning, loading and preparation of asphalt concrete, asphalt mineral and other types of mixtures.

Industry produces asphalt concrete mixtures and equipment of several types.

The main specifications of the production equipment used at asphalt concrete plants are presented in Tables 7.2-7.11.

The working temperature for heating the asphalt is taken from the data of Table 7.2 with prepared asphalt concrete mixtures, the time required to mix the mixtures is taken from Table 7.13 and the temperature of the mixture when it comes from the mixer should be in the range indicated in Table 7.14.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 22. Process Flow Diagram of D-597 Asphalt Mixer: 1--feeder; 2--elevator for cold materials; 3--drying drum; 4--dust-trapping unit; 5--burner; 6--hot elevator; 7--screen; 8--mineral powder elevator; 9--hopper for hot materials; 10--weighing hopper; 11--two-shaft blade mixer; 12--asphalt pipe with nozzles in mixer; 13--surfactant proportioning device; 14--asphalt proportioning device

Physical and chemical activation of the materials using the corresponding activating mixtures or activators is used to improve the properties of materials contained in the asphalt concrete mixture (mineral powder, gravel, sand and so on).

The activated mineral powder is prepared at special plants or in separate shops of ABZ [Asphalt concrete plant] (Figure 23). Production of activated mineral powder includes the following processes: drying the crushed material in rotary roasters, heating the asphalt and surfactant to working temperatures and preparation of activating mixture from them, proportioning and mixing of dried crushed stone with activating mixture in any type mixers, delivery of the mineral material combined with the activating mixture to the crushing unit and crushing of it to activated mineral powder and delivery of powder to storage hoppers or to warehouse. The crushing units may also include hammer or roller breakers for preliminary crushing of limestone prior to drying.

To produce activated concentrated gravel, the ABZ is pre-equipped with special units for crushing and preparation of the activating mixtures included in the overall process flow diagram for preparation of the asphalt concrete mixture.

The gravel material is crushed in a hammer breaker in the presence of the activating mixture adsorbed on the freshly formed surfaces of mineral particles.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.2. Sets of Production Equipment to Prepare Asphalt Concrete Mixtures

(1) Показатели и состав агрегатов комплекта	ДС-65	Д-508-2	Д-617-1	Д-617-2	Д-645-2	Д-645-3
(2) Производительность комплекта, т/ч	12	25	50	50	100	100
Тип комплекта (3)	(4) Передвижной	(5) Перебазируемый		(6) Стационарный		(5) Перебазир.
(7) Общая мощность: (8)						
электродвигателей, кВт	80	140	305	305	440	480
электронагревателей, кВт (9)	40	57,5	146	146	170	208
Расход топлива, кг/ч (10)	137,5	320	550	550	1200	1200
Масса комплекта, т (11)	40	87,5	110	128	165	202
Размеры площадки для комплекта, м (12)	25×14	40×27	40×20	43×30	60×40	60×40
Состав комплекта: (13)						
(14) 1. Агрегат дозатор-питатель щебня и песка	ДС-79			Д-587		
Количество агрегатов в в комплекте, шт. (15)	1	1	1	1	2	2
(16) 2. Агрегат для сушки и нагрева щебня и песка	ДС-65	Д-588		Д-620	Д-646	
Количество агрегатов в комплекте, шт. (15)	1	1	1	1	1	1
(17) 3. Агрегат смесительный	ДС-65	Д-589	Д-619	Д-619	ДС-61	Д-647
Количество агрегатов в комплекте, шт. (15)	1	1	1	1	1	1
(18) 4. Агрегат хранения и дозирования минерального порошка	ДС-65	Д-591	Д-591	ДС-591	ДС-59	Д-591
Количество агрегатов в комплекте, шт. (15)	1	1	1	1	1	1
(19) 5. Агрегат нагрева битума в хранилище	—	Д-592	Д-592	Д-592	Д-592	Д-592
Количество агрегатов в комплекте, шт. (15)	—	1	1	1	2	2
(20) 6. Агрегат обезвоживания и нагрева битума до рабочей температуры	—	Д-506	Д-618	Д-618	Д-649	Д-649
Количество агрегатов в комплекте, шт. (15)	—	1	1	1	1	1
(21) 7. Обогреваемая цистерна расходного запаса битума	ДС-65	Д-594	Д-594	Д-594	Д-594	Д-594
Количество цистерн в комплекте, шт. (22)	1	1	1	1	2	2

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.2 (Continued).

Показатели и состав агрегатов комплекта	ДС-65	Д-508-2	Д-617-1	Д-617-2	Д-645-2	Д-645-3
(23) 8. Обогреваемая цистерна для хранения и расхода жидкого топлива	—	Д-595	Д-595	Д-595	Д-595	Д-595
Количество цистерн в комплекте, шт.	—	1	1	1	1	
(24) Схема расположения агрегата	(25) Партерная	(26) Башенная	Партерная	Башенная	Башенная	Партерная
Тип смесителя (27)	(28) Периодического действия				(29)	Непрерывного действия

Note. All equipment has automated control.

Key:
1. Indicators and composition of units in set
2. Productivity of set, tons/hr
3. Type of set
4. Mobile
5. Redeployable
6. Stationary
7. Total output
8. Of electric motors, kW
9. Of electric heaters, kW
10. Fuel consumption, kg/hr
11. Mass of set, tons
12. Overall dimensions of sit for set, meters
13. Composition of set
14. Crushed-stone and sand feeder-proportioning device unit
15. Number of units in set, pieces
16. Crushed stone and sand drying and heating unit
17. Mixing unit
18. Mineral powder storage and proportioning unit
19. Asphalt heating unit in storage area
20. Unit for dehydration and heating of asphalt to working temperature
21. Heated tank of asphalt service reserve
22. Number of tanks in set, pieces
23. Heated tank for storage and consumption of liquid fuel
24. Layout of unit
25. Pit
26. Tower
27. Type of mixer
28. Periodic operation
29. Continuous operation

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.3. Sets of Mobile Automated Production Equipment for Preparation of Asphalt Concrete and Other Mixtures

(1) Характеристика и состав комплекта	ДС-79	ДС-95	ДС-118-4
Тип (2)	(3) Периодического действия		(4) Непрерывного действия
Производительность, т/ч (5)	25	50	100
Общая установленная мощность, кВт: (6)			
электродвигателей (7)	158	252,2	346
электронагревателей (8)	55	151,5	194
Расход топлива максимальный, кг/ч (9)	300	530	1000
Необходимые размеры площадки для комплекта (10)	40,7×16,0	46,8×17,2	54,4×28
Агрегат питания (щебень, песок): (11)			
марка (12)	ДС-79,5 / ДС-79,1	ДС-587А-1	ДС-120
число бункеров (13)	3	3	4
Агрегат сушильный с пылеотделением: (14)			
марка (12)	ДС-79,2 ДС-79,3	ДС-95,2 ДС-95,3	ДС-119 ДС-121
диаметр × длина, мм (15)	1400×5600	1800×7000	2200×8000
установленная мощность, кВт (16)	33,3	60	98
Агрегат смесительный с лопастной мешалкой: (17)			
марка	ДС-79,4	ДС-95,4	ДС-122
вместимость по загрузке, кг (18)	600	900	2300
установленная мощность, кВт (19)	61,4	68,5	91,5
Агрегат хранения и дозирования минерального порошка:			
марка	ДС-79,8	ДС-79,8 (два)	ДС-130
вид транспортирования (20)	(22) Пневматический		
объем силосной банки или бункера, м³ (21)	16	16	20
Агрегат битумоплавильный: (23)			
марка	ДС-17 (Д-506А)	ДС-649	ДС-649
производительность, т/ч (24)	3	10	10
Цистерна, обогреваемая для расходного запаса битума	ДС-65,7	ДС-92	ДС-118-4.02 (Д-649)
Бак для жидкого топлива (обогреваемый):			
марка (25)	Д-595	ДС-95,5	ДС-95,5
производительность, кг/ч	600	1400	1400
Бункер готовой смеси (накопительный): (26)	(27) (электрообогрев)		
марка	ДС-79,4	ДС-95,4	ДС-124
вместимость, т (28)	12,5	17,5	100
Кабина оператора с пультом управления: (29)			
марка	ДС-79.9.1	ДС-95.9 (ДС-65.9.2)	ДС-79.9.1
площадь кабины, м² (30)	6	6,6	6

Key:
1. Characteristic and composition of set
2. Type
3. Periodic operation
4. Continuous operation

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

5. Productivity, k/hr
6. Total established output, kW
7. Of electric motors
8. Of electric heaters
9. Maximum fuel consumption, kg/hr
10. Required dimensions of site for complete set
11. Feed (crushed stone or sand) unit
12. Mark
13. Number of hoppers
14. Drying unit with dust separation
15. Diameter by length, mm
16. Established output, kW
17. Mixing unit with blade mixer
18. Load capacity, kg
19. Mineral powder storage and proportioning unit
20. Type of transportation
21. Volume of silo banks or hopper, m^3
22. Pneumatic
23. Asphalt melting unit
24. Heated service tank for asphalt reserve
25. Liquid fuel tank (heated)
26. Finished mixture hopper (storage)
27. Electric heating
28. Capacity, tons
29. Operator's cab with control console
30. Cab area, m^2

Table 7.4. Crushed Stone and Sand Feed-Proportioning Device

(1) Показатели	(2) Д-587
Общая емкость бункеров агрегатов, м³ (3)	21,4
Вместимость одной секции бункера, м³ (4)	5,35
Приозводительность дозатора-питателя, м³/ч (5)	2,16—15,0
Установленная мощность электродвигателей, кВт (6)	14—15,5
Масса агрегата, т (7)	7,5

Key:
1. Indicators
2. D-587
3. Total hopper capacity of units, m^3
4. Capacity of one hopper section, m^3
5. Productivity of feed-proportioning device, m^3/hr
6. Installed capacity of electric motors, kW
7. Mass of unit, tons

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.5. Crushed Stone and Sand Drying and Heating Units

(1) Показатели	ДС-65	Д-588	Д-620	Д-646
(2) Производительность при влажности минерального материала 5%, т/ч	10—12	25—30	45—60	45—60
(3) Условное напряжение барабана по влаге, кг/м³ ч	125	125	115	115
Размеры сушильного барабана: (4)				
диаметр (наружный) (5)	1200	1400	1800	1800
длина, мм (6)	4500	6500	8500	8000
объем, м³ (7)	5,5	9,7	21,3	20,3
Расход мазута, кг/ч (8)	137	260	480	1100
Тип форсунки (9)	(10) Воздушная низкого давления			
Мощность электродвигателей, кВт (11)	34,5	62,8	73,5	194,2
Масса агрегата, т (12)	10,3	12,8	21,1	45,4

Key:

1. Indicators
2. Productivity with 5 percent moisture content of mineral material, t/hr
3. Specific moisture tension of drum, $kg/m^3 \cdot hr$
4. Dimensions of drying drum
5. Diameter (outside)
6. Length, mm
7. Volume, m^3
8. Mazut consumption, kg/hr
9. Type of nozzle
10. Low-pressure air
11. Output of electric motors, kW
12. Mass of unit, tons

Table 7.6. Mixing Units

(1) Показатели	ДС-65	Д-589	Д-619	Д-647
(2) Производительность горячего элеватора, т/ч	20	34	58	130
(3) Производительность грохота, т/ч	20	36	50	110
Количество сит (4)	3	3	3	3
(5) Дозатор для минеральных материалов	АДИ-3УМ		АДИ-30ЦБ	Д-677
Тип лопастной мешалки (6)	(7) Порционная	(8) Двухвальная		(9) Непрерывного действия
Масса замеса, кг (10)	240	600	1200	3400
Насос для битума (11)	НБП-500			Д-647
Мощность электродвигателей, кВт (12)	—	41	53	142
(13) Вместимость накопительного бункера горячей смеси, т	4,5	8,0	14,0	20,0
Масса, т (14)	—	26,6	—	43,0

Key:

1. Indicators
2. Hot elevator productivity, t/hr
3. Screen productivity, t/hr
4. Number of screens
5. Proportioning device for mineral materials

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

6. Type of blade mixer
   Portion
8. Two-shaft
9. Continuous operation
10. Mass of batch, kg
11. Asphalt pump
12. Capacity of electric motors, kW
13. Capacity of hot mixture storage hopper, tons
14. Mass, tons

Table 7.7. Mineral Powder Units

Показатели (1)	Д-591	Д-591-3
Производительность агрегата, т/ч (2)	8,5	20
Вместимость силосной банки, м³ (3)	25	20
Мощность электродвигателей, кВт (4)	44,5	8,4
Масса, т (5)	7,5	5,8

Key:
1. Indicators
2. Unit productivity, t/hr
3. Silo bank capacity, m^3
4. Electric motor capacity, kW
5. Mass, tons

Table 7.8. Heating-Pumping Units

Показатели (1)	Д-592	Д-592-2
Производительность при нагреве от 10 до 90° и влажности 5%, т/ч (2)	3	6
Расход пара при давлении 8 кгс/см², кг/ч (3)	280	430
Поверхность нагрева, м² (4)	50	75
Производительность битумного насоса, т/ч (5)	14	14
Мощность электродвигателя, кВт (6)	5,5	5,5
Габаритные размеры (ширина×длина×высота), м (7)	2,6×2,6×0,66	2,6×2,6×0,86
Масса, т (8)	2,3	3,1

Key:
1. Indicators
2. Productivity when heating from 10 to 90° and moisture content of 5 percent, t/hr
3. Steam consumption at pressure of 8 kgf/cm^2, kg/hr
4. Heating surface, m^2
5. Asphalt pump productivity, t/hr
6. Electric motor capacity, kW
7. Overall dimensions (width X length X height), meters
8. Mass, tons

The granulometric composition of the mineral mixture is regulated by the operating mode of the hammer breaker. The operating mode of the breaker is practically maintained in which the crushing product is a finished mineral mixture for preparation of asphalt concrete consisting of the required amount of crushed stone, artificial

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.9. Asphalt Melting Units

(1) Показатели	Д-506	Д-618	Д-640	ДБИ-12	Д-335-1
(2) Тип агрегата	(3) Непрерывного действия			(4) Непрерывного или периодического действия	(5) Периодического действия
(6) Принцип действия выпаривания влаги из битума	(7) В тонком слое			(8) В полном объеме котла	
Вид теплоносителя (9)	(10) С газовым подогревом (жаротрубный) и с теплоизоляцией	(11) С радиационно-конвективными трубчатыми нагревателями с циркуляцией газов и дополнительным электроподогревом (с теплоизоляцией)		(12) С электроподогревом электронагревателями	(13) С жаровыми трубами—горячими газами
(14) Рабочая вместимость, л:					
(15) основного агрегата	8 500	14 300	29 000	(16) 4 000 и (теплообменника —5 000)	10 000
(17) расходных котлов	30 000 (Д-594)×1 (или 2)	30 000×2 (или 3)	30 000×3 (или 5)	15 000×1 (или 2)	10 200×1 (до 3)
(20) Установленная мощность, кВт:	(18)				(19)
(21) электродвигателей	17,1	19,5	24,5	5,5×2	4,5×2+0,6
(22) электронагревателей	(23) Нет	176	189	174	Нет
Расход топлива на форсунки, кг/ч (24)	До 40	До 45	100—102	Нет	26
(25) Производительность установки (при влажности 5% и нагреве от 90° до 170° С), т/ч	3	6	10	(26) 2,3 при соединении «на треугольник» или 1,3 при соединении «на звезду»	(27) Время разогрева: от 6—8 до 20—24 ч (удельное 0,25—0,6 т/ч)
Масса установки, кг (28)	9 200	13 800	22 000	4 700	(29) 29105 (батарея из трех котлов для жидкого топлива)
(30) Габаритные размеры мм	7 625×2 290×1 740	8 025×2 760×3 800	16 500×14 500×3 800 (4 495)	4 750×2 250×2 860	6 880×6 100 (9 800) при трех котлах (31) 2 440 (без дымовой трубы) (32)

Key:

1. Indicators
2. Type of unit
3. Continuous operation
4. Continuous or periodic operation
5. Periodic operation
6. Working principle of moisture evaporation from asphalt

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

7. In thin layer
8. In total volume of boiler
9. Type of heat carrier
10. With gas heating (heat tube) and with heat insulation
11. With radiative-convective tubular heaters with gas circulation and additional electric heating (with heat insulation)
12. With electric heating by electric heaters
13. With heat tubes--hot gases
14. Working capacity, liters
15. Of main unit
16. 4,000 and (heat exchanger--5,000) 15,000 X 1 (or 2)
17. Of service boilers
18. Or
19. Up to
20. Installed capacity, kW
21. Of electric motors
22. Of electric heaters
23. No
24. Fuel consumption to nozzles, kg/hr
25. Productivity of installation (with 5 percent moisture content and heating from 90 to 170°C), t/hr
26. 2.3 with "triangle" connection or 1.3 with "star" connection
27. Heating time: from 6-8 to 20-24 hr (specific time of 0.25-0.6 t/hr)
28. Mass of installation, kg
29. 29,105 (bank of three boilers for liquid fuel)
30. Overall dimensions, mm
31. With three boilers
32. Without flue

Table 7.10. Heated Asphalt Tank

(1) Показатели	Д-594	Показатели	Д-594
Вместимость цистерны, м³ (2)	30	(4) Производительность битумного насоса, т/ч	14,0
Давление системы парообогрева, кгс/см² (3)	6	(5) Мощность электродвигателя, кВт	5,5

Key:
1. Indicators
2. Tank capacity, m^3
3. Pressure of steam heating system, kgf/cm^2
4. Asphalt pump productivity, t/hr
5. Electric motor capacity, kW

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.11. Asphalt Mixing Unit

(1) Показатели	Д-597	Показатели	Д-597
Тип установки (2)	(3) Сборно-разборная, башенная	(6) Пределы дозирования минеральных материалов, кг	100—700
(4) Производительность (при влажности минерального материала 3,5%), т/ч	25—30	Пределы (7) дозирования активизирующих добавок, кг	0,6—6,0
(5) Мешалка циклического действия (масса одного замеса), кг	700	Расход топлива (8) (мазута), кг/ч	220—260
		Мощность электродвигателей, кВт (9)	73
		Габариты установки (10) в рабочем положении, м	20,4×8,56×9,5
		Масса установки, т (11)	26,9

Key:
1. Indicators
2. Type of unit
3. Assembled-separable, tower
4. Productivity (with 3.5 percent moisture content of mineral material), t/hr
5. Cyclic mixer (mass of one batch), kg
6. Range of proportioning mineral materials, kg
7. Range of proportioning activating additives, kg
8. Fuel (mazut) consumption, kg/hr
9. Capacity of electric motors, kW
10. Overall dimensions of installation in working position, meters
11. Mass of installation, tons

Table 7.12. Working Temperature of Asphalt Heating

(1) Марка битума	(2) Температура нагрева, °С	
	(3) без ПАВ	(4) с ПАВ
БНД 90/130, ВНД 60/90, БНД 40/60	130—150	110—130
БНД 200/300, БНД 130/200	100—120	90—110
СГ 130/200	90—100	90—100
СГ 70/130, МГ 70/130	80—90	80—90
БГ 70/130	70—80	70—80

Note. The indicated asphalt heating temperature can be maintained for not more than 5 hours. The temperature of viscous asphalts may be maintained no higher than 80°C and that of liquid asphalts can be maintained no higher than 60°C for not more than 12 hours.

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Mark of asphalt
2. Heating temperature, °C
3. Without surfactants
4. With surfactants

Table 7.13. Mixing Time of Asphalt Concrete Mixtures in Forced Blade Mixers, Seconds

(1) Тип смеси	(2) Продолжительность перемешивания, с	
	(3) сухого	(4) мокрого
(5) Смеси, применяемые в горячем состоянии:		
песчаные (6)	15	45—60
мелко- и среднезернистые (7)	15	30—45
крупнозернистые (8)	--	20—30

Notes. 1. The mixing time of sand and fine- and medium-grained mixtures in old model machines with counterflow motion of materials should be increased 1.5-2-fold. 2. The wet mixing time should be increased with a reduction of asphalt content on an increase of the mineral powder content.

3. The wet mixing time can be increased by 15-30 percent when using surfactants and activated mineral powder.

4. The mixing time of coarse-grained mixtures in free mixing mixers is 120-180 seconds.

5. The mixing time of cold mixtures should be 1.3-1.5 times greater than that of hot mixtures of the same type.

Key:

1. Type of mixture
2. Mixing time, seconds
3. Dry
4. Wet
5. Mixtures used in hot state
6. Sand
7. Fine- and medium-grained
8. Coarse-grained

Table 7.14. Temperature of Asphalt Concrete Mixtures When Poured from Mixers

(1) Вид смесей	(2) Марка битума	(3) Температура смесей, °С	
		(4) без ПАВ	(5) с ПАВ
Горячие (6)	БНД 90/130 БНД 60/90 БНД 40/60	140—160	120—140
Теплые (7)	БНД 200/300 БНД 130/200	110—130	100—120
	БГ 70/130 СГ 130/200	80—100 80—110	— 80—100
Холодные (8)	СГ 70/130 МГ 70/130	90—110 90—120	80—100

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Type of mixtures
2. Mark of asphalt
3. Temperature of mixtures, °C
4. Without surfactants
5. With surfactants
6. Hot
7. Warm
8. Cold

Figure 23. Process Flow Diagram of Installation to Prepare Activated Mineral Powder: 1--storage hopper for screenings or crushed stone; 2--transporter to feed screenings or crushed stone to storage hopper; 3--conveyer to delivery to rotary roaster; 4--drying-mixing unit; 5--proportioning tank for activating material; 6--conveyer to delivery material to storage hopper; 7--storage hopper; 8--rotary-table feeder; 9--ball mill; 10--elevator for activated mineral powder; 11--distributing hopper; 12--screwed conveyer for loading transport equipment

sand and mineral powder. The activated gravel crushing products are fed by means of a hot elevator to the blade mixer of the asphalt concrete installation and are mixed with the given quantity of asphalt. The finished asphalt concrete mixture is delivered to a storage hopper or directly to the body of a dump truck.

7.3. Cement Concrete Plants

Cement concrete plants (TsBZ) are organized to prepare the concrete mixture in airfield construction with cement concrete pavement, which may be:

at the railroad, constructed directly near the railroad siding (Figure 24) or at the facility, constructed in the immediate vicinity of the airfield under construction by the nature of operation;

cyclic using periodic operating machines and batch proportioning devices for proportioning the components of the concrete mixture and continuous operating (Figure 25) where the processes of proportioning, mixing and delivery of the finished mixture are combined in time and preparation of the mixture is a continuous flow by the operating principle of the production equipment;

small capacity with productivity of 30-40 m^3/hr, medium capacity with productivity of 60-90 m^3/hr, large capacity with productivity of 120-150 m^3/hr and super large (double) capacity with productivity of 240-300 m^3/hr (Figure 26) in capacity;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

tower with vertical arrangement of the equipment such that the materials fed upward to the service hoppers, then are moved downward from the hoppers to the concrete transport equipment due to gravity flow and stepped with arrangement of the production equipment in the horizontal plane--one row with another, in the configuration of production equipment;

mechanized--the main production processes of intrawarehouse handling of materials and preparation of the concrete mixture are performed by machines and mechanisms controlled manually and automated--the production processes of delivery and proportioning of components and modes of mixing and unloading the finished mixture are regulated automatically--by the degree of mechanization and automation;

stationary--usually located in stationary structures and designed for long-term operation (not less than three years), standard--located in assembled-separable type structures with operating life up to three years, and mobile--located near the point of installation of the pavement and designed for short-term use at one location (from one month to one year) by the degree of stock inventory.

Regardless of the type of TsBZ, the production process of preparing the concrete mixture includes unloading and storage of the materials, intraplant storage of materials and delivery of them to the hopper of the mixing installations, proportioning of the components of the concrete mixture (crushed stone, sand, cement, water and special additives), mixing the proportioned components and delivery of finished concrete mixture to dump trucks. The plant contains various equipment, installations, machines and so on.

Mobile cement warehouses are used to store the cement in mobile TsBZ (Table 7.15 and 7.17).

A standardized series of facility storage areas with capacity of 360/240 and 720/480 tons has been developed for large-productivity mixing plants. These storage areas have two modifications: with delivery of cement by a pneumatic cement elevator and delivery of cement by a pneumatic screw-type pump.

Hopper and semi-hopper cement warehouses do not now meet the requirements placed on modern cement warehouses. In this regard automated railroad silo cement warehouses with capacity from 240 to 4,000 tons (Figure 27), Table 7.18, have recently been developed for stationary and standard TsBZ.

The mixing equipment at TsBZ is divided by the method of loading the components and delivery of the finished mixture into cyclic-periodic (Table 7.19) and continuous (Table 7.20) concrete mixers. The initial materials in cyclic concrete mixers are loaded in individual portions and then each new portion is delivered to the drum after the previous batch has been unloaded from it.

The charge of initial materials, mixing and unloading of the finished mixture are continuous in continuous concrete mixers.

Concrete mixtures are divided into gravity-flow and forced as a function of the method of mixing the components of the concrete mixture. In gravity-flow concrete

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 24. Diagram of Railroad Base for TsBZ Having Productivity: a--120 m^3/hr; b--240 m^3/hr; 1--filler storage area; 2--cement storage area; 3--compressor plant; 4--fuel-refuelling depot; 5--canopy; 6--truck traffic routes

Key:
1. Crushed
2. Sand

mixers, the materials are mixed in rotary drums on the inner surfaces of which are blades. When the drum rotates, the mixture is formed as a result of the collision of flows of the components freely falling from the blades due to the effect of gravity.

In forced concrete mixers, mixing is carried out by means of blades moving inside the body of the concrete mixer than intensively move the mixture.

Concrete mixers are mobile and stationary by the method of installation.

Concrete mixing plants are designed to prepare a concrete mixture from components delivered from warehouses. Concrete mixing plants contain a hopper section with devices for reception, distribution and delivery of fillers and cement, a proportioning section for proportioning them and a mixing section for preparation and delivery of mixtures to dump trucks.

The plants are divided by operating principle into cyclic (Table 7.21) in which cyclic (batch) proportioning devices and mixers are used and continuous (Table 7.22) in which continuous proportioning devices and mixers are used.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 25. SB-109 Concrete Mixing Plant: 1--mineral material proportioning unit; 2--cement proportioning unit; 3--standard cement storage area; 4--inclined conveyer; 5--mixer with water proportioning device; 6--additive preparation unit; 7--belt conveyer to deliver mixture to dump trucks; 8--plant control console; 9--cement storage area control console; 10--horizontal conveyer; 11--proportioning devices for cement fillers

7.4. Proving Grounds and Shops for Manufacturing of Concrete and Reinforced Concrete Articles

Concrete and reinforced concrete articles--pipe sections, base blocks for sewer pipes, components of precast manholes and thalweg pits, components of mouth

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 26. Diagram of Cement Concrete Plant Based on Two SB-109 Mixers: 1--filler storage area; 2--concrete mixing section; 3--additive preparation section; 4--compressor plant; 5--truck traffic routes

Key:
1. Crushed stone
2. Sand

Table 7.15. Specifications of SB-33 (S-753) and SB-65 (S-998) Mobile Automated Cement Warehouses

(1) Показатели	СБ-33 (С-753)	СБ-65 (С-998)	(2) Назначение
Производительность по приведенной длине 100 м, т/ч (3)	14—18	20	(4) Для приема цемента из автоцементовозов и питания бетоносмесительных установок производительностью 30 м³/ч
(5) Вместимость:			
приемного бункера, т (6)	4,5	4,5	
силоса, т (7)	25	25	
камерного насоса, м³ (8)	0,5	—	
Наибольшая длина цементопровода, м (9)	50	—	
В том числе по вертикали (10)	20	—	
Давление воздуха, кгс/см² (11)	2,5—3	—	
Расход воздуха, м³/мин (12)	3—6	—	
Габаритные размеры, мм: (13)			
длина (14)	2800	4200	
ширина (15)	2800	2800	
высота (16)	8400	8400	
Масса, кг (17)	3200	2900	
Обслуживающий персонал, чел (18)	1	1	

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Indicators
2. Designation
3. Productivity by given length of 100 meters, t/hr
4. For receiving cement from cement haulers and feeding of concrete mixing plants with productivity of 30 m^3/hr
5. Capacity
6. Of receiving hopper, tons
7. Of silo, tons
8. Of chamber-type pump
9. Greatest length of cement line, meters
10. Including that along the vertical
11. Air pressure, kgf/cm^2
12. Air flow rate, m^3/min
13. Overall dimensions, mm
14. Length
15. Width
16. Height
17. Mass, kg
18. Maintenance personnel, persons

Table 7.16. Specifications of SB-74 Mobile Automated Cement Warehouse

(1) Показатели	(2) Единица измерения	(3) Количество
(4) Вместимость склада	т	25
Производительность разгрузки (5)	т/мин (6)	0,5—1
Рабочее разрежение в цистерне (7)	кг/см² (8)	0,8
Дальность подачи при разгрузке (9)	м	25
В том числе по вертикали (10)	»	15
Габаритные размеры склада: (11)		
длина (12)	мм	10 400
ширина (13)	»	2 650
высота (14)	»	3 750
Масса склада: (15)		
без компрессорного агрегата (16)	кг	8 400
с компрессорным агрегатом (17)	(18) »	10 100

Key:

1. Indicators
2. Unit of measurement
3. Number
4. Warehouse capacity
5. Unloading productivity
6. Tons/min
7. Working vacuum in tank
8. Kg/cm^2
9. Delivery distance when unloading
10. Including vertical distance
11. Overall dimensions of warehouse
12. Length
13. Width
14. Height
15. Mass of warehouse
16. Without compressor unit
17. With compressor unit
18. Kilograms

structures, small parts and so on--are used in airfield construction. These articles are usually manufactured on proving grounds of reinforced concrete articles

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.17. Specifications of Mobile Cement Warehouse with Capacity of 480 Tons

(1) Показатели	(2) Единица измерения	(3) Количество
Вместимость (4)	т	480
Вместимость одной цистерны (5)	»	60
Количество цистерн-котлов (6)	(7) шт.	8
Производительность по выгрузке цемента (8)	(9) т/ч	100
Дальность подачи цемента (10)	м	50
Высота подачи (11)	»	20
Расход воздуха при разгрузке (12)	(13) м³/мин	10—15
Рабочее давление воздуха при разгрузке, кгс/см² (14)		2
Масса цистерны в незагруженном состоянии (15)	(17) кг	12 670
В том числе: на седельно-сцепное устройство (16)	»	4 770
на заднюю ось (18)	»	7 900
Габаритные размеры: (19)		
длина (20)	»	16 300
ширина (21)	»	2 800
высота (22)	»	4 000

Key:

1. Indicators
2. Unit of measurement
3. Number
4. Capacity
5. Capacity of one tank
6. Number of boiler-tanks
7. Pieces
8. Productivity in unloading cement
9. T/hr
10. Cement delivery distance
11. Height of delivery
12. Air consumption when unloading
13. m^3/min
14. Working air pressure when unloading, kgf/cm^2
15. Mass of empty tank
16. Including on saddle-clutch device
17. Kilograms
18. On rear axle
19. Overall dimensions
20. Length
21. Width
22. Height

Table 7.18. Specifications of Railroad and Facility Silo-Type Warehouses

(1) Показатели	(2) Прирельсовый склад				Приобъектный склад (3)	
Вместимость склада, т (4)	360 / 240	720 / 480	1700 / 1100	4000 / 2500	360 / 240	720 / 480
Годовой грузооборот, тыс. т (5)	17 / 15	36 / 23	82 / 54	196 / 131	17 / 15	35 / 23
Установленная мощность двигателей, кВт (6)	156 / 141	156 / 141	244 / 192	343 / 291	61 / 51	61 / 51
Наибольший расход сжатого воздуха, м³/мин (7)	36,4	36,4	47,5	71,5	10,5	10,5
Количество обслуживающего персонала, чел. (8)	4	4	5	5	2	2

Note. The indicators for six silos are given in the numerator and those for four silos are given in the denominator

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Indicators
2. Railroad warehouse
3. Facility warehouse
4. Warehouse capacity, tons
5. Annual freight traffic volume, thousand tons
6. Installed capacity of motors, kW
7. Highest compressed air flow rate, m^3/min
8. Number of maintenance personnel, persons

Table 7.19. Specifications of Stationary Cyclic Concrete Mixers

(1) Показатели	СБ-15 (С-336г)	СБ-15 (С-336Д)	С-333Н	СБ-91	СБ-11А (С-302)	СБ-3 (С-230А)
(2) Объем смесительного барабана, л	500	500	500	750	1200	2400
(3) Объем готового замеса, л	330	330	330	500	800	1600
(4) Предельная крупность заполнителей, мм	70	70	70	70	120	150
(5) Скорость вращения смесительного барабана, об/мин	18,3	18,2	18,2	18,0	17	12,6
(6) Установленная мощность, кВт	3,6	9,1	8,5	4,0	14,0	25,0
(7) Привод наклона смесительного барабана	(8) Гидравлический				(9) Пневматический	
(10) Давление воздуха в сети, кгс/см²	-	-	-		3,5	4,0
(11) Давление в гидросистеме, кгс/см²	10	10	10	10	-	
(12) Габаритные размеры, мм:						
(13) длина	2600	2670	2200	1750	3700	3500
(14) ширина	2200	2200	2400	2000	2750	4200
(15) высота	2800	2800	1900	1800	2526	3400
(16) Масса, кг	1370	2100	1900	1250	4000	8100

Key:

1. Indicators
2. Volume of mixing drum, liters
3. Volume of finished batch, liters
4. Maximum coarseness of fillers, mm
5. Rotational speed of mixing drum, rpm
t. Installed capacity, kW
7. Angle drive of mixing drum,
8. Hydraulic
9. Pneumatic
10. Air pressure in system, kgf/cm^2
11. Pressure in hydraulic system, kgf/cm^2
12. Overall dimensions, mm
13. Length
14. Width
15. Height
16. Mass, kg

which can be created as independent enterprises at facilities under construction or as an integral part of a cement-concrete plant.

The proving grounds are temporary enterprises and are designed only for the period of airfield construction. Their capacity does not exceed 15,000 m^3 of finished products annually. In this case the work is conducted mainly during the warm season

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 27. Diagram of Railroad Cement Warehouse with Capacity of 2,500-4,000 Tons: 1 and 2--receiving hoppers; 3--cement hauler rail car; 4--closed rail car with cement; 5--cement hauler tank; 6--air output filter after cement has settled in silo bank; 7--cement precipitator-hopper above silo bank; 8--upper air channel; 9--silo banks; 10--side cement unloaders from silo bank; 11--pneumatic bottom unloader; 12--cement hauling truck; 13--bottom air channel; 14--pneumatic cement unloader; 15--cement delivery hopper; 16--pneumatic screw-type pump

Table 7.20. Specification of Continuous Concrete Mixers

(1) Показатели	С-632	С-939	С-75	СБ-78	СБ-109 (гравитационный) (2)
(3) Производительность, м³/ч	5	15	30	60	120
(4) Наибольший размер крупного заполнителя, мм	40	70	70	70	120
Мощность электродвигателя, кВт (5)	4	7	20	40	40
Габаритные размеры, мм: (6)					
длина (7)	2 400	3 300	4 735	4 880	11 650
ширина (8)	692	1 000	1 655	2 380	2 800
высота (9)	1 230	1 600	2 420	1 066	5 670
Масса, кг (10)	670	930	3 115	5 900	17 000

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Indicators
2. Gravity-flow
3. Productivity, m^3/hr
4. Largest size of coarse filler, mm
5. Capacity of electric motor, kW
6. Overall dimensions, mm
7. Length
8. Width
9. Height
10. Mass, kg

Table 7.21. Specifications of Stationary Cyclic-Type Concrete Mixing Plants

(1) Показатели	СБ-4 (С-243-1Б)	СБ-4 (С-243-2Б)	СБ-6 (С-283-Б)
Производительность, м³/ч (2)	36—38	72—76	15
Установленная мощность электродвигателей, кВт (3)	84	134	35,9
Потребность в сжатом воздухе на 1 м³ продукции, м³ (4)	1	3	0,5
Масса технологического оборудования, т (5)	32,3	55	20,9
Масса металлоконструкций, т (6)	55,4	96,2	31,1
Бетоносмеситель (7)			
Тип (8)	СБ-11 (С-302)	СБ-11 (С-302)	С-333П
Количество (9)	2	4	2
Вместимость по загрузке, л (10)	1200	1200	500
Объем готового замеса, л (11)	800	800	330

Key:

1. Indicators
2. Productivity, m^3/hr
3. Installed capacity of electric motors, kW
4. Need for compressed air per cubic meter of product, m^3
5. Mass of production equipment, tons
6. Mass of assembled steel sections, tons
7. Concrete mixer
8. Type
9. Number
10. Charge capacity, liters
11. Volume of finished batch, liters

of the year on open sites. The warehouse, reinforcement, mixing, shaping and thermal-moisture assemblies are created on the proving ground, on which all production processes are performed, beginning from reception and storage of materials and ending with storage of articles and loading them into transport equipment for delivery to the work production site.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 7.22. Specifications of Continuous-Type Plants

(1) Показатели	СБ-37 (С-780)	СБ-75	СБ-78	СБ-109	СБ-118
(2) Производительность, м³/ч	30	30	60	120	240
Количество фракций заполнителей: (3)					
песок (4)	1	1	1	1	1
щебень (5)	3	3	3	3	3
Вместимость расходных бункеров, м³ (6)					
цемента (7)		34	34	40	40
заполнителей (8)		12	12	70	75
Наибольший размер заполнителей, мм (9)	40	40	70	40	40
Жесткость приготовляемой смеси, с (10)	(11) Не более 30–50				
Установленная мощность (без склада цемента), кВт (12)	32,2	37,5	57,8	135	155
Габаритные размеры, мм (13)					
длина (14)	30 140	36 600	36 600	48 000	50 000
ширина (15)	6 000	3 250	4 000	3 800	3 800
высота (16)	8 400	12 500	12 000	12 990	12 500
Масса, кг (17)	23 000	28 850	33 000	13 200	

Key:

1. Indicators
2. Productivity, m^3/hr
3. Number of filler fractions
4. Sand
5. Crushed stone
6. Capacity of service hoppers, m^3
7. Of cement
8. Of fillers
9. Largest size of fillers, mm
10. Stiffness of prepared mixture
11. Not more than
12. Installed capacity (without cement warehouse), kW
13. Overall dimensions, mm
14. Length
15. Width
16. Height
17. Mass, kg

There are three main methods of manufacturing concrete and reinforced concrete articles: bench, unit-flow and conveyer (Figure 28).

With the bench method (Figure 28, a), the form and the article manufactured in it are located on a bench during the entire period of producing it and is not moved anywhere. All operations to manufacture articles--installation of the reinforcing body or frame, placement of the concrete mixture, packing, heat treatment of the article and removing the form from it--are carried out with equipment which is moved directly from one form to another. The article is moved to the finished product warehouse only after the form has been removed.

With the unit-flow method (Figure 28, b), the machines and devices for manufacture of articles are fixed at special stations, on each of which a specific production operation is performed, while the forms are moved from one station to another by means of hoisting-transport equipment. Unlike the bench method, the articles are eat-treated in special evaporation chambers rather than on the form site. The use

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 28. Methods of Manufacturing Concrete and Reinforced Concrete Articles: a--bench; b--unit-flow; c--conveyer- 1--bench--2--fixed forms (posts) with articles; 3--movement of articles with forms removed to finished product warehouse; 4--mobile production equipment by means of which all operations are performed; 5--forms moved from one station to another; 6--chamber for heat treatment of articles; 7--stations for removing forms from articles; 8--direction of motion of articles with forms removed; 9--empty forms; 10--stations for preparation of empty forms for placement of mixture; 11--mobile pallets-trolleys; 12--chamber for heat treatment of articles

of this method is feasible at stationary proving grounds with produced product volume of more than 15,000 m^3 annually.

With the conveyer method (Figure 28, c), the forms are moved with the articles from station to station on a closed ring by means of a conveyer. A specific operation is performed at each station. The chamber for heat treatment of the articles is a component of the closed conveyer moving ring. This method is used at large reinforced concrete products plants.

The forms for manufacture of concrete and reinforced concrete articles should be manufactured with high accuracy, they should be rigid, strong and easy to assemble and disassemble, easily separated from the article and easily cleaned of residues of the cement-concrete mixture. Metal forms are most widely used and they are convenient and reliable in operation and have high reusability. The forms are cleaned with manual or mechanical brushes and scrapers and are lubricated with brushes or sprayers. Mixtures (for example, kerosene and solidol), an emulsion of spent oil, cement and water in the ratio 1:1:0.3 and so on are used for lubrication.

The reinforcement for manufacture of reinforced concrete articles is procured at the reinforcing assembly of the proving ground, which consists of a reinforcement warehouse and reinforcement shop. The reinforcement is manufactured in the reinforcement shop at reinforced concrete products plants.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The reinforcement warehouse of the proving ground is a closed building equipped with racks and different devices to store the reinforcing steel. The reinforcing steel up to 14 mm in diameter is trimmed and cut on PO-6, AN-14 and S-336 machines. Heavy machines are used to straighten large-diameter reinforcement. The reinforcement is cleaned of rust, scale and dirt on special electric machines with rotary metal brushes.

The reinforcement is welded with different methods: contact-butt electric arc welding, electric-arc spot welding and electric-arc welding. The most widely used method is contact-butt welding.

Electric spot welding is used when manufacturing rebar grids and three-dimensional frames to connect rods from 2.5 to 60 mm in diameter at the points of their intersection. Electric-arc welding is used mainly to connect large-diameter rods.

Assembly and manufacture is the final process of reinforcement preparation. Grids, frames, assembly loops, insertion parts and other reinforcement are assembled from rods or wire by means of different devices (jigs, racks, benches and so on).

Reinforcement of articles is completed in installation of previously manufactured reinforcement in the form in precise accordance to the plan and with reliable fastening.

Articles are formed by filling a previously cleaned and lubricated form with a cement-concrete mixture and packing the mixture.

Vibrators, vibrating forms (for articles from 500 to 1,000 kg in mass) or a vibrating platform with capacity from 2 to 16 tons are used to pack the mixture.

Concrete and reinforced concrete pipe and also cylindrical components for pits of the runoff system are manufactured in vibrating forms. The mixture is placed in the forms by a special concrete placer installed above the top part of the form.

Figure 29. Diagram of Heated Bench: 1--heat-insulating layer (slag); 2--concrete base; 3--special layer; 4--heat-protective cap; 5--hoisting loops; 6--connection pipe for steam feed; 7--article; 8--form; 9--openings for heat carrier

Key:
1. Steam

The molded article should acquire the required strength. Under normal conditions (at temperature of 20 ± 5° C), concrete acquires its design strength within 28 days.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 30. Diagram of Hole-Type Steam Chamber: 1--common concrete; 2--reinforced concrete; 3--cover; 4--slag; 5--concrete wall; 6--reinforced concrete slab; 7--cement coupler with reinforcement; 8--pipe for steam delivery

The artificial method is used to accelerate hardening of concrete. Concrete is hardened under these conditions on benches (Figure 29) heated with steam or another heat carrier passed through openings installed in the base of the bench. The article is covered with a heat-protective cap to reduce heat losses.

Steaming is carried out by using saturated steam at temperature from 70 to 100°C at relative humidity of 90-98 percent. This steaming is conducted in special steaming chambers submerged in the soil and constructed of concrete or reinforced concrete on open sites or in closed buildings of proving grounds and plants.

The chambers are hole type (Figure 30), into which articles are loaded with cranes through the top, and the tunnel type with articles loaded through openings in both ends of the chamber.

The mode of steaming the articles usually consists of three phases: the first is to age the articles with a gradual temperature rise to the established range (the length of the phase is 2-4 hours, the second is to steam the article at the established maximum temperature (isothermal heating) for 6-8 hours and the third is to age the articles with a gradual reduction of temperature, which continues from 3 to 10 hours. The highest permissible steam-heating temperature of concrete and reinforced concrete articles manufactured from portland cement is 70-80°C.

The forms are removed from the concrete and reinforced concrete articles at the end of heat treatment. After the articles are removed from the forms, they are loaded onto transport equipment and sent to a warehouse.

The finished products warehouses are well graded and packed open sections of the proving ground or plant. The articles are stored in the horizontal position in stacks or in the vertical position using racks in the required cases. The stacks of articles are arranged so that each of them provides free movement of trucks and loading-unloading equipment.

Each article laid in the stack should rest on wood spacers, while the bottom row should rest on pallets. The thickness of the spacers and pallets should be so that the gap formed by them between laid articles freely admits the forks of a forklift or strapping cable. The spacers are arranged strictly along the vertical one above the other in the height of the stack along the line of the installation loops and openings or near them.

In all cases work at the storage area should be organized so that the possibility of cracks forming, corners and edges breaking off or other damage to the articles during acceptance, storage and delivery of them to the customer be completely prevented.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 8. MACHINES USED IN AIRFIELD CONSTRUCTION

[Text] Machines for Preparatory Work and Excavation

Table 8.1. Brush Cutters and Stump Removers

(1) Показатели	(2) Кусторезы		Корчеватели (3)		
	ДП-4 (Д-514А)	ДП-24	ДП-8 (Д-508)	ДП-3 (Д-513А)	ДП-25
Базовый трактор (4)	Т-100М3ГП	Т-130 1	ДТ-75Б	Т-100М3ГП	Т-130. 1.Г-1
Мощность, л. с. (5)	108	160	75	108	160
Диаметр срезаемых деревьев, мм (6)	200—300	—	300	450	450
Отвал: ширина захвата, мм (7)	3 600	3 600	2 170	1 380	1 380
Угол установки ножей в плане, град (8)	64	64	—	—	—
Управление (9)	Гидравлическое (10)				
Габаритные размеры, мм: (11)					
длина (12)	7 380	7 600	5 050	5 550	5 830
ширина (13)	3 600	3 600	2 752	3 000	3 250
высота (14)	3 150	3 250	2 300	3 050	3 043
Масса (эксплуатационная), кг (15)	14 420	17 100	10 215	13 300	15 800
Производительность, га/ч (16)	0,4—0,5	0,5—0,8	45 дней	До 20 дней	
Количество зубьев (стоек) (17)	—	—	6	4	4
Величина заглубления зубьев, мм (18)	—	—	230	400	—

Key:
1. Indicators
2. Brush cutters

[Continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

3. Stump removers
4. Base tractor
5. Output, horsepower
6. Diameter of trees to be cut, mm
7. Blade: width of grab, mm
8. Angle of setting knives in cross-section, degrees
9. Control
10. Hydraulic
11. Overall dimensions, mm
12. Length
13. Width
14. Height
15. Mass (operating), kg
16. Productivity, ha/hr
17. Number of teeth (tines)
18. Extent of teeth submergence, mm

Table 8.2. Bulldozer-Ripper Units

(1) Показатели	ДП-14 (Д-705)	ДП-15 (Д-706)	ДЗ-90С	(2) Бульдозер ДЗ-35С с рыхлителем ДП-22С	(3) Бульдозер Д-34С с рыхлителем ДП-9С
Базовый трактор (4)	Т-100 МЗГП		Т-130. 1.Г-1	Т-180КС	ДЭТ-250М
Мощность, л. с. (5)	108	108	160	180	300
Бульдозерное оборудование (6)	ДЗ-18 (Д-493А)	ДЗ-54С (Д-687С)	ДЗ-27С (Д-532С)	ДЗ-35С (Д-575С)	ДЗ-34С (Д-572С)
Рыхлительное (7) »	ДП-5С (Д-515С)	ДП-5С (Д-515С)	ДП-5С (Д-515С)	ДП-22С	ДП-9С (Д 625АС)
Управление (8)	Гидравлическое (9)				
Максимальная скорость передвижения, км/ч (10)	10,13	10,13	11,2	12,0	19,0
Габаритные размеры, мм: (11)					
длина (12)	6 350	5 840	6 080	8 350	8 655
ширина (13)	3 940	3 030	3 200	3 640	4 540
высота (14)	3 059	3 059	3 065	2 825	3 180
Масса (эксплуатационная), кг (15)	15 100	15 100	17 900	22 710	38 350

Key:

1. Indicators
2. DZ-35S bulldozer with DP-22S ripper
3. D-34S bulldozer with DP-9S ripper
4. Base tractor
5. Output, horsepower
6. Bulldozer equipment
7. Ripper equipment
8. Control
9. Hydraulic
10. Maximum speed, km/hr
11. Overall dimensions, mm
12. Length
13. Width
14. Height
15. Mass (operating), kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 8.3. Bulldozers

(1) Тип и марка машин	(2) Базовый трактор	(3) Мощность, л. с.	(4) Бульдозерное оборудование					(10) Масса, кг	(11) Максимальная скорость передвижения км/ч	(12) Габаритные размеры, мм			(16) Масса (эксплуатационная), кг	(17) Лебедка
			(5) Длина отвала, мм	(6) Высота отвала, мм	(7) Угол резания, град	(8) Подъем отвала над поверхностью, мм	(9) Опускание отвала ниже опорной поверхности, мм			(13) Длина	(14) Ширина	(15) Высота		
(18) Бульдозер с неповоротным отвалом и гидропроводом:														
ДЗ-54С (Д-687С)	Т-100М3ГП	108	3 200	1 200	50—60	850	370	1 780	10,1	5 100	3 200	3 040	14 020	—
ДЗ-37 (Д-579)	МТЗ-50/МТЗ-52	55	2 100	650	60	500	150	440	25,8	4 580	2 100	2 485	3 600	—
ДЗ-34С (Д-572С)	ДЭТ-250	300	4 540	1 550	50—60	840	400	3 980	19,0	6 900	4 540	3 180	30 680	—
ДЗ-29 (Д-535)	Т-74С2	75	2 560	800	55	600	200	850	11,5	4 510	2 560	2 325	6 730	—
ДЗ-42 (Д-606)	ДТ-75С2	75	2 520	800	55	600	200	1 070	10,8	4 550	2 520	2 300	6 860	—
ДЗ-35С (Д-575С)	Т-180Г	180	3 640	1 230	45—55	900	320	3 400	12	6 590	3 640	2 825	19 610	—
ДЗ-101	Т-4АП1	130	2 600	900	55	700	310	1 440	9,52	4 630	2 860	2 535	9 640	—
ДЗ-27С (Д-532С)	Т-130.1.Г-1	160	3 200	1 300	50—60	900	500	1 910	11,2	5 400	3 200	3 065	16 460	—
Бульдозер с поворотным отвалом и гидропроводом: (19)														
ДЗ-18 (Д-493А)	Т-100М3ГП	108	3 970	1 000	50—60	1 050	250	1 860	10,1	5 500	3 970	3 040	14 100	—
ДЗ-104	Т-4АП1	130	2 600	900	55	700	300	1 765	9,52	4 900	3 280	2 535	9 965	—
ДЗ-28 (Д-533)	Т-130.1.Г-1	160	3 940	1 000	50—60	1 050	440	2 850	11,2	5 760	3 940	3 065	16 550	—
Бульдозер с неповоротным отвалом с канатным приводом: (20)														
ДЗ-53 (Д-686)	Т-100М	108	3 200	1 200	50—60	900	1 000	2 130	10,1	5 300	3 200	3 040	14 020	Д-499Б или Д-269 (21)
ДЗ-17 (Д-492)	Т-100М3	108	3 940	1 000	50—60	1 100	1 000	2 215	10,1	5 500	3 970	3 040	14 110	То же
ДЗ-24А (Д-521А)	Т-180	108	3 640	1 490	45—55	1 200	1 000	2 860	12	6 600	3 690	2 825	18 620	(21) —

Key:

1. Type and mark of machines
2. Base tractor
3. Output, horsepower
4. Bulldozer equipment
5. Blade length, mm
6. Blade height, mm
7. Cutting angle, degrees
8. Hoisting of blade above surface, mm
9. Lowering blade below reference surface, mm
10. Mass, kg
11. Maximum speed, km/hr
12. Overall dimensions, mm
13. Length
14. Width
15. Height
16. Mass (operating), kg
17. Winch
18. Bulldozer with fixed blade and hydraulic drive
19. Bulldozer with rotary blade and hydraulic drive
20. Bulldozer with fixed blade and hydraulic drive
21. D-499B or D-269

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.4. Towed Scrapers

(1) Показатели	ДЗ-33 (Д-569)	ДЗ-111	ДЗ-20 (Д-498)	ДЗ-20В (Д-498В)	Д-77С
Базовый трактор (2)	ДТ-75С2	Т-4АП1	Т-100 М3ГС	Т-130.1.Г	Т-130.1.Г
Вместимость ковша, м³ (3)	3	4,5	7	7	8
Мощность, л. с. (4)	75	130	108	160	160
База, мм (5)	4000	4530	5600	5600	6200
Ширина резания, мм (6)	2100	2454	2620	2650	2718
Глубина резания, мм (7)	200	250	300	300	350
Размер шин (8)	9,00—20	14,00—20	14,00—20	16,00—24	18,00—25
Управление (9)	(10) Гидравлическое				
Габаритные размеры, мм: (11)					
длина (12)	6800	7425	8785	875	9720
ширина (13)	2440	2876	3138	3138	3078
высота (14)	1980	4800	2526	2560	2680
Масса, кг (15)	2700	4800	7000	7000	9200

Key:

1. Indicators
2. Base tractor
3. Bucket capacity, m^3
4. Rating, horsepower
5. Base, mm
6. Cutting width, mm
7. Cutting depth, mm
8. Tire size
9. Control
10. Hydraulic
11. Overall dimensions, mm
12. Length
13. Width
14. Height
15. Mass, kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.5. Motorized scrapers

(1) Показатели	ДЗ-13 (Д-392)	ДЗ-67
Вместимость ковша, м³ (2)	15	25
Грузоподъемность, т (3)	27	45
Колесная формула (4)	4×2	4×4
Мощность тягача, л. с. (5)	360	850
База, мм (6)	8 200	10 220
Колея, мм: (7)		
тягача (8)	2 490	—
скрепера (9)	2 360	2 600
Максимальная скорость передвижения, км/ч (10)	45	40
Трансмиссия (11)	Гидравлическая (12)	
Ширина резания, мм (13)	2 926	3 650
Глубина » (14)	350	400
Размер шин (15)	27—33	37,5—39
Управление (16)	Гидравлическое (12)	
Габаритные размеры, мм: (17)		
длина (18)	12 800	16,560
ширина (19)	3 400	4 644
высота (20)	3 600	4 255
Масса (эксплуатационная), кг (21)	34 000	64 000

Key:

1. Indicators
2. Bucket capacity, m^3
3. Load capacity, tons
4. Wheel formula
5. Tractor output, horsepower
6. Base, mm
7. Track, mm
8. Of tractor
9. Of scraper
10. Maximum speed, km/hr
11. Transmission
12. Hydraulic
13. Cutting width, mm
14. Cutting depth, mm
15. Tire size
16. Control
17. Overall dimensions, mm
18. Length
19. Width
20. Height
21. Mass (operating), kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.6. Motorized Graders

(1) Показатели	ДЗ-98А-1 (Д-710Б)	ДЗ-31-1 (Д-557-1)	ДЗ-98
(2) Мощность, л. с.	90	130	250
Колесная формула (3)	1×2×	1×2×3	1×2×3
База, мм (4)	5 200	5 800	6 000
Колея, мм (5)	1850	2070	2 340
Максимальная скорость передвижения, км/ч (6)	38,1	37,7	34,4
Трансмиссия (7)	(8) Механическая		
Размер шин (9)	12—20	16—20	16—24
Отвал, мм: (10)			
длина (11)	3 040	3 700	3 700
высота (12)	500	600	700
угол резания, град (13)	30—70	30—70	30—80
опускание ниже опорной поверхности, мм (14)	250	250	250
Управление (15)	Гидравлическое (16)		
Габаритные размеры, мм: (17)			
длина (11)	8 650	9 260	10 300
ширина (18)	2 300	2 650	2 800
высота (12)	2 985	3 475	3 570
Масса (эксплуатационная), кг (19)	9 850	13 100	19 500

Key:

1. Indicators
2. Output, horsepower
3. Wheel formula
4. Base, mm
5. Track, mm
6. Maximum speed, km/hr
7. Transmission
8. Mechanical
9. Tire size
10. Blade, mm
11. Length
12. Height
13. Cutting angle, degrees
14. Lowering below reference surface, mm
15. Control
16. Hydraulic
17. Overall dimensions, mm
18. Width
19. Mass (operating), kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.7. Semitowed Elevator-Graders

(1) Показатели	(2) ДЗ-50 (Д-347А) к гусеничному трактору класса 10 тс	(3) Д-347АК к колесному трактору К-700 класса 5 тс
Производительность, м³/ч (4)	630	750
Двигатель привода рабочего оборудования: (5)		
модель (6)	СМД-14К	СМД-14К
мощность, л. с. (7)	75	75
Рабочий орган: (8)		
тип (9)	(10) Дисковый	(11) Совковый
диаметр диска, мм (12)	800	800 (ширина захвата) (13)
угол резания, град (14)	20—55	20—55
Дальность отбрасывания грунта, м (15)	(16) До 9	До 11,5
Транспортер: (17)		
ширина ленты, мм (18)	1200	1200
скорость движения ленты, м/с (19)	3,6	3,6
высота подъема, мм (20)	3400	3400
Управление (21)	Гидравлическое (22)	Электрогидравлическое (23)
Габаритные размеры, мм (24)		
длина (25)	6280	6195
ширина (26)	9600	3930
высота (27)	4250	3000
Масса, кг (28)	8200	8760

Key:

1. Indicators
2. DZ-50 (D-347A) to caterpillar tread tractor, class 10 t-f
3. D-347AK to K-700 wheeled tractor, class 5 t-f
4. Productivity, m^3/hr
5. Drive motor of working equipment
6. Model
7. Output, horsepower
8. Working member
9. Type
10. Disk
11. Shovel
12. Disk diameter, mm
13. Width of grab
14. Cutting angle, degrees
15. Soil dumping distance, meters
16. Up to
17. Conveyer
18. Width of belt, mm
19. Belt speed, m/s
20. Lifting height, mm
21. Control
22. Hydraulic
23. Electrohydraulic
24. Overall dimensions, mm
25. Length
26. Width
27. Height
28. Mass, kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.8. Motorized Packing Machines (Rollers)

(1) Показатели	(2) Вибрационные			(5) Статические			
	Двухвальцовые		(4) Двухвальцовые ДУ-8В (Д-399В)	Трехвальцовые			
	(3) ДУ-104А (Д-455А)	ДУ-47А		(6) ДУ-50	ДУ-48А	ДУ-8В (Д-409В)	ДУ-49А
(7) Масса, т:							
без балласта (8)	1,5	6	8	6	9,4	10,3	11
с балластом (9)	1,8	8	13	8	13	18	18
Ширина уплотняемой полосы, мм (10)	850	1200	1290	1800	1850	1290	1290
Ширина вальцов, мм: (11)							
ведомого (12)	-	--	1290	1000	1040	1290	-
ведущих (13)		--	--	500×2	539×2	1290	--
Мощность, л. с. (14)	8	50	50	50	50	50	50
Скорость передвижения рабочая, км/ч (15)	1,8; 3,0	1,8; 3,35	3,25; 5,26; 8,0	2,73	1,94 3,42	3,25; 5,26; 8,0	3,25; 5,26; 8,0
Линейное давление вальцов, кгс/см (16)							
вибрационного (17)	10 18	--	-		-		-
направляющего (18)	7 10						
с балластом (19)	-	40	60	50	75	60	80
Габаритные размеры, мм: (20)							
длина (21)	2890	4500	4320	4380	5200	6080	6985
ширина (22)	1000	1600	2070	1800	1850	2070	2040
высота (23)	2200	2606	3200	2600	2600	3200	3350

Key:

1. Indicators
2. Vibrating
3. Two-wheeled DU-104 (D-455A)
4. Two-wheeled DU-8V (D-399V)
5. Static
6. Three-wheeled
7. Mass, t
8. Without ballast
9. With ballast
10. Width of strip to be packed, mm
11. Width of wheels, mm
12. Driven
13. Drive
14. Output, horsepower
15. Working speed, km/hr
16. Linear pressure of rollers, kgf/cm
17. Vibrating
18. Guide
19. With ballast
20. Overall dimensions, mm
21. Length
22. Width
23. Height

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.9. Pneumatic-Tire Packing Machines (Rollers)

(1) Показатели	(2) Самоходные		(3) Полуприцепной	(4) Прицепные	
	ДУ-31А (Д-627А)	ДУ-20 (Д-624)	ДУ-16В (Д-554В)	ДУ-30 (Д-625)	ДУ-39 (Д-703)
Масса, т: (5)					
без балласта (6)	8,3	15,3	7,3	4	6,28
с балластом (7)	16	30	25,9	12,5	25
Ширина уплотняемой полосы, мм (8)	1900	2220	2620	2200	2530
Двигатель (9)	А-41Д	АМ-01А	—	—	—
Мощность, л. с. (10)	90	130	—	—	—
Давление воздуха в шинах, кгс/см² (11)	3—5,5	3,5—10	—	До 5,5 (17)	3,5—7,0
Система регулирования воздуха в шинах (12)	(13) Централизованная				
Трансмиссия (14)	(15) гидромеханическая				
Скорость передвижения (рабочая), км/ч (16)	7; 12; 2; 20,5	До 23 (17)	15	—	—
транспортная, км/ч (18)	—	—	40	—	—
Габаритные размеры, мм (19)					
длина (20)	5300	6160	10400	5300	5700
ширина (21)	1970	2890	3045	2340	2850
высота (22)	3200	3410	2930	1820	2000
Тягач (23)				Трактор (25)	
Глубина уплотнения, мм (24)	—	—	—	250	350

Key:

1. Indicators
2. Motorized
3. Semitowed
4. Towed
5. Mass, tons
6. Without ballast
7. With ballast
8. Width of strip to be packed, mm
9. Motor
10. Output, horsepower
11. Air pressure in tires, kgf/cm^2
12. Air control system in tires
13. Centralized
14. Transmission
15. Hydromechanical
16. Speed (working), km/hr
17. Up to
18. Transport, km/hr
19. Overall dimensions
20. Length
21. Width
22. Height
23. Towing vehicle
24. Depth of packing, mm
25. Tractor

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.10. Impact Machines

(1) Показатели	ДУ-12 (Д-471-Б)	ДУ-12В (Д-471В)
(2) Масса, т:		
навесного оборудования (3)	6,5	6,0
одной плиты (4)	1,42	1,3
Площадь плиты, м² (5)	1,06	1,0
Высота подъема плиты, мм (6)	1100	1100
Число ударов плиты в 1 мин (7)	12—18	12—18
Ширина уплотняемой полосы, мм (8)	2500	2500
Глубина уплотнения, м (9)	1,2	1,2
Габаритные размеры, мм: (10)		
длина (11)	5900	6050
ширина (12)	2500	2500
высота (13)	3015	3015

Key:

1. Indicators
2. Mass, tons
3. Of suspended equipment
4. Of single plate
5. Area of plate, m^2
6. Height of raising plate, mm
7. Number of impacts of plate per minute
8. Width of strip to be packed, mm
9. Packing depth, meters
10. Overall dimensions, mm
11. Length
12. Width
13. Height

Table 8.11. Sheepsfoot Rollers

(1) Показатели	ДУ-26 (Д-614)	Д4-32А (Д-630А)	ДУ-3А
(2) Масса, т			
без балласта (3)	5	9	12,3
с балластом (4)	9	18	30
Ширина уплотняемой полосы, мм (5)	1800	2600	2800
Удельное давление вальца, кгс/см³ (6)	50	57,5—69,0	75
Ширина вальца, мм (7)	1800	2600	2800
Габаритные размеры, мм: (8)			
длина (9)	5016	7890	6552
ширина (10)	2196	3080	3250
высота (11)	1800	3280	3124

Key:

1. Indicators
2. Mass, tons
3. Without ballast
4. With ballast
5. Width of strip to be packed, mm
6. Specific roller pressure, kgf/cm^3
7. Width of roller, mm
8. Overall dimensions, mm
9. Length
10. Width
11. Height

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

8.2. Machines to Install Beds and Flexible Pavement

Table 8.12. Hoes and Soil-Mixing Machines

(1) Показатели	(2) Фреза ДС-74	Фреза ДС-18А (Д-530А)	Фреза ДС-73	(3) Грунтосмесительная машина на ДС-16Б (Д-391Б)
(4) Ходовая часть	(5) Пневмоколесная	(6) Гусеничная		(5) Пневмоколесная
Базовый трактор (7)	Т-158	Т-100М3ГП	Т-130.1.Г-1	Спецшасси (8)
Мощность двигателя, л. с. (9)	165	108	140	300
Ширина обработки, м (10)	2,4	2,50	2,50	2,40
Глубина обработки, см (11)	25	20	20	8—25
(12) Скорости движения, км/ч:				
рабочие (I—IV) (13)	0,112—0,96	0,10—0,76	0,11—0,31	0,098—0,64
транспортные (14)	—	6,4	10,5	1,54—17,6
(15) Нормы дозирования, кг/м²:				
жидких вяжущих и воды (16)	—	6—50	6—50	1,12—105
цемента, извести (17)	—	—	—	2—140
Габаритные размеры, мм: (18)				
длина (19)	10 470	7 400	7 468	11 850
высота (20)	2 850	3 040	3 040	3 110
ширина (21)	2 950	3 060	3 073	3 850
Масса, т (22)	12,6	14,8	17,1	24,1

Key:

1. Indicators
2. Hoe
3. Soil-mixing machines on DS-16B (D-391B)
4. Travel part
5. Pneumatic tire
6. Caterpillar tread
7. Base tractor
8. Special chassis
9. Engine output, horsepower
10. Width of treatment, meters
11. Depth of treatment, cm
12. Speed, km/hr
13. Working
14. Transport
15. Proportioning norms, kg/m^2
16. Of liquid binders and water
17. Of cement and lime
18. Overall dimensions, mm
19. Length
20. Height
21. Width
22. Mass, tons

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.13. Cement Spreaders

(1) Показатели	ДС-9 (Д-343В)	ДС-72
(2) Тип машины	(3) Прицепная	Полуприцепная (4)
Ширина распределения, м (5)	2,0	2,4
Объем бункера (6)	3,5	4,2
Нормы дозирования, кг/м² (7)	10—50	—
Скорости передвижения, км/ч: (8)		(10)
с ходоуменьшителем (9)	0,53—0,93	Распределения до 0,897
без ходоуменьшителя (11)	3,59—7,9	Транспортная (12) до 43,8
Число передач (13)	(15) 4	6
Загрузка бункера, цистерны (14)	Пневматическая или гравитационная	Пневматическая (16)
Габаритные размеры, мм: (17)		
длина (18)	4 220	11 300
высота (19)	3 720	3 300
ширина (20)	2 700	2 900
Масса, кг (21)	2 250	13 300

Key:

1. Indicators
2. Type of machine
3. Towed
4. Semitowed
5. Spreading width, meters
6. Hopper capacity
7. Proportioning norms, kg/m^2
8. Speed, km/hr
9. With reducing gear
10. Spreading up to
11. Without reducing gear
12. Transport up to
13. Number of gears
14. Loading of hopper or tank
15. Pneumatic or gravity
16. Pneumatic
17. Overall dimensions, mm
18. Length
19. Height
20. Width
21. Mass, kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.14. Construction Materials Spreaders

(1) Показатели	ДС-49 (Д-708А)	ДС-54 (Д-724)	Д-337Б
Тип (2)	(3) Самоходный на колесном шасси	(4) Самоходный на гусеничном ходу	
Производительность: (5)			
при распределении каменной мелочи, м³/ч (6)	75	—	70
при распределении щебня, гравия, т/ч (7)	—	75—100	—
при распределении асфальтобетонной и грунтовой смеси, т/ч (8)	—	60	—
Вместимость приемного бункера, м³ (9)	4,5	4,5	3,5
Скорость передвижения, км/ч: (10)			
рабочая при распределении каменной мелочи (11)	2,82—6,3		
То же, асфальтобетонной и грунтовой смеси, щебня (12)	—	0,043—0,8	До 0,8
транспортная (13)	9,46—31,7	(14) До 2,13	1,9
Габаритные размеры, мм: (15)			
длина (16)	8960	8800	7870
ширина (17)	4010	3160	3915
высота (18)	2950	3000	3035
Масса, кг (19)	9350	9400	10,000

Key:
1. Indicators
2. Type
3. Motorized on wheeled chassis
4. Motorized on caterpillar track
5. Productivity
6. When spreading grit, m^3/hr
7. When spreading crushed stone and gravel, t/hr
8. When spreading asphalt concrete and soil mixture, t/hr
9. Capacity of receiving hopper, m^3
10. Speed, km/hr
11. Working speed when spreading grit
12. Working speed when spreading asphalt concrete and soil mixture and crushed stone
13. Transport speed
14. Up to
15. Overall dimensions, mm
16. Length
17. Width
18. Height
19. Mass, kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.15. Road Oilers

(1) Показатели	ДС-39А (Д-640А)	ДС-53А (Д-722А)
Вместимость цистерны, л (2)	3500	6000
Скорость передвижения, км/ч: (3)		
рабочая (4)	3,5—24,6	3,5—24,6
транспортная с грузом (5)	40—60	40—60
Наибольшая ширина распределения, мм (6)	3 800	4 000
Интервал ширины распределения, мм (7)	190	190
Норма розлива, л/м² (8)	0,5—3,0	0,5—3,0
Производительность шестеренчатого насоса, л/мин (9)	840	840
Скорость нагрева битума, град/ч (10)	(11) Не менее 25 в интервале 76—87°С	15
Габаритные размеры, мм: (12)		
длина (13)	6 650	9 720
ширина (14)	3 800	2 360
высота (15)	2 480	2 620
Масса с полным грузом, кг (16)	9 450	14 805

Key:

1. Indicators
2. Tank capacity, liters
3. Speed, km/hr
4. Working
5. Transport with load
6. Greatest spreading width, mm
7. Interval of spreading width, mm
8. Pouring norm, liters/m^2
9. Productivity of gear-type pump, liters/min
10. Asphalt heating rate, degrees/hr
11. Not less than 25 in the range of 76-87°C
12. Overall dimensions, mm
13. Length
14. Width
15. Height
16. Mass with full load, kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.16. D-709 Plant

(1) Показатели	Д-709
Производительность, т/ч (2)	(4) 100
Тип мешалки (3)	Лопастная, двухвальная, непрерывного действия
Мощность электродвигателя, кВт (5)	137
Производительность, т/ч: (6)	
питателей грунта (7)	50—100
дозатора цемента (8)	2—11
» сыпучих добавок (9)	0,5—4,0
насосов для жидких вяжущих и воды (10)	0,1—19
Вместимость бункера-питателя грунта, м³ (11)	2,00
Вместимость бункера-накопителя готовой смеси, м (12)	2,7
Масса установки, т (13)	22,8

Key:

1. Indicators
2. Productivity, t/hr
3. Type of mixer
4. Blade, two-shart, continuous operation
5. Electric motor output, kW
6. Productivity, t/hr
7. Of soil feeders
8. Of cement proportioning device
9. Of bulk additive proportioning device
10. Of liquid binder and water pumps
11. Capacity of soil hopper-feeder, m^3
12. Capacity of finished mixture storage hopper, meters
13. Mass of plant, tons

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.17. Asphalt Spreaders

(1) Показатели	ДС-126	ДС-1 (ДС-1б6Б)	ДС-71	ДС-18 (ДС-69)
Тип (2)	(3) Самоходный на гусеничном ходу			(4) Самоходный
Производительность, т/ч (5)	130	100	150	200
Ширина укладываемой полосы, м (6)	3; 3,5; 3,75	3,03—3,53	3,0; 3,5; 3,75; 4,0	3,03; 3,5; 3,78
Толщина укладываемого слоя, мм (7)	30—200	30—150	20—150	30—150
Вместимость приемного бункера, кг (8)	6 000	4 000—4 500	8 000	10 000
Двигатель: (9)				
модель (10)	Д-37Е-С3	Д-48А	Д-37ЕС1	А-41
мощность, л. с. (11)	50	40	50	90
Скорость передвижения: (12)				
рабочая, м/мин (13)	1,7—7,8	1,6—34 (вперед) 4,5—34 (назад)	1,48—13,07 (вперед)	1,95—17,1
транспортная, км/ч (16)	2 (15)	2	5,09	9,45
Привод рабочих органов и механизма передвижения (17)	(18) Механический			(19) Гидравлический
Габаритные размеры, мм: (20)				
длина (21)	5 100	5 060	5 950	7 090
ширина (22)	3 150	3 150	3 150	3 090
высота (23)	3 000	3 125	2 130	3 655
Масса, кг (24)	12 200	12 000	14 500	17 300

Key:

1. Indicators
2. Type
3. Motorized on caterpillar track
4. Motorized
5. Productivity, t/hr
6. Width of strip to be spread
7. Thickness of layer to be spread, mm
8. Capacity of receiving hopper, kg
9. Motor
10. Model
11. Output, hp
12. Speed
13. Working, meters/min
14. Forward
15. Reverse
16. Transport, km/hr
17. Drive of working members and travel mechanism
18. Mechanical
19. Hydraulic
20. Overall dimensions, mm
21. Length
22. Width
23. Height
24. Mass, kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

8.3. Machines to Install Rigid Pvaement

Table 8.18. Composition of DS-110 Railless Set of Machines

Name of Machine	Index	Designation
Subgrader (Figure 31)	DS-108	For levelling top layer of packed dirt pan and for finishing profile of binder-strengthened dirt bed
Loader-conveyer (Figure 32)	DS-78	For pouring any materials of the bed and the dirt pan in a pile or into transport equipment
Concrete spreader (Figure 33)	DS-109	For receiving concrete mixture and spreading it over the width of the pavement
Reinforcement embedding machine (Figure 34)	DS-102	For embedding reinforcing mesh, first laid on the surface of concrete pavement, to a specific depth
Reinforcement truck		For arrangement of reinforcing mesh on it
Concrete spreader (Figure 35)	DS-111	For final spreading and packing of concrete mixture and finishing the pavement surface
Concrete finishing machine (Figure 36)	DS-104A	For final finishing of the surface of concrete pavement, including levelling the profile of the pavement and imparting the required texture to the concrete surface
Film-forming materials spreader (Figure 37)	DS-105A	For application of transverse roughness and film-forming fluids
Asphalt spreading equipment	DS-106	For reception, spreading along the width and packing of road construction materials with simultaneous finishing of the pavement surface
Trailer (based on MAZ-537 tractor with capacity of 40 tons)	DS-107	For transporting the machines of the set

Table 8.19. Main Parameters of DS-110 Set of Machines

(1) Показатели	(2) Профилировщик ДС-108 с конвейером-перегружателем ДС-78	(3) Распределитель бетона ДС-109	(4) Бетоноукладчик ДС-111	(5) Бетоноотделочная машина ДС-104А	(6) Распределитель пленкообразующих материалов ДС-105А
(7) Производительность, м/смену	(8) Всего комплекта 600—1000 и более				
Мощность дизельного двигателя, л. с.	425	300	400	47	47
(9) Скорость передвижения, м/мин:	(10)				
рабочая (11)	0—18	0—18	0—18	0—67	0—67
транспортная (12)	0—54	0—72	0—54	0—67	0—67
Ширина обработки, м (13)	8,4—9,6	До 8,4	7,5	3,65—7,5	3,65—7,5
(14) Толщина слоя обработки, м (15)	До 0,45	До 0,5	До 0,45	—	—
Колея, м (16)	8,1—6,86	8,1—6,86	8,1—6,86	8,2—9,5	8,2—9,5
Масса, т (17)	36,2	31,8	34	5,2	5,6

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Indicators
2. DS-108 subgrader with DS-78 loader-conveyer
3. DS-109 concrete spreader
4. DS-111 concrete spreading machine
5. DS-104A concrete finishing machine
6. DS-105A film-forming materials spreader
7. Productivity, meters/shirt
8. 600-1,000 or more for complete set
9. Diesel engine output, horsepower
10. Speed, meters/min
11. Working
12. Transport
13. Width of treatment, meters
14. Thickness of treatment layer, meters
15. Up to
16. Track, meters
17. Mass, tons

Figure 31. DS-109 Subgrader: 1--frame-floor grating; 2--frame support arm; 3--caterpillar track fork; 4--caterpillar track; 5--control console; 6--hydraulic steering cylinder; 7--main frame; 8--power plant; 9--guardrails; 10--screw conveyer setting indicator; 11--screw stop of warm conveyer setting; 12--caterpillar track drive; 13--wing; 14--side stop; 15--screw conveyer blade; 16--screw conveyer drive; 17--side cover of screw conveyer; 18--screw conveyer; 19--screw stop of screw conveyer-hoe setting; 20--screw conveyer-hoe blade; 21--screw conveyer-hoe drive; 22--side cover of screw conveyer-hoe; 23--screw conveyer-hoe; 24--rod; 25--scale; 26--pointer; 27--support

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 32. DS-108 Subgrader with DS-78 Loader-Conveyer

Figure 33. DS-109 Concrete Spreader: 1--control console; 2--screw conveyer-hoe setting indicator; 3--receiving hopper of conveyer; 4--frame support arm; 5--caterpillar tracks; 6--conveyer frame; 7--steering control rod; 8--extensible conveyer unit; 9--screw conveyer-hoe drive; 10--main frame; 11--screw stop of blade setting; 12--power plant

Suspended equipment installed on any motorized chassis of a concrete spreading complex (DS-502B, DS-503B or DS-504B) is also used to cut transverse joints in hardened concrete. The suspended equipment is a guide beam with all mechanisms for cutting joints with productivity of 350 meters/shift of joint up to 60 mm deep. The guide beam serves as a track for movement of two carriages on which the cutting disks are installed. The carriages move in such a manner that each of them cuts

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 34. DS-102 Reinforcing Mesh Embedding Machine: 1--working member; 2--body; 3--working member steering wheel; 4--travelling form; 5--wheel; 6--vertical support; 7--thrust beam; 8--brace; 9--stop on frame of working members of concrete spreading machine

the grooves of the joint to half the width of the pavement (from the edge to the axis and from the axis to the edge) with the disks located on it while moving at the same time. The output of the working electric motor is 10 kW and that of the power plant is 27 kW. The mass of the suspended equipment is 2,485 kg and the speed of the machine is 2-2.5 meters/min.

A small motorized single-disk cutter, which is a motorized machine with self-contained internal combustion drive engine (SD-15 two-stroke internal combustion motor with nominal output of 15 horsepower), is also used to cut control joints in hardened concrete. The cutter is moved in the working mode from a motor through a V-belt drive, which also rotates the disk and the centrifugal water pump that feeds the disk water-cooling system.

The cutting depth is regulated by a steering wheel by changing the position of the rear wheels with respect to the drive wheels.

Joint-sealing machines. DS-501 and DS-67 joint filling machines are used to fill the grooves of joints with asphalt-polymer and asphalt-rubber mastics.

The DS-501 filling machine is a boiler with capacity of 50 liters for the mastic in which a heat pipe is installed. Hot gases created by a burner pass through it.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 35. DS-111 Concrete Spreading Machine: a--overall view; b--diagram of working members; 1--water tank; 2--power plant; 3--hydraulic systems tank; 4--fuel tank; 5--tool box; 6--control console; 7--vibrator control unit; 8--working member frame; 9--travelling form (side form); 10--rocker beam setting indicator; 11--deep vibrator drive generator; 12--screw conveyer; 13--screw conveyer blade; 14--deep vibrator chamber; 15--vibrating beam-proportioning device; 16--primary rocker beam; 17--secondary rocker beam; 18--sole plate

All the equipment is mounted on a carriage. A four-blade shaft driven manually is installed in the boiler. There is a thermometer to measure the mastic temperature in the boiler. The grooves are filled with mastic through a special nozzle and the rate of delivery of the mastic is controlled by a tapered needle valve.

The pouring machine is moved by hand during operation.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Figure 36. DS-104A Concrete Finishing Machine

Figure 37. DS-105A Film-Forming Materials Spreader

The DS-67 pouring machine is mounted on a UAZ-452D truck and has a tank with capacity of 330 liters for the mastic. It is equipped with a system for heating the mastic and mixing it and with a compressor for cleaning the joints with compressed air. There is a tank having capacity of 25 liters and one for priming the walls of the joint with capacity of 40 liters to fill the grooves with mastic.

They are moved by hand. The productivity of the pouring machine is approximately 700 running meters of joint per shift.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 8.20. Set of Rail-Travel Machines to Install Concrete Pavement

(1) Показатели	(2) Профилировщики основания		(3) Распределители бетонной смеси		(4) Бетоноотделочные машины		
	ДС-502А (Д-345А)	ДС-502Б (Д-345Б)	ДС-503А (Д-375А)	ДС-503Б (Д-376Б)	ДС-504А (Д-376А)	ДС-504Б (Д-376Б)	ДБОТ-7,5
(5) Производительность, пог. м/смену	250	250	До 250	До 250	250	250	500
Максимальное заглубление рабочих органов от уровня головки (6) рельсформ, мм	300	300	—	—	—	—	—
Двигатель (7)	Д-37Е	Д-37Е	Д-37Е	Д-37Е	Д-37Е	Д-37Е	(8) Электростанция ДЭС-100П
Мощность двигателя, л. с. (9)	40	40	40	40	40	40	
Ширина обрабатываемой полосы, мм: (10)							
односкатного профиля (11)	(12) 3500 и 7000	3750 и 7500	3500 и 7000	3750 и 7500	3500 и 7000	3750 и 7500	7000, 7500
двускатного » (13)	7000	7500	7000	7500	7000	7500	7000, 7500
Скорость передвижения, рабочая, (14) м/мин	0,81	0,81	0,81	0,81	0,81	0,81	0,6
Габаритные размеры, мм: (15)							
длина (16)	3244	3244	7005	7005	4100	4100	8300
ширина (17)	8606	9106	8000	8500	8600	9090	8440
высота (18)	2941	2941	2587	2587	3120	3120	3400
Масса, кг (19)	7128	7235	8900	9060	8900	9060	15 000
Толщина обрабатываемого (20) слоя, см	30	30	—	—	30	30	30
Вместимость бункера, м³ (21)	—	—	1,8	1,8	—	—	—

Note. The ENTs-3 machine (of Mintransstroy) is used to maintain the concrete when using film-forming materials. The characteristics of the machine are: wheeled, nozzle working member moving along a guide frame to the entire spreading width (7-7.5 meters) at a speed of 0.88 m/min, travel speed of the machine of 1.5-20.8 m/min, productivity of 250 m^2/hr and PES-15A generator drive (30 horsepower).

Key:

1. Indicators
2. Subgraders
3. Concrete mix spreaders
4. Concrete finishing machines
5. Productivity, running meters/shift
6. Maximum penetration of working members from level of rail-form head, mm
7. Motor
8. DES-100P electric power station
9. Engine output, horsepower
10. Width of strip to be treated, mm
11. Single-roller profile
12. And
13. Two-roller profile
14. Working speed, m/min
15. Overall dimensions, mm
16. Length
17. Width
18. Height
19. Mass, kg
20. Thickness of layer to be treated, cm
21. Hopper capacity, m^3

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 8.21. Joint-Cutting Machine

(1) Показатели	(2) ДС-112 для нарезки поперечных швов	(3) ДС-115 для нарезки продольных швов в затвердевшем бетоне	ДС-510 (Д-903)	(4) ДНШС-60 для нарезки швов в свежеуложенном бетоне
(5) Количество режущих кругов	4	3	2	—
Тип кругов (6)	(7) Отрезные, алмазные, сегментные			
Диаметр кругов, мм (8)	250 и 320	250 и 320	310 и 350	—
Глубина резания, мм (9)	До 80	До 80	До 60	До 60
Расход воды на круг, л/мин (10)	8—15	8—15	12—16	—
Марка двигателей (11)	Д-37Е-С3	Д-37Е-С3	Д-37М	(13) Электродвигатель
Установленная мощность, (12) л. с.	100	50	40	—
Скорость передвижения, (14) м/мин	До 30	До 30	0,1—1,5	—
Производительность нарезки шва, м/ч (15)	115	13	30—35	До 50
Габаритные размеры, мм: (16)				
длина (17)	7600	3520	2410	8400
ширина (18)	2890	2080	1315	3000
высота (19)	2950	2300	1240	2600
Масса машины, кг (20)	5500	2150	1870	3128

Key:

1. Indicators
2. DS-112 for cutting transverse joints
3. DS-115 for cutting longitudinal joints in hardened concrete
4. DNShS-60 for cutting joints in freshly laid concrete
5. Number of cutting disks
6. Type of disks
7. Segmented diamond cutting
8. Disk diameter, mm
9. Cutting depth, mm
10. Up to
11. Water consumption per disk, liters, min
12. Mark of engines
13. Electric motor
14. Installed capacity, horsepower
15. Travel speed, m/min
16. Joint cutting productivity, m/hr
17. Overall dimensions, mm
18. Length
19. Width
20. Height
21. Mass of machine, kg

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

8.4. Cranes

Table 8.2. Cranes Mounted on a Truck Chassis

(1) Марка крана	(2) Тип привода	(3) Базовое шасси	(4) Грузоподъемность при вылете на основной стреле, т		(7) Вылет стрелы (крюка), м		(8) Наибольшая высота подъема, м, при вылете		(9) Максимальная скорость перемещения крана, км/ч	(10) Длина стрелы номинальная и со вставкой, м	(11) Тип двигателя	(12) Масса, т	(13) Габаритные размеры при номинальной стреле (длина × ширина × высота), мм
			(5) наименьшая	(6) наибольшая	наименьший	наибольший	наименьшая	наибольшая					
К-2,5-1ЭА	Электрический (14)	ГАЗ-51А	2,5	1,2	2,5	5,0	5,5	2,8	50	6,5	ГАЗ-51А	1,13	7500×2490×3300
ЛАЗ-690	Механический (15)	ЗИЛ-130	3,0	1,0	2,5	5,5	6,6	5,0	45	6,2	ЗИЛ-120	8,3	9000×2400×3400
К-45	То же (15)	ГАЗ-53А	4,0	0,75	3,5	6,0	6,8	5,0	75	6,0—10	ГАЗ-53А	7,0	8300×2400×3300
КС-1562	»	ГАЗ-53А	4,0	1,0	3,5	6,0	6,2	3,8	75	6,0—10	ГАЗ-53А	7,8	8130×2400×3300
КС-2561Д	Гидравлический (16)	ЗИЛ-130	6,3	1,9	3,3	7,0	8,0	5,5	75	8,0—12,0	ЗИЛ-120	7,2	10600×2600×3650
К-64		МАЗ-500	6,3	2,0	3,3	6,5	7,7	5,3	40	7,35—11,75	ЯАЗ-236	12,2	10090×2710×3600
К-67, К-68	Электрический	МАЗ-500 МАЗ-200	6,3	1,7—2,0	3,5	7,5	8,0	3,5	40	8,4—12,4	ЯАЗ-236 ЯАЗ-М204А	12 11,5	8200×2800×3350
АК-75В	Механический	ЗИЛ-130	7,5	1,65	2,8	7,0	7,5	5,2	70	7,34—11,84	ЗИЛ-120	8,7	9910×2500×3500
СМК-7	Электрический	МАЗ-200	7,5	2	4	7	8	—	35	8	ЯАЗ-М204А	13,6	—
К-104	То же	МАЗ-505	10	1,6	4	10	10	5	50	10—18	ЯАЗ-236	—	—
МКА-10Г	Гидравлический	МАЗ-200	10	2,2	4	10	10	—	35	—	ЯАЗ-М204А	14	—
КС-3561	То же	МАЗ-500	10	1,4	4	20	18	5	60	10—12—18	ЯАЗ-236	15,4	11000×2800×3800
К-1015	»	МАЗ-500	10	1,6	4	17,6	10,2	7,0	60	10—18	ЯАЗ-236	14,2	13900×2730×3760
К-162	Электрический	КрАЗ-257К	16	2,8	3,9	10	10,5	4,3	30	10—14—18—22	ЯАЗ-238А	22,5	14000×2750×3920

Key:

1. Mark of crane
2. Type of drive
3. Base chassis
4. Load capacity with overhang on main boom, tons
5. Greatest
6. Least
7. Overhang of boom (hook), meters
8. Greatest hoisting height, meters, with overhang
9. Maximum speed of crane, km/hr
10. Nominal length of boom and with insert, meters
11. Type of motor
12. Mass, tons
13. Overall dimensions with nominal boom (length X width X height), mm
14. Electric
15. Mechanical
16. Hydraulic

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

FOR OFFICIAL USE ONLY

Table 8.23. Fully Rotatable Cranes on Caterpillar Track

(1) Марка крана	(2) Тип привода	(3) Грузоподъемность, т		(6) Вылет стрелы (крюка), м		Наибольшая высота подъема, м (9)		(10) Скорость хода, км/ч	(11) Тип двигателя	(12) Мощность, л. с.	(13) Масса, т	(14) Габаритные размеры (длина × ширина × высота), мм
		(4) при наименьшем вылете	(5) при наибольшем вылете	(7) наименьший	(8) наибольший	(4) при наименьшем вылете	(5) при наибольшем вылете					
Э-1258(Б)	(15) Гидромеханический	20	5,5	4	13,1	10,7	3,5 (8,1)	1,53	У2Д6	120	39 (37)	5600×3500×4200
МКГ-25	(16) Механический	25	2	4	21	25	10	1,0	Д-108	108	38,5	5600×3500×4200
ДЭК-25Г	(17) Дизель-электрический	25	2	4,2	22	30	11	0,81	Д-108	108	41,3	5700×3700×4250
К-402	То же (17)	40	1,8	4,3	27	—	—	0,7	У2Д6 (18)(два)	240	64,8	—
Э-2508	(19) Электропневматический	60	1,2	4,4	30	39	2	0,17—1,79	2Д12Б	300	79	7387×4150×6300
СКГ-100	Механический	100	2,8	5,0	34	19,6	—	0,5	(20) Э/двиг.	150	138,3	6300×4650×7600

Key:

1. Mark of crane
2. Type of drive
3. Load capacity, tons
4. With least overhang
5. With greatest overhang
6. Overhang of boom (hook), meters
7. Least
8. Greatest
9. Greatest hoisting height, meters
10. Travel speed, km/hr
11. Type of motor
12. Output, horsepower
13. Mass, tons
14. Overall dimensions (length X width X height), mm
15. Hydromechanical
16. Mechanical
17. Diesel-electric
18. To
19. Electropneumatic
20. Electric motor

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 9. QUALITY CONTROL AND ACCEPTANCE OF AIRFIELD CONSTRUCTION WORK

[Text] 9.1. General Propositions

Organization of the system for control and acceptance of airfield construction work envisions that the following will be carried out:

production control in construction and installation organizations;

inspection control on the part of the customers' engineering inspectorate and the inventors' inspectorate;

special control of state and agency control and inspection organizations and other organizations.

Production (engineering) quality control in construction and installation organizations includes input (preliminary), operational (current) and acceptance control with an evaluation of quality at all phases of work production.

Input control includes a check of the conformity of construction materials, structures, articles and engineering equipment arriving at the construction site to existing standards, specifications, certificates, the requirements of detail plans and also a check of adherence to unloading and storage requirements.

Input control is usually entrusted to the service for production and technological completion of a set (UPTK) and is accomplished at make-up bases or directly at manufacturing enterprises. Materials and articles are tested in required cases in the construction laboratory. The work producers (foremen) are obligated to carry out quality control of structures, materials and articles by external inspection and a check of their conformity to established requirements.

Operational control is exercised during work upon completion of production operations and construction processes for timely determination of defects and the

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

reasons for their occurrence and also timely implementation of measures to correct and prevent them.

Control is exercised by work producers and foremen with recruitment of construction laboratories and the geodetic service while self-control is exercised by the performers of work.

When exercising operational control, conformity of work techniques provided by the work production plan (PPR) and standard process flow charts (TTK) and the conformity of their fulfillment to detail plans and SniP and GOST requirements are checked.

The basis of control should be operational quality control schemes (SOKK) developed within the PPR. SOKK should contain drawings of structures with indication of permissible deviations and the required measurement accuracy, data on the required characteristics of material quality, an indication of the composition, deadlines and methods of control, a list of operations and processes subject to control on the part of the work producer (foremen), including the participation of a construction laboratory and the geodetic service, and a list of hidden jobs subject to certification and intermediate acceptance with compilation of official reports.

The results of operational quality control should be recorded in work logs.

Acceptance control is accomplished to check and evaluate the quality of airfields on which construction has been entirely completed or individual units and components, buildings and structures or parts of them have been completed and also with intermediate accpetance of hidden work and individual crucial structures.

The quality of hidden work is accepted and evaluated by the contractor, usually in the presence of the customer's representative, and more crucial structures are accepted and evaluated with the participation of the representative of the planning organization (author's supervision).

The conformity of work performed to the plan and to detail plans, fulfillment of the requirements of corresponding chapters of the SNiP, the accuracy of adhering to the design dimensions and established tolerances and the correctness of filling out the technical documentation (work logs and so on) are checked during acceptance.

Work quality is accepted and evaluated with respect to the finished components of an airfield and individual buildings and structures by working committees of the customer according to the requirements of SNiP.III-3-76.

The quality of airfield construction (reconstruction) as a whole, an individual unit or starting complex is accepted and evaluated by the State Acceptance Committee according to the requirements of SNiP.III-3-76.

The quality of individual types of work performed, structural components, individual units and starting complexes and also of the airfield as a whole is evaluated according to existing instructions on evaluation of quality SN 378-77.

Complex evaluation of the quality of individual work performed is determined with respect to the facility as a whole by the mean arithmetic indicator K_{sr} by the formula

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

where P_5, P_4 and P_3 are the number of types of work that have received marks of "excellent," "good" and "satisfactory," respectively.

The mean values of index K_{sr} correspond to the following evaluations:

From 4.51 to 5.0 . . . . . mark of "excellent"
From 3.51 to 4.5 . . . . . mark of "good"
From 3.0 to 3.5 . . . . . mark of "satisfactory"

9.2. Quality Control and Acceptance of Preparatory and Excavation Work

Quality control and acceptance of preparatory and excavation work should be carried out according to the requirements of SNiP III-8-76 and instructions SN 121-73 and SNiP III-46-79.

Quality control of preparatory work envisions a check of the correctness of performing the work with respect to development and engineering preparation of the construction territory according to the requirements outlined in Chapter 3. In accomplishing quality control, the following are checked:

the volumes, sequence and timeliness of completing preparatory work and their conformity to the plan;

the correctness of performing survey work;

adherence to technical regulations for producing all types of preparatory work;

the timeliness and correctness of filling out the work log and official reports for concealed work.

Production of the main types of airfield construction work is authorized only after completion and acceptance of preparatory work from an official report. Preparatory work is accepted by inspection of the sections of terrain prepared for production of main work an checking the production-technical documentation (official reports about formulation of earth removal, completion of geodetic survey work and so on).

Quality control of excavation work includes a systematic check of the conformity of work performed to the plan and observation of technical regulations of producing it according to the requirements of Chapter 3. Control is exercised in the phases of performing work with vegetation-laden and mineral soil.

The excavation work plan is drawn to scale prior to the beginning of work and if necessary the levelling grid of squares 40 X 40 meters is restored. When converting the plan to full-scale, layout of the staking and positive points should be performed with an accuracy up to $\pm$ 0.1 meter in cross-section and $\pm$ 1 cm in height.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Data on conversion of the plan to full-scale and subsequent geodetic control of excavation work are entered in a special survey, levelling and angle measurement log. Upon completion of work to convert the plan to full-scale, an official report is compiled on the production of geodetic-mine surveying, which together with all the documentation on geodetic work and control, is presented when the airfield is turned over for operation.

Conformity of the following requirements should be checked in performing work with vegetation-laden soil:

the boundaries of the work production contours and the thickness of the removed and restored layers of vegetation-laden soil should correspond to the planned boundaries;

the vegetation layer subject to removal should be crushed on the site to total thickness and cleaned of stones, remains of roots, pieces of unbroken sod and so on;

vegetation-laden soil may not be mixed with the underlying layers of mineral soil;

during ripping and breakup, during banking and storage in embankments and during restoration of the layer of vegetation-laden soil, it should not be permitted to dry out.

The thickness of the layer of vegetation-laden soil to be restored is checked by saving 5-10 pieces for each 1,000 m^2 of excavation area. Deviation of thickness of the restored layer from the planned thickness should not exceed $\pm$ 10 percent.

Quality control on channel excavation work and construction of fills from mineral soil includes:

preliminary examination of the soil in the channels (drainage canals and quarries) of the soil intended for pouring into fills and checking its conformity to the plan;

checking the quality and density of soils in the surface layers of channels and in the bases of fills and the absence of low-quality soils in them;

operational control of the conformity of the technology of performing the work to the provided work production plan (by standard process flow charts).

Soil samples are taken from holes equal in depth to the planned excavation depth at calculation of one hole for each 5,000 m^3 of soil poured into fills when examining soils in channels. The total number of soil samples taken in channels and also in poured fills is established from calculation of not less than one sample for each 300 m^3 of soil to be excavated or poured into a fill. The type of soil, its optimum moisture content and the maximum packing density are determined from the samples.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The quality of preparation of the bed (with compilation of an official report for concealed work), the quality of poured soils and their conformity to the plan, the conformity of the thickness of the poured layer of soil to the packing capability of the means of mechanization used, the moisture content of the soil during packing, the modes and degree of packing, the planning marks and the evenness of the flying field surface are controlled when constructing fills.

The quality of packing is checked by determining the actual density of the soil, expressed by the density of the soil skeleton with its subsequent comparison to the maximum density during standard packing.

Soil density is determined by the following methods:

by the method of sampling soil with undisturbed structure by means of metal cylindrical soil probes for clay and sandy soils;

by the method of taking samples of soil with disturbed structure from a hole with subsequent filling of it with homogeneous sand for gravel-pebbly, sandy and clay soils with inclusions of coarse fractions.

Soil packing should be controlled during layer-by-layer pouring of fills in each layer to be filled at five points (along the axis, edges and at intervals) for each 2,000 m^2 of area of dirt flying fields and 1,000 m^2 of area of the soil bed under pavement. When filling in trenches, holes and gulleys passing under pavement, not less than one sample is taken for each 50 m^2 of trench or hole or 50 m^2 of gulley.

When making the check, soil samples are taken from a depth of 8-10 cm from the soil surface. The soil density in the sample shouldnot differ from the planned density by more than 4 percent in the direction of a decrease. In this case the number of points with maximum deviation should not exceed 10 percent of the total number of measurements.

Upon final acceptance of work, a hole is dug to the total height of the fill on the fill contour being accepted and three control samples of soil are taken to determine its density in the top, middle and lower parts of the fill. After taking the samples, the hole is filled in with soil and packed to the planned (required) density.

The criterion of the required degree of soil packing is the packing coefficient intended by the plan and expressed in fractions of the maximum soil density with standard packing. If there are no instructions in the plan on the required degree of packing, the value of the least packing coefficient is taken from Table 9.1.

Quality control of grading the surface of the flying field includes establishment of the conformity of height marks to planning data and slopes of the graded surface and also its evenness. The height marks of the soil part of the flying field and of the landing strip is controlled by geodetic levelling at all points of the planned levelling grid. Deviations of the actual marks from the planned marks--macrounevennesses--should not exceed $\pm$ 50 mm.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 9.1. Lowest Values of Soil Packing Coefficient

(1) Разновидность грунта	(2) Коэффициенты уплотнения					
	(3) Цементобетонные, асфальтобетонные и битумоминеральные покрытия		(4) Щебеночные, обработанные битумом, цементогрунтовые покрытия		(7) Грунтовая часть летного поля	(8) Полосы безопасности
	(5) Верхние слои в зоне промерзания	(6) Слои ниже зоны промерзания	Верхние слои в зоне промерзания	Слои ниже зоны промерзания		
(9) Пески, супеси	0,98	0,95	0,95	0,95	0,90	0,85
Суглинки (10)	1,00	0,95	0,98	0,95	0,95	0,85
Глины (11)	1,00	0,98	0,98	0,95	0,95	0,85

Note. The packing coefficients are taken as for the layers below the freezing point for climatic zones IV and V.

Key:
1. Variety of soil
2. Packing coefficients
3. Cement-concrete, asphalt concrete and asphalt-mineral pavement
4. Crushed stone treated with asphalt and cement-soil pavement
5. Upper layers in freezing zone
6. Layers below freezing point
7. Soil part of flying field
8. Safety strips
9. Sands and sandy loams
10. Loams
11. Clays

The evenness of the dirt flying field surface is evaluated by the size of mesounevennesses, characterized by the value of relief breaks on sections up to 40 meters long every 5, 10 and 20 meters and by the value of microunevennesses characterized by the open spaces under a three-meter control rod.

Mesounevennesses are checked by levelling the transverses on defective and doubtful sections every meter. In this case the algebraic difference of contiguous slopes of the mesorelief should not exceed 0.025 with levelling spacing of 5 meters, 0.020 with spacing of 10 meters and 0.015 with spacing of 20 meters.

Microunevennesses are checked with a metal control rod 3 meters long. The permissible unevennesses of the microrelief should not exceed 30 mm.

When preparing the soil bed (trough) for pavement, the following are checked: the position of the axis, the linear dimensions and slopes of the bed and the height markers and microunevennesses of its surface. The width and slopes are checked every 80 meters and deviations from the planned values by more than 1/1,000 in width and by more than 1/2,000 in length are not permitted. Deviations of slopes from those adopted in the plan should not exceed $\pm$ 0.001.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Control levelling of the bed surface is carried out at all points of the planned levelling grid: deviations of the actual marks from the planned marks should not exceed ± 40 mm. Microunevennesses of the soil cover under the pavement are checked by means of a three-meter rod and gaps of not more than 20 mm are permissible.

When constructing frost-protective and drain layers, their thickness, transverse slope, height markers (along the axis), surface evenness and quality of packing are checked every 50 meters along the axis and edges of the pavement. The extent of permissible deviations are ± 5 percent but not more than 20 mm in thickness, +0.002 for slopes and ± 20 mm for height markers. The greatest gap under a three-meter rod in layers under a monolithic pavement is 10 mm and under precast pavement is 5 mm.

Intermediate acceptance of excavation work with compilation of official reports for concealed work is carried out upon completion of the following types of work: surveying, preparation of the dirt bed, packing of the constructed fills, final grading of the dirt bed (cover) under the pavement and installation of cold-protective and drain layers.

9.3. Quality Control and Acceptance of Work to Install Runoff-Drain Systems

When exercising operational quality control and acceptance of work to install runoff-drain systems of airfields, one should be guided by the instructions of existing SNiP III-30-74 and SN 121-73 and also by the operational quality control schemes (charts) (SOKK) worked out by planning and other organizations.

Operational quality control of work performance envisions the checking of the quality of materials, prefabricated structures and parts used, a check of the conformity of technological work production regulations (see Chapter 4), certification and intermediate acceptance of them with reflection of the results of quality control and evaluation in work logs, process flow control charts and official reports for concealed work.

Intermediate certification and acceptance of work with compilation of official reports for concealed work are carried out during the following acceptance phases:

finished sections of trenches for runoff-drain systems;

beds under pipelines, manholes and thalweg pits, storm-water inlets and so on;

finished sections of pipelines, prior to filling in with conducting of preliminary hydraulic tests;

work on back-filling of runoff-drain systems.

When finished sections of trenches are accepted, their linearity is checked (with a theodolite), the conformity of the bottom and slope marks to the planned marks is checked (with a leveller and sighting devices) and the evenness of the bottom is checked (with a three-meter rod).

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Deviations of the bottom marks of trenches from planned marks should not exceed ± 2 cm and deviations of slopes should not be more than ± 0.0005 while conforming to the general direction of the planned slope. The gaps between the control rod and the bottom of the trench should not exceed 1.5 cm.

When accepting open drain ditches, the correctness of making the slopes is also checked (by means of templates) and the quality of strengthening them is checked.

When accepting finished sections of beds for pipes, the value of longitudinal slopes of the bed surface and their conformity to planned values, the thickness of the bed and the evenness of its surface are checked.

Longitudinal slopes are checked at the planned points of breaks along the level, at intermediate points by sighting devices not less than every 2 meters with slopes up to 0.005 and every 3-5 meters with slopes greater than 0.005. Deviations of the slopes of the bed surface from the planned marks should not exceed ± 0.0005.

The thickness of the bed is checked no less than every 10 meters and the permissible deviations from the planned thickness should not exceed ± 5 percent.

The evenness of the bed surface is checked by means of a three-meter rod not less than every 10 meters and also on doubtful sections the permissible gap under the rod is not more than 0.5 cm.

The linearity of pipelines in cross-section and their vertical position, the tightness of the pipes lying on the bed, the quality of finishing and waterproofing of the pipe joints, the walls of pits and abutments of pipes to pits, sealing of joints and the waterproofing of pipelines and pits are checked during acceptance of finished sections of sewage conduits.

The linearity of pipelines in cross-section is checked on sections between adjacent pits by inspection for light using mirrors. In this case deviations from the regular shape of a circle along the horizontal are permitted by not more than one-fourth the pipeline diameter but not more than 50 mm in each direction. Deviation from the regular shape of a circle along the vertical is not permitted. Possible vertical deviations of the position of pipes from the planned position are not more than ± 10 mm and deviations of the marks of covers in manholes from the planned marks should not exceed ± 5 mm.

The tightness of the pipes resting on the bed is checked by selective inspection. The pipes must not rest on pads.

The water impermeability of pipelines and sewage conduit pits is checked by hydraulic tests which should be conducted twice:

preliminary tests before filling in the trench;

final tests after filling in the trench.

The tests are conducted in sections from pit to pit and are carried out by one of the following methods as a function of the conditions of laying the pipelines:

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

by determination of water leakage in dry soils and also in wet soils with location of the groundwater level near the top of the pit at a depth equal to half the depth of pipe placement or greater than it (counting from the cover to the apex);

by determination of water influx in wet soils with location of the groundwater level above half the depth of pipe placement (counting from the cover to the apex).

Wells having internal waterproofing are tested by the first method and wells having waterproofing on the outside are tested by the second method. The tests should be begun no earlier than 24 hours after the pipelines and wells have been filled with water.

Pipelines of asbestos-cement pipes on cylindrical couplings with rubber packing rings are not tested.

During leakage tests, the hydrostatic pressure in the pipeline is created by filling a temporary standpipe with water installed at the upper point of the section to be tested or in the upper pit if it is subject to testing. Pressure is determined by the excess water level in the standpipe or in the pit above the apex of the pipe or above the groundwater level if it is located above the apex. The excess should not be less than the depth of pipe placement (counting up to the pipe apex) and should be maintained at a given level during the entire test.

If the pipe diameter is more than 400 mm and the placement depth is greater than 4 meters, the test pressure should be taken as equal to 4 meters of water column. The permissible decrease of the level in the standpipe or in the pit should not exceed 0.2 meters during the tests.

Preliminary testing of the pipeline and pits is carried out by filling them with water and by external inspection. The pipeline and pits are acknowledged as passing the preliminary test if no visible water leaks are detected upon inspection.

The extent of water leakage during the final testing is determined in the upper pit of the section to be tested by the volume of water added to the standpipe or pit to the level indicated above. The extent of water influx is determined in the lower pit by the volumetric method or by means of a runoff. The length of testing should not be less than 30 minutes.

The section of sewer conduit is recognized as having passed the final test if the specific leakage or influx of water during the test does not exceed the permissible values presented in Table 9.2.

The quality of the soils used for filling, the correctness of performing work on filling and packing (see section 9.2) and the quality of filter materials when laying edge drains and installation of drains with filter filler are checked during back-filling of the edges of runoff-drain systems.

Runoff-drain systems are accepted on the basis of operational control charts, official reports for concealed work, test data and certification of systems in full-scale and includes:

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 9.2. Permissible Leakage or Influx of Water During Testing of Sewer Conduits

(1) Вид трубопровода	(2) Допускаемая величина утечки или притока воды, м³/сут, на 1 км длины трубопровода при диаметре труб, мм									
	150	200	250	300	350	400	450	500	550	600
(3) Из бетонных, железобетонных и асбестоцементных (на цилиндрических муфтах без уплотнительных колец) труб	7	20	24	26	30	32	34	36	38	40

Notes. 1. The permissible leakage or influx of water for pipes more than 600 mm in diameter is determined by the formula

where q is the permissible leakage per kilometer of pipeline, m^3/day and D_0 is the inner diameter of the pipeline, inches.

2. The standard leakage permissible in Table 9.2 is taken with factor of 0.5 for reinforced concrete pipelines with butt joints on rubber rings.

3. The permissible leakage is taken the same as for reinforced concrete pipelines equal to them in cross-sectional area for sewer conduits constructed from precast components and blocks.

4. The permissible leakage (influx) of water through the walls and bottom of the pit per meter of depth is taken as equal to the values presented in Table 9.2, reduced to one meter of pipe length, the diameter of which is equal to the inner diameter of the pit.

Key:
1. Type of pipeline
2. Permissible leakage or influx of water, m^3/day, per kilometer of pipeline with pipe diameter, mm
3. Of concrete, reinforced concrete and asbestos-cement (on cylindrical couplings without sealing rings) pipes.

external inspection of the systems (pits, drain channels and so on);

a check of the linearity of pipelines;

an instrument check of the shoot marks in pits and a check of the absence of standing water in them;

hydraulic tests of systems (if required);

checking and acceptance of technical documentation.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

9.4. Quality Control and Acceptance of Work to Install Beds and Construction of Flexible Pavement

When implementing operational control and acceptance of work to install artificial beds (levelling interlayers) under pavement and flexible pavement, the following are checked: conformity of the bed (pavement) structure and the materials used to the plan, the quality of materials, the width and thickness of the bed (pavement), the conformity of height markers and slopes of the bed (pavement) surface to planned marks, the evenness of the bed surface and the degree of packing.

The sand, sand-gravel mixture and gravel and crushed stone materials used to install beds should correspond to the instructions of the plan and the requirements of existing GOST (see Chapter 2 of this handbook). The quality of the materials is checked by external inspection and from data of laboratory analyses of not less than two samples taken every 1,000 m^3 of materials installed in the bed.

The width and thickness of the bed (pavement) should be checked not less than two times for each 400 m^2 of area.

Height marks and slopes of the bed (pavement) surface are checked by control levelling at the levelling points of transverse sections every 40 meters along the length of beds (pavement) and also at one-two points between transverse sections. The evenness of the bed (pavement) surface is checked with a three-meter metal rod.

The permissible deviations from the parameters indicated above from the planned values should not exceed the values presented in Table 9.3.

Table 9.3. Permissible Deviations in Construction of Flexible Pavement and Evaluation of Work Quality

(1) Контролируемые параметры	(2) Допускаемые отклонения		
	(3) „отлично"	(4) „хорошо"	(5) „удовлетворительно"
(6) Ширина основания (покрытия), см	±5	±8	±10
Толщина слоя основания (покрытия), % (7)	±3	±4, но не более (17)	±5
То же, мм (8)	±10	±15	±20
Толщина выравнивающей прослойки, см (9)	0,3	0,4	0,5
Высотные отметки по оси, см (10)	1	1,5	2
Поперечный уклон (11)	0,001	0,0015	0,002
Наибольший просвет под трехметровой рейкой: (12)			
основания под монолитные покрытия, мм (13)	5	8	10
основания под сборные покрытия, мм (14)	3	4	5
выравнивающие прослойки, мм (15)	1	2	3
основания и покрытия из грунтов и каменных материалов, обработанных вяжущими, мм (16)	3	5	7

[Key on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

[Key continued from preceding page]:

1. Parameters checked
2. Permissible deviations
3. Excellent
4. Good
5. Satisfactory
6. Width of bed (pavement), cm
7. Thickness of bed (pavement), layer, percent
8. Thickness of bed (pavement), layer, mm
9. Thickness of levelling interlayer, cm
10. Height marks along axis, cm
11. Transverse slope
12. Greatest space under three-meter rod
13. Of bed for monolithic pavement, mm
14. Of bed for precast pavement, mm
15. Levelling interlayers, mm
16. Of bed and pavement of soils and stone materials treated with binders, mm
17. But not more than

The degree of packing the beds is checked:

when the sand bed is installed by determining the density (see section 9.2) of the sand at not less than two points every 1,000 m^2 of area. In this case the value of the packing coefficient should not be less than that indicated in the plan (not less than 0.98 if this is not indicated in the plan);

when installing a sand-gravel bed with control passes of a smooth-wheeled roller 8-10 tons in mass and a track more than 0.5 cm deep should not remain on the bed after the roller has passed;

during installation of gravel, crushed stone, slag and sand-cement bed with control passes of a smooth-wheeled roller 10-12 tons in mass. In this case no track should remain on the surface of the bed during movement of the roller and the ridge measuring 40 mm discharged under the wheels of the rollers should be flattened and should not be squeezed into the bed.

The quality control of beds installed during winter is accomplished during production of work and acceptance is accomplished after complete thawing of the layer of bed, elimination of detected defects and deformations and repeat packing.

The quality control of work to install beds and to construct pavement from soils, sand-gravel and crushed stone-sand mixtures and other mineral materials treated with binders should be carried out according to the "Instructions on the Use of Soils Strengthened with Binders to Install Beds and Pavements of Highways and Airfields" (SN 25-74).

When making the check, one must check no less than once per shift the granular composition of the soil and mixtures, the density and moisture content of the prepared dirt bed, the plasticity number and degree of pulverization of clay soils by screening medium samples on screens with mesh size of 5 and 10 mm, the accuracy of

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

proportioning and the uniformity of introducing binder materials, the moisture content of soils to be treated and the finished mixture prior to packing, the degree of packing and the evenness of the surface layer of strengthened soil (mixture) and conformity of maintenance conditions of the bed (pavement) of strengthened soil (mixture).

The granulometric composition and the physicomechanical properties of soils are checked by taking three-four samples for each 200-300 m^3 of treated soil.

Operational quality control of performing all the production processes and operations is accomplished during work production according to SN 25-74.

The degree of packing the soils and also of the gravel-sand and crushed stone-sand mixtures treated with inorganic binders is checked by determining the packing coefficient, expressed by the ratio of the volumetric mass of the soil skeleton (mixture) of cores to the volumetric mass of specimens packed with optimum moisture content by the standard packing method.

The degree of packing of soils, gravel-sand and crushed stone-sand mixtures treated with organic binders is checked by determining the packing coefficient, expressed by the ratio of the volumetric mass of cores to the volumetric mass of specimens of soil (mixture) packed with optimum moisture content and load of 300 kgf/cm^2.

The core samples are selected at the rate of three units for each 100 running meters of pavement (bed).

The packing coefficient of beds and pavement of soils, gravel-sand and crushed stone-sand mixtures treated with binders should not be less than that indicated in the plan, but not less than 0.98.

The movement of construction transportation on the bed or pavement of soil (mixture) treated with asphalt or tar is authorized immediately upon completion of packing and surface treatment provided that traffic is controlled for not less than 10 days.

The movement of transport equipment on the bed or pavement of noncohesive or low-cohesive soils treated with inorganic binders (cement, lime and so on) is authorized no sooner than 14 days and that treated with cohesive soils is authorized no sooner than 7 days after completion of work to install the bed (pavement).

Work to install and pack the dirt bed and work to install the structural layers of pavement (bed) from strengthened soils and mixtures is subject to intermediate acceptance with compilation of official reports for concealed work during operational control.

The width and thickness, height marks, slopes and evenness of pavement (bed) and degree of packing are checked upon acceptance of pavement (beds). The degree of packing is checked by test passes of a smooth-wheeled roller 10-12 tons in mass. A noticeable track should not remain on the pavement (bed) in this case. In doubtful cases the density is checked by core specimens.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The quality control of work is carried out during construction of asphalt concrete pavement in the phases of acceptance and storage of materials, preparation, transportation, placement and packing of the mixture and maintenance of the pavement.

The quality of the mineral material (cleanliness, granulometric composition and so on), the quality of the mineral powder (volumetric mass, porosity, moisture content and hydrophobic nature), the quality of organic binder materials (viscosity, softening point and so on) and adhesion of the binder to the surface of the mineral material are subject to selective control.

The conformity of the composition of the mass to the plan and the accuracy of proportioning the mineral and binder materials (not less than once per shift), the temperature conditions of preparing the mixture in each batch and the temperature of the finished mixture and the quality of the finished mixture (granular composition, homogeneity and so on) are checked during preparation of an asphalt concrete mixture.

The time for transportation and the temperature of the mixture during placement and packing, the quality of preparing the base, the thickness of the installed layers and the quality of making joints, conformity to given conditions and the quality of packing, observation of planning dimensions and also the evenness of the pavement and the quality of the formed layer of pavement are checked during transportation and placement of the asphalt concrete mixture.

The temperature of the asphalt concrete mixture should be checked in each dump truck.

The thickness of the installed layers is checked by the level of setting the sole plate of the asphalt spreading machine.

The degree of packing is checked visually and by core samples on the basis of determining the packing coefficient within 10 days after placement--the ratio of the volumetric mass of the specimen to that of a reformed specimen packed under a standardized load. The value of the packing coefficient should not be less than that indicated in the plan.

The evenness of the pavement surface is checked with a three-meter metal rod or a movable multisupport rod designed by Soyuzdornii.

The width and thickness of the pavement and the conformity of the transverse slope to the planned slope are checked not less than every 100 meters of pavement.

Pavement is accepted and work quality is evaluated upon completion of all work on the basis of external inspection and checking in full-scale the width and thickness of pavement, height markers and slopes of the evenness of pavement surface. Permissible deviations should not exceed the values indicated in Table 9.4.

The quality of asphalt concrete (asphalt and tar-mineral) pavement is evaluated by the following indicators:

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Table 9.4. Permissible Deviations in Acceptance of Pavement

(1) Контролируемые параметры	(2) Допускаемые отклонения
(3) Ширина покрытия	±10 см (8)
Толщина » (4)	±10%, но не более 10 мм
Высотные отметки по оси(5)	±2 см
Поперечный уклон (6)	±0,002
Наибольший просвет под трехметровой рейкой (7)	3 мм

Key:
1. Parameters to be checked
2. Permissible deviations
3. Width of pavement
4. Thickness of pavement
5. Height markers along axis
6. Transverse slope
7. Greatest gap under three-meter rod
8. But not more than 10 mm

"excellent" if no more than 20 percent of the total number of gaps 3 mm in size are found under a three-meter control rod, the pavement surface is uniform, has no cavities, there are no cutouts of poor-quality spots and the edges of the pavement are even and packed;

"good" if the number of gaps of 3 mm is found to be no more than 30 percent of the total number of gaps, there are individual cavities (not more than 2 percent of area) on the pavement surface, there are no cutouts of poor-quality spots and the edges of the pavement are packed but have slight unevennesses;

"satisfactory" if gaps measuring 3 mm are found with no more than 50 percent of the total number of gaps, there are slight cavities (not more than 5 percent of area) and there are other defects not corresponding to the requirements of excellent and good marks.

9.5. Quality Control and Acceptance of Work on Construction of Rigid Pavement

The following are checked when implementing operational quality control of the performance of work to construct monolithic concrete, armored concrete and reinforced concrete pavement with a prepared and adopted artificial bed:

the correctness of installing the rail-forms or master strings;

the quality of installing the separating layer and priming of the walls of the rail-forms and lateral edges of the slabs;

the quality of manufacture, installation and strengthening of reinforcement, components of butt joints and inserts in deformation joints;

the quality of materials and of the finished concrete mixture and conformity to the regulations for its preparation, transportation and placement;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

the degree of packing and stratification of the concrete mixture and the quality of finishing the surface of the pavement and edges of joints;

conformity to the rules of maintaining the concrete and removal of the rail-forms;

the quality of installation and filling of deformation joints with mastic;

the strength of the concrete of control specimens and directly in the pavement.

The correctness of installation and the reliability of attaching the rail-forms are checked by visual inspection and control levelling. Individual unevennesses of the rail-forms in the vertical plane and a difference of the marks of rail-form sections at joints should not exceed 2 mm and deviations in the horizontal plane should not be more than 5 mm from a straight line. Variation of the marks of rail-forms and mutual excesses in the joints after control passes of the subgrader or concrete finishing machine should not be more than 3 mm.

The following are checked during manufacture and installation of reinforcement and components of butt joints: the diameter and number of bars, the quality of connecting the bars, the dimensions of cells and the absence of curvature of the rods, the conformity of the position of reinforcing mesh, frames and components to the planned position and the reliability of attaching them and provision of the required thickness of the protective concrete layer. Deviation of the height position of reinforcement from the planned position should not exceed 1 cm. Before installing the reinforcement, the quality of installing the separating layer is checked: the number of layers of roll materials, the correctness of placing them and the absence of gaps.

Installed reinforcement in components of butt joints and also a prepared separating layer are subject to intermediate acceptance with compilation of an official report for concealed work.

Main quality control of materials and the finished concrete mixture are carried out at the concrete plant. Visual inspection of each machine with concrete mixture is carried out at the placement site to detect visible violations (separation, water separation, drying, the presence of foreign objects and so on). If these violations are discovered, the mixture is rejected and a report is made immediately to the concrete plant.

Moreover, the suitability of the mixture to be placed is determined at the placement location at the beginning of the shift and also during it (in the case of ambient air temperature variation by 5°C) and if necessary a correction is made to the variation of the consistency of the mixture during transportation. The degree of packing of the concrete mixture is controlled by determining its volumetric mass after passage of the concrete finishing machine. The volumetric mass of samples of the concrete mixture taken from the pavement should not differ from that of a mixture packed in a laboratory vibrating bench by more than 2 percent.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The degree of stratification of the concrete mixture is checked immediately after the passage of the concrete finishing machine by measuring the thickness of the dissolved part of the mixture in the surface layer of the pavement, which should not exceed 3 mm.

The degree of packing is determined on samples taken during the first week of operation and on one sample taken the following week, while the degree of stratification every 5 meters at three points is determined on the edges and along the axis of the concreted row.

The evenness of the pavement surface in the longitudinal, transverse and diagonal directions is checked by a metal control rod three meters long. Unevennesses (gaps) under the three-meter rod should not exceed 3 mm.

Control specimens of concrete should be manufactured for compression (three specimens) and tensile bending (three specimens) tests for each 200 m^3 of laid concrete mixture, but not less than once per shift. The results of testing the specimens are entered in a concreting log.

The following should be checked during installation of deformation joints (expansion and compression joints) in the pavement: provision of planned expansion of joints and the conformity of expansion joint spacers with them, the correctness of selecting the method and adherence to regulations for cutting the joints according to the requirements of section 6.7, provision of the planned width and depth of joint cutting, the linearity of joints and the extent of unevennesses between their edges and the quality of filling the joints with sealing mastics.

The following are checked during the phase of maintaining the concrete: the timeliness and correctness of performing operations at all stages of maintaining the concrete, installation of warning signs with indication of the concreting time and periods of maintaining the concrete, adhering to the deadlines for removal of rail-forms and excluding the passage of transport equipment on pavement sections with inadequate strength of the concrete. The quality of applying the film-forming materials on freshly laid concrete is checked once per shift on a section 20 X 20 cm in area. A 10 percent sulphuric acid solution or a 1 percent phenolphthalein solution is applied in a uniform layer to a section carefully flushed with water and wiped with clean rags. The number of detected flawed points should not be more than two per 1 square inch of surface.

The thickness of the pavement should be measured not less than every 100 meters as the rail-forms are removed and the permissible deviations should not exceed $\pm$ 5 percent, but not more than 15 mm. Cavities in the concrete, detected on the edges of slabs, should be filled in with cement-sand mortar in the ratio of 1:3.

Work to construct pavement is accepted on the basis of full-scale certification with taking of the required control measurements and tests and familiarization with the production-technical documentation. The width and thickness of the pavement, the height marks and extent of slopes, the state of the pavement surface (evenness, absence of cracks, cavities, peeling and so on), the quality of making the seams (linearity, finishing and conformity of the edges and filling with mastic) and the strength of the concrete in the pavement are checked during acceptance.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The thickness of the pavement is checked by holes along the lateral edges, by taking cores and if the corresponding equipment is available, by the acoustic method using ultrasonic instruments.

The evenness of the pavement surface is checked by means of a multimarker rod designed by Soyuzdornii or with a three-meter metal rod by measuring the gaps under it at the rate of not less than 100 per 1 kilometer of each row. The permissible size of the greatest gaps is 3 mm.

The strength of the concrete is evaluated from the results of testing control specimens of concrete (cubes and small beams) and cores cut from the pavement at the rate of not fewer than 3 per each 10,000 m^2 of pavement area. If the appropriate equipment is available, strength is tested by nondestructive methods directly in the pavement.

The extent of possible deviations by the parameters indicated above should not be more than indicated in Table 9.5.

Table 9.5. Permissible Deviations from Planned Dimensions of Basic Characteristics of Cement-Concrete and Reinforced Concrete Pavement and Evaluation of Work Quality

(1) Основные параметры и замеры	(2) Допускаемые отклонения		
	(3) „отлично"	(4) „хорошо"	(5) „удовлетворительно"
Ширина покрытия, см (6)	±3	±4	±5
Толщина покрытия, % (7)	±3	±4	±5
	(13) Но не более		
То же, мм (8)	±5	±10	±15
Высотные отметки по оси, см (9)	±1	±1,5	±2
Поперечный уклон, % (10)	±0,001	±0,0015	±0,002
Наибольший просвет под трехметровой рейкой, мм (11)	2	2,5	3
Наибольшее превышение кромок плит в продольных и поперечных стыках, мм (12)	2	2,5	3

Key:
1. Main parameters and measurements
2. Permissible deviations
3. Excellent
4. Good
5. Satisfactory
6. Width of pavement, cm
7. Thickness of pavement, percent
8. Thickness of pavement, mm
9. Height marks along axis, cm
10. Transverse slope, percent
11. Greatest gap under three-meter rod, mm
12. Greatest excess of slab edges in longitudinal and transverse joints, mm
13. But no more than

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Work quality is evaluated during acceptance of pavement by three indicators: No 1--strength of concrete, No 2--quality of joints and No 3--evenness of pavement surface.

The following marks are established by indicator No 1:

"excellent," when the entire 100 percent of tested specimens have strength not below the planned strength;

"good," when compressive strength of 5 percent of the tested specimens is not less than 10 percent of the planned strength. In this case deviations from the planned tensile bending strength are not permitted;

"satisfactory," when the compressive strength is not less than 10 percent of the planned strength in 10 percent of the specimens and the tensile bending strength is not below the planned strength for all tested specimens.

The following marks are given for index No 2:

"excellent," if the joints are made in complete accord with the plan and specifications: the joints are cut to the full depth, their edges are vertical, the edges are linear, the excess of edges is in the permissible range, there are no chipoffs, cavities, cracks and boiling and the joints are carefully filled with mastic. Deviations from linearity by no more than 3 cm in 2 percent of joints in length of the total length of tested joints are permitted in this case;

"good," if the same requirements are observed, but deviations from linearity up to 3 cm in 5 percent of the joints are permitted;

"satisfactory," if deviations from linearity up to 3 cm in 10 percent of the joints are permitted.

The following marks are given tocording to index No 3:

"excellent," if gaps 3 mm in size under the three-meter rod occur no more than in 20 percent of the total number of measurements;

"good," if 3 mm gaps occur in no more than 30 percent of the total number of measurements;

"satisfactory," if 3 mm gaps occur in no more than 50 percent of the total number of measurements.

Individual deviations from the normative gap up to 5 mm at the rate of not more than 5 percent of the total number of measurements are permitted for the marks of "excellent" and "good" and not more than 10 percent for the mark "satisfactory."

Total evaluation of the quality of concrete, armored concrete and reinforced concrete pavement is determined by indicators No 1, 2 and 3.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Pavement that meets the requirements of the plan and the instructions of SN 121-73 receive the marks:

"excellent," when all indicators or two of them have a mark of "excellent" and the third indicator has a mark of "good;"

"good," when all indicators have a mark not below "good;"

"satisfactory," when all indicators have a mark not below "satisfactory."

A mark no higher than "satisfactory" is given if 2 percent of the slabs in the pavement have temperature-shrinkage cracks.

Acceptance of pavement for operation is formulated by a report.

Quality control of work to construct precast reinforced concrete pavement is carried out in the following phases:

acceptance, transportation and storage of slabs;

acceptance, storage and checking the quality of materials used to install the artificial bed and the levelling layer under the pavement, for welding butt cleats and finishing the joints between slabs;

installation of the artificial bed and the levelling layer under the pavement;

placement and vibration placement of slabs;

welding of butt cleats;

finishing the joints between slabs;

acceptance of finished sections of pavement.

The thickness, degree of packing and evenness of the bed and levelling layer are checked during installation and intermediate acceptance (with compilation of reports for concealed work)--the permissible gaps under a three-meter rod should not exceed 5 mm.

The following are checked during placement and vibration placement: the correctness of layout and placement of the marker and subsequent rows of slabs, provision of linearity, the required width of joints and evenness of pavement at joints, observance of the established modes of vibration placement (rolling) of slabs and provision of complete and tight contact of slabs with the bed.

The marker row of slabs should be laid along a guide cord with systematic selective control using a theodolite.

The width of the joints between adjacent slabs should not be greater than 15 mm and the maximum mutual excess of slab edges should not be more than 5 mm in longitudinal joints and not more than 3 mm in transverse joints.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The degree of contact of the slabs and base (the levelling layer) is checked by selective raising of one slab of every 100 slabs, but not less than once per shift, with the contact area being fixed by the visible imprint of the slab on the bed.

A repeat check is made on five slabs in the absence of complete contact of control slabs. A second vibration placement (rolling) of all slabs on the section of pavement being checked is made with negative results of the additional check.

The vibrating placement conditions are established in the presence of a representative of the customers' technical inspection.

Table 9.6. Permissible Deviations in Construction of Precast Reinforced Concrete Pavement and Evaluation of Work Quality

(1) Показатели	(2) Допускаемые отклонения		
	(3) „отлично"	(4) „хорошо"	(5) „удовлетворительно"
(6) Высотные отметки по оси, см	±1	±1,5	±2
(7) Поперечный уклон, %	±0,001	±0,0015	±0,002
(8) Разница в уровнях кромок поперечных швов, мм	1	2	3
(9) Разница в уровнях кромок продольных швов, мм	3	4	5

Key:
1. Indicators
2. Permissible deviations
3. Excellent
4. Good
5. Satisfactory
6. Height marks along axis, cm
7. Transverse slope, percent
8. Difference in levels of edges of transverse joints, mm
9. Difference in levels of edges of longitudinal joints, mm

In welding butt cleats, the quality of preparing them for welding (cleaning of dirt and so on), conformity of the type and mark of electrodes used to the plan and specifications and observation of the established welding conditions are checked.

The quality of weld seams is checked on the basis of visual inspection, measurement oftheir geometric dimensions, tapping with a hammer 1 kg in mass and from the results of control rolling of the pavement with a heavy truck (pneumatic-tire rollers) during two-three passes with subsequent inspection of the seams. The results of control are reflected in the report for concealed work.

The quality of cleaning and priming the lateral edges of the slabs, filling the lower part of joints to two-thirds the thickness of the slabs (except expansion joints) with a cement-sand mixture and the quality of filling the joints with sealing mastic are checked when finishing the joints.

The joints should be filled with mastic without gaps and beads on the slab surface.

Precast reinforced concrete pavement is accepted by analogy with acceptance of monolithic pavement with formulation of an acceptance report.

The extent of permissible deviations in construction of precast reinforced concrete pavement and evaluation of work quality are presented in Table 9.6.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

CHAPTER 10. SAFETY PROCEDURES IN AIRFIELD CONSTRUCTION WORK

[Text] 10.1. General Propositions

Supervision and responsibility for observing the requirements on safety regulations and production sanitation according to section 32 of SNiP III-A.11-70 is entrusted to the engineering and technical personnel of the construction organization.

The construction organization plan and the work production plan should contain specific engineering decisions:

on creation of conditions for safe and harmless work at the construction site, facilities and job sites under ordinary and under winter conditions;

on sanitary-hygienic servicing of workers;

on lighting the construction site, passages, thoroughfares and job sites.

Sanitation-service buildings and devices--locker rooms, washrooms, showers, toilets, drying rooms, first-aid rooms, rooms for dedusting of special clothing, rooms for personal hygiene of females, rooms for warming and resting, snackbars and so on--must be available at the construction site. A dispensary with medicines should be available at each facility.

Easily visible, warning and indicator inscriptions or safety signs lighted after dark, posters and safety instructions should be hung on all construction sections where this is required according to work conditions. Barriers should be erected in necessary cases or watchmen should be appointed.

Organization of job sites should provide safe work conditions. Outside personnel may not visit the job site.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Workers should be supplied with special clothing, special footwear and equipment for individual protection according to the nature of the work performed and the typical norms of free issue of special clothing, special footwear and protective accessories.

There should be drinking water according to existing sanitation norms at the construction site.

Construction machines, mechanisms, equipment, implements, tools and accessories should correspond to the nature of the job being performed and should be in good working order. The movable parts of machines and mechanisms must be enclosed at locations of possible access of people. It is prohibited to leave machines and mechanisms operating while unattended. It is prohibited to permit workers and service personnel not being authorized to service the machine to control construction machines.

It is prohibited to conduct construction-installation work, to store materials and to park machines in the right-of-way of overhead power transmission lines without coordination with the organization operating the lines.

Work in the right-of-way is not authorized without a permit.

It is prohibited from operating excavators, boom cranes, loaders and other construction and road machines directly under the wires of operating overhead power transmission lines of any voltage.

Work and movement of the indicated machines near an overhead power transmission line are possible if the distance from the hoisting or extensible part of the machine through the air and also from the load to be hoisted in any position, including the greatest hoisting or overhang, to the nearest wire under voltage is not less than:

with line voltage up to 1 kV	1.5 meters
with line voltage of 1-20 kV	2 meters
with line voltage of 35-110 kV	4 meters
with line voltage of 150-220 kV	5 meters
with line voltage up to 300 kV	6 meters
with line voltage of 500 kV	9 meters
with line voltage of 800 kV (DC)	-9 meters

The working members of a machine should be in the transport position when passing under a live power transmission line.

Work in the right-of-way of overhead power transmission lines and near an electric power transmission line should be conducted while fulfilling the requirements of the "Safety Regulations in Operation of Overhead Electric Power Transmission Lines with Voltage of 35 kV and Above" of Minenergo [Ministry of Power and Electrification] of the USSR.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

10.2. Safety Regulations in Production of Preparatory and Excavation Work

Safety regulations in preparation and development of territory. The following requirements must be fulfilled when cleaning a section of bushes and small trees:

the site should be cleaned of stones, stumps and trees when operating a brush cutter;

when two brush cutters are operating, each of them should operate on a separate strip, the distance between which is taken as not less than 40 meters;

carefully follow the working order of the enclosure that protects the operator against blows from cut trees;

auxiliary workers removing cut trees should be no closer than 25 meters from the brush cutter.

The following reqirements should be fulfilled when felling trees:

creation of a forbidden zone with radius not less than 50 meters around the perimeter of tree-cutting, enclosed with portable warning signs: "Pedestrians and vehicles prohibited--tree-cutting!";

workers should wear hard hats;

the distance between sections of tree-cutters is not less than 50 meters;

preliminary cutting of limbs from hanging, dry, rotten, crooked or hollow trees and those with broken or hanging crowns;

observance of other safety regulations in tree-cutting work.

The following requirements should be fulfilled when removing stumps:

the working order of the brake drums of the stump-removing machine and the winch of the tractor, the reliability of the cables being attached to the support stump and the stump being removed, the working order and conformity of the cable diameter to the diameters of the stumps being removed and the reliability of attaching the pulley blocks to the stumps;

location of blasters no closer than 50 meters from each other, knowledge and adherence to the location and direction of movement of neighbors and blasters being under cover after ignition of the fuse and detonator. A brigade leader should supervise the work of blasters.

It is prohibited for people to be closer than 15 meters in front of bulldozers or stump pullers when they are used to remove large stones. The reliability of strapping the stones and preventing them from rolling are provided during hoisting, movement and loading into transport equipment. People may not be in a radius of 10 meters of an operating crane.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Safety regulations when conducting excavation work. The main safety regulations which should be fulfilled in excavation work are as follows:

Engineering personnel must inspect all locations daily where collapses, slides and formation of dirt lips are possible at the faces of quarries prior to the beginning of soil excavation in channels. These locations should be enclosed, equipped with warning signs and soil should be dumped without expecting spontaneous collapse of it.

Fulfillment of safety regulations during operation of earth-moving, earth-moving-transport, grading and packing machines should be specially checked during excavation work.

It is categorically prohibited to work on malfunctioning machines and they should have sound signals and light signals when working at night. The traffic paths of machines should be maintained in good condition.

It is forbidden to be located between a towed machine and tractor, to pass under the towing device and to be located on it.

One must be guided by the "Unified Safety Regulations in Conducting Explosive Work" of USSR Gosgortekhnadzor when performing rock and excavation work with explosives.

The following main safety regulations must be fulfilled during operation of individual machines:

a) during operation of bulldozers--no one should be located between the tractor and blade before the engine has completely stopped, the blades should be lowered to the ground during stops, the soil should not be sloped more than 30°, the bulldozer blade should not be moved beyond the lip of a pile when soil is being dumped, the bulldozer should not turn with loaded or submerged blade, work should not be conducted in clay soils during rainy weather, it is prohibited for the bulldozer to back up with lowered blade, heavy parts of the bulldozer should be raised only with functioning jacks and tackle, crowbars and other devices must not be used for these purposes, the speed should not be greater than second gear when a tractor is operating in broken terrain or when crossing a poor road, suspended equipment of a bulldozer can be installed on a tractor and disassembled from it only under the supervision of a brigade leader;

b) during operation of scrapers--do not bring the tracks of the tractor and the wheels of the machine closer than 1 meter to the edge and closer than 0.5 meter to the cut of a channel, do not move soil on slopes steeper than 30° and do not load it when moving backward on the pile, do not work in wet clay soils or during rainy weather, transport the scraper with bucket fixed in the raised position and with the winch switched off, clean the scraper bucket of adhering soil with a scraper or shovel only after the tractor has completely stopped, do not sit on the scraper or stand on its frame, the blade should not cut into the soil, the levers of the control mechanisms must be switched off until the bucket has reached its maximum position when raising or tilting the bucket;

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

c) during operation of excavators--do not begin excavation of soil prior to stable securing of the machine with extensible supports on a level horizontal surface, prohibit the location of people under the boom, bucket or between the excavator and transport equipment and at the face closer than 15 meters from the excavator, prohibit excavation of soil in the presence of overhangs and lips and collapse them with the bucket, transport equipment for loading soil is placed so that the bucket comes up behind or to the side of the truck body and is not moved over the cab, the truck driver should not be in the cab, the excavator should be moved from the edge of a trench not less than 2 meters during an interruption in work and the bucket should be lowered to the ground, the excavator bucket can be cleaned only in the lowered position, the boom must be set strictly in the direction of movement and the bucket must be raised 0.5-0.7 meter above the ground during movement of a single-bucket excavator. An excavator with loaded bucket must not travel, the excavator may move only after measures have been implemented to prevent slipping of the caterpillar tracks during icy conditions, the excavator can ascend and descend with angle of inclination of terrain greater than the established certificate data by using tractors and in the presence of a responsible person, oversize pieces of rock, logs, boards and beams may not be raised and moved with the bucket, it is prohibited to change the boom overhang during operation with the bucket filled, to tow a load with the boom and to work the brakes with the bucket raised, extreme cutting of the blade into the soil is not permitted when an excavator equipped with a straight blade is operating, the excavator should turn to unload and move with an empty bucket only after the bucket has left the ground, the lever must not be moved to the extreme position when excavating heavy soils, the bucket block may not stop against the boom block when lifting the bucket and one should follow the correct winding of cables on the winch drum, significant deviations of the bucket from the direction of projections of the longitudinal axis of the boom, which may occur when the bucket is being dumped in a turn, is not permitted when a dragline is operating;

d) during operation of motorized graders--it is prohibited to work on sections where there are trees, stumps and large stones, speed should be lowest in turns, the distance between the crown of a dirt bed and the outer wheels of the motorized grader or the caterpillar track of a tractor should not be less than 1 meter when levelling soil and two workers should set the sloper and extender, move the blade aside to cut slopes and also to reset the blade;

e) when packing soils--the distance between motorized and towed rollers should not be less than 2 meters, a warning signal should be given when a roller changes direction, a loaded single-axle roller on pneumatic tires may not be uncoupled but it must first be unloaded to do this, workers must not be behind the body and in the body when the roller is being towed, movement of the tractor in reverse is prohibited when rolling with a towed roller, the distance between the brow and the travel parts of a tractor should not be less than 1.5 meter when rolling a high fill and towed rollers on pneumatic tires should be transported on a truck trailer without ballast.

There should be no people in a radius of 5 meters from the tamping plate when packing soil with tamping plates, the excavator or tractor should move along a layer of already packed soil, the excavator should not come closer to the edge of poured

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

fill closer than 3 meters counting from the brow of the fill to the caterpillar track and a tractor with installed tamping plate should not come closer than 0.5 meter.

10.3. Safety Regulations in Construction of Runoff-Drain Systems

The safety regulations outlined in "Safety Regulations in Construction, Repair and Maintenance of Highways," confirmed by the USSR Ministry of Transport Construction and the RSFSR Ministry of Highways, 29 April 1977, and coordinated with the Central Trade-Union Committee of Motor Transport and Highway Workers, when performing work to construct a runoff-drain system.

Special attention should be devoted to providing work safety when cutting trenches, laying pipe in trenches, disassembling the supporting walls of trenches and during backfilling of trenches with soil.

To prevent tailings or slips, the soil removed from the trench or materials placed alongside it should be placed at a distance of not less than 0.5 meter from the lip. To do this, no materials of any kind can be put within the soil collapse triangle of the trench not having wall support.

Systematic checking should be established of the condition of the walls of trenches not having reinforcement. The walls of trenches should be reinforced reliably and without any projections from established regulations or standard plans. The reinforcement is disassembled only in the presence of a work supervisor or foreman.

Special care should be taken when lowering pipe or precast components of structures into the trench or ditch. It is categorically prohibited to suspend loads whose mass exceeds the capacity of the mechanism on a crane.

When lowering pipes, the rings of precast pits or other components, workers installing them in the trench or ditch should be at a safe distance from the load being lowered.

10.4. Safety Regulations When Constructing Beds and Flexible Pavement

The following basic regulations should be observed when constructing beds and pavement from strengthened soils, crushed stone and gravel: one may not be in the body of a dump truck or in a distributing hopper when unloading and spreading stone materials (crushed stone, gravel, sand and so on), cement or limestone, a dump truck loaded with stone materials can back up only if the spreading machine or spreader operator or an auxiliary worker gives a signal, it is forbidden to approach closer than 1 meter to the lip of a fill when a spreading machine or spreader is operating on fills, it is forbidden to clean a hopper during operation of a placer or spreader, it is categorically prohibited to regulate the thickness of the layer being spread or placed and also to regulate the vibrating plate of a crushed stone spreader or to correct or change the belts of vibrators during operation of machines, the density and tightness of hoppers, tanks, hatches and throats and the readiness of pumps, conveyers, communications lines and proportioning devices

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

should be checked on rotary hoes, soil-mixing machines and binding material spreaders prior to the beginning of work, it is forbidden for persons unrelated to the operation of a given machine to be on jobsites and on the frames of all machines, the operator must ascertain the absence of people or different objects in front of machines at a distance of not less than 50 meters prior to beginning the operation of motorized soil-mixing machines and towed mixers, chemical products must be mixed and dissolved in solution assemblies, mechanical and pneumatic devices must be used for loading and unloading and pumps must be used to pump fluids, machines should move so that the operators, drivers and workers are on the windward side as little as possible when spreading loose and liquid products on a strip to be treated and when mixing them with soil, machines travelling to the garage or to parking areas should be completely freed of chemical products at the end of work and their working members should be flushed with a strong stream of water on sites allocated for this, it is prohibited from removing and raising the cover of working members of mixing machines during operation and it is prohibited from replacing the blades on the shafts of mixing machines when the mixing chamber is raised. The chamber should be installed on strong pads.

The possibility of resins falling on the skin of workers should be prevented, workers involved in pouring resins should use safety masks, rubber boots, gloves and aprons and should be upwind, there should be a reserve of solvents (acetone and raw alcohol), clean water, neutral soap, gauze, spare glasses, respirators and breathing masks on the job site, the duration of continuous work on machines when pouring furfurol and aniline should not exceed 4 hours during cold and moderate weather and 2 hours during hot weather and it is forbidden to treat soils with furfurol and aniline when there is no wind during hot weather when strengthening soils with synthetic resin (furfurol-aniline, carbamide and so on).

Liquid materials should be stored in metal tanks with hermetically sealed spouts.

The inscriptions: "Poison" and "Flamable" should be in red on all tanks designed to store toxic and flamable materials.

The following basic requirements should be observed when installing asphalt concrete pavement: it is forbidden to be near the side walls of the hopper when loading the hopper of an asphalt spreader to avoid burns by the hot mixture, one must follow the normal operating conditions of all assemblies of the spreader when spreading the asphalt concrete mixture, one should avoid touching the housing under it when working with a heated screed, the body of the dump truck must be greased prior to loading at the ABZ to facilitate unloading of the asphalt concrete mixture into the hopper of the asphalt spreader, the body of the dump truck cannot be cleaned during unloading, it is authorized to unload a mixture that has become stuck in the body by using special scrapers or a shovel with handle not less than 2 meters long, standing on the ground, workers are prohibited from sliding into the hopper of the asphalt spreader and into a tilted dump truck body and of rocking it if a mixture is difficult to unload, the tools used for asphalt concrete pavement from a hot mixture should be heated in a mobile roaster (on wheels), it is prohibited from heating tools on open fires, it is prohibited of finishing (wiping) porous spots of pavement in front of a moving roller, when several rollers are working in sequence, the distance between them and also between the asphalt spreader and the rollers should not be less than 5 meters, the asphalt spreaders and rollers must be

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

cleaned, inspected, parked in a specially allocated site and braked during prolonged interruptions in work (6 hours or more), asphalt layers should be stopped in the same sequence in which they being work, barriers with red signals should be placed on both sides of the column of machines--flags during the day and lanterns at night, hoses should be reliably connected to the connecting pipe of the road oiler or asphalt hauler during loading and spreading of liquid binder materials, the movement of the road oiler is authorized only upon a signal of the operator or foreman, it is forbidden to be closer than 10 meters from the delivery pipes when pouring asphalt, it is prohibited from igniting and regulating the burner of a road oiler, truck-mounted asphalt hauler or burner of an asphalt spreader while under way and the operator should be at the side of the nozzle during this operation, a tank can be filled only through a filter with low or medium revolutions of the pump, it is prohibited from pouring material into a tank if there is liquid (water or solvent) in it, it is prohibited from liquefying binder material in a tank and to stand under a filled tank, fuel should be initially delivered in a small stream when igniting the burner, gradually increasing the delivery to normal, a burner may be ignited only by means of a starter with a long handle and the burner must be extinguished and the valves of the fuel delivery pipelines must be closed before beginning pouring of the binder material.

10.5. Safety Regulations When Constructing Rigid Pavement

When working with a set of rail-travel concrete spreading machines, one must observe the following requirements: the rail-forms must be hauled on stake-bed trucks or tractor carriages with single-axle trailers--the rail-forms are loaded, unloaded and installed by cranes while observing safety regulations for loading-unloading work (see section 10.6), regulations of the priority of engaging the assemblies of a common transmission and individual units must be observed when starting machines, it is prohibited from moving machines without a signal, the signal for operation of a concrete mixture hopper-spreader is given after the dump truck has departed, the concrete mixture is unloaded from a dump truck into the hopper of the spreader after the handbrake of the truck has been set and an audio signal has been given, it is prohibited from cleaning the walls of the hopper during movement of it or the movement of machines, one must follow the normal operating conditions of mechanisms and not permit people in the operating zone of machines when spreading the mixture and finishing cement-concrete pavement, when concrete spreading and concrete finishing machines are working jointly, the distance between them should not be less than 10 meters, it is forbidden from being between the machines before they stop, it is forbidden to stand on the vibrating beam and the finishing beam during operation of the machines and blocks must be installed on the rail-forms on sections with longitudinal slopes to prevent spontaneous movement of the machines.

The following safety requirements must be observed when installing joints in hardened concrete: the functioning of cutting disks, the presence of water in the tank and the functioning of the delivery system must be checked, each cutting disk is set strictly vertically and one sees that it come into contact with the wall of the joint in the plane during rotation, the groove of the joint is cut only while wearing safety glasses and with the safety housing of the cutting disks in working order, it is prohibited from regulating and moving the machine when cutting joints (with rotating disks) and from working with the disk in an unfixed position.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

The following safety measures should be observed when filling joints using a special machine: the tank boiler should be filled with asphalt mastic to no more than three-fourths its capacity and the temperature of the mastic should not exceed 170°C after heating (to avoid ignition), there should be a box filled with sand on the job site to eliminate possible ignition of the mastic and the mastic is delivered from the base to the job site in closed containers.

Film-forming materials used in maintenance of freshly laid concrete (ethanol varnish, latexes and so on) should be used while observing safety measures in work with noxious and poison substances.

10.6. Safety Regulations at Production Enterprises

General requirements. The territory of the base or plant should have an even surface and slope for runoff of surface waters. Ditches and holes should be covered with strong tight flooring or barriers and two-sided guardrails one meter high are installed at points of human traffic and light signals are placed during darkness.

Walkways not less than 0.8 meter wide with guardrails one meter high should be built at crossings over ditches, trenches and conveyers.

Instructions, posters and warning signs on safety regulations must be hung on machines and mechanisms in all sections of production bases and plants where it is required according to working conditions.

Production bases and plants should be equipped with fire extinguishers.

Basic measures on safety regulations at ABZ.

The functioning of electric motors, fuel, steam or compressed air delivery system in a burner and asphalt lines must be checked prior to starting up an asphalt concrete plant, after which a warning sound signal must be given about starting and, having turned on the electric motor, the operation of the asphalt concrete plant under no load must be checked.

When the asphalt concrete mixer is started up, one must initially switch on the machine, then the screen, the hot elevator, the rotary dryer and the cold elevator. If no malfunctions are detected during idling, one can ignite the burner, having ascertained the absence of fuel in the burner, having first opened the steam or air delivery valve, and then the fuel delivery valve.

If there is no automatic ignition, burners must be ignited with a lighter having a handle not less than 2.5 meters long. One must stand aside of the burner when igniting the nozzle and regulating the fuel combustion intensity. The flame in the burner must be observed through a window in the enclosing screen of the burner. During operation of the mixing plant, one must see that the temperature of heating the mineral material in the rotary drum not exceed 220-230°C, that the steam pressure in the steam generator be in the range of 5-8 kgf/cm^2 and that the temperature of heating the fuel in front of the burner not exceed 70-80°C.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Operation of the rotary dryer is not permitted if an outburst of flame into the atmosphere through the ignition opening or through the slits of any part of the burner or the annular slits between the burner sleeves and walls of the rotary drum is observed.

Inspection and repair of the internal parts of the rotary drum and mixer should be made after they have stopped, cooled down and completely freed of materials.

The mixer must be cleaned of asphalt concrete mixture only after the machine has been stopped and measures to prevent sudden starting of it have been implemented.

During operation of the mixing plant, one must follow the cleanliness of working surfaces, stairs and passages. Places contaminated with asphalt can be sprinkled with sand after cleaning.

The asphalt storage area must be enclosed and covered with a canopy and all hatches of asphalt melting boilers must be tightly closed with safety catches and covers.

Passages not less than 1 meter wide should be located between the throats (hatches) of boilers and also between the throats and enclosures.

Asphalt melting boilers should be loaded with asphalt by pumping previously heated asphalt from storage areas. When heating asphalt in boilers one must load the boiler to three-fourths its volume, increase the fire in the burner gradually to ensure slow melting of the asphalt and part of the asphalt must be pumped to a spare boiler if signs of foaming appear. It is forbidden to pour hot asphalt from boiler to boiler by hand and asphalt in boilers must be mixed with mechanical mixers or by means of a circulating system.

Asphalt is pumped through pipelines only after the functioning and tightness of the flange joints of valves and pumps have been checked. The pumps should be started up with open valves of the asphalt pipelines and heating of the asphalt in them.

To avoid ignition, the valve to a road oiler or other tanks must be opened with special care when pouring hot asphalt from an asphalt melting boiler to the hanging bucket of a proportioning device.

The following requirements must be observed when unloading asphalt from railroad tank cars and gondola hoppers: blocks are placed under the wheels of the rail cars, the working order and tightness of the steam sleeve of the hopper gondola is checked before admitting steam and the hose for delivery of steam to the connecting pipes of the tank cars and the steam sleeve of the hopper is connected with the valve on the steam pipeline closed.

The hopper can be freed of its retainers and tipped over only upon a signal of a responsible person. Only mechanized tipping (with a winch or other equipment) is permissible. There should be no people on the unloading side in the range of a 15-meter zone.

The following safety measures must be observed when heating asphalt in an asphalt storage tank and in boilers with electric heaters: see that the insulation or

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

enclosers of all conducting components of the heating device are in working order, do not permit the coils of the electric heating elements to become exposed (they should be completely submerged into the asphalt), switch on the electric heater and lighting lamps only by starters and knife switches, do not connect and disconnect an electric wire under load, do not use metal objects to measure the asphalt level and to mix it and do not leave the storage tank and boilers with the electric heaters switched on without inspecting them.

The posters "Danger" and "Current on" must be hung on the electric heating sections.

Basic measures on safety regulations at TsBZ. There should be a reliable system of audio of light signalling at the TsBZ that ensures timely stopping of any machine and individual mechanisms. Preparation of the concrete mixture should be stopped if the signalling system is damaged and should be renewed only after elimination of the damage.

The working order of all moving assemblies, units and motors must be checked prior to starting the plant equipment. A warning signal must be given prior to starting.

A signal must be given immediately with sudden stopping of the concrete mixer (or another machine of the production cycle) so that the other machines of the producton complex can be switched off. A plant can be started into operation after such a stop only at the authorization of the shift engineer.

It is prohibited from lubricating, repairing and adjusting machines and equipment during operation of the plant. The inscriptions "Do not switch on--men working" should be hung on the control consoles.

Operation of a plant with open covers of the mixer, removed housings and barriers and also in the case of misalignment or slipping of the conveyer belt is prohibited. Conveyer belts cannot be cleaned by hand while running and cleaning under a conveyer belt and drive rollers is prohibited with the conveyer in operation.

The machines and equipment of a TsBZ should be repaired and inspected only by qualified personnel who know the regulations and instructions for operation of the machines and equipment of the plant and the safety regulations during repair work.

All machines and mechanisms should be in a position that eliminates the possibility of their starting by outside personnel during nonworking hours. Therefore, starters are locked and knife switches are enclosed in locked boxes.

Possible causes of explosion of the steam boiler--insufficient water in the boiler, excess normal pressure in the boiler, formation of crust on the heating surface and the appearance of severe breakdowns (wear of the boiler)--must be eliminated when operating steam power plants.

There should be no fewer than two safety valves that eliminate an increase of pressure above normal on a steam boiler.

To eliminate the danger of an explosion during operation a compressor, one must provide normal operation of the intermediate compressor cooling system, delivery of

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

uncontaminated air to the compressor, timely and correct lubrication of the compressor cylinders with lubricating oils of the corresonding quality and grade depending on the air pressure, major cleaning of the compressor not less than once every two months and the correct operating mode of the air collecting tank and one must also warn of the possibility of an extreme increase of pressure in the system.

Fire hydrants, fire extinguishers, sand boxes, water tanks and so on should be installed on the territory of the TsBZ.

BIBLIOGRAPHY

Tsikkerman, L. YA., M. A. Berliner, A. M. Vas'kovskiy et al, "Avtomatizatsiya proizvodstvennykh protsessov v dorozhnom stroitel'stve" [Automation of Production Processes in Highway Construction], Moscow, Transport, 1972.

Antonov, A. M., V. A. Bochin and Ye. V. Kalechits, "Organizatsiya i planirovaniye dorozhnogo stroitel'stva" [Organization and Planning of Highway Construction], Moscow, Transport, 1968.

Vasil'yev, A. A. and N. V. Martynov, "Mashiny dlya postroyki i soderzhaniya avtomobil'nykh dorog" [Machines for Construction and Maintenance of Highways], Moscow, Mashinostroyeniye, 1973.

Glushkov, G. I. and B. S. Rayev-Bogoslovskiy, "Izyskaniya i proyektirovaniye aerodromov" [Surveys and Design of Airfields], Moscow, Transport, 1972.

Glybin, V. S., "Tekhnologiya dorozhnogo tsementobetona" [Technology of Highway Cement-Concrete], Moscow, Vysshaya shkola, 1972.

Dashevskiy, E. M. and B. I. Demin, "Stroitel'stvo aerodromov" [Airfield Construction], Moscow, Transport, 1972.

"Highway Construction Materials," TRUDY GIPRODORNII, No 9, 1974.

Vasil'yev, A. A., I. A. Vasil'yev, B. N. Prussak and M. M. Urusov, "Dorozhno-stroitel'nyye mashiny. Spravochnik" [Highway Construction Machines, A Handbook], Moscow, Mashinostroyeniye, 1977.

"Zakrepleniye i uplotneniye gruntov v stroitel'stve. Materialy VIII vsesoyuznogo soveshchaniya" [Strengthening and Packing of Soils in Construction. Proceedings of the Eighth All-Union Conference], Kiev, Budivel'nik, 1974.

"Izyskaniye i proyektirovaniye aerodromov. Spravochnik" [Survey and Design of Airfields, A Handbook], edited by G. I. Glushkov and D. A. Mogilevskiy, Moscow, Transport, 1979.

"Instruktsiya po opredeleniyu ekonomicheskoy effektivnosti kapital'nykh vlozheniy v stroitel'stve" [Instructions to Determine the Economic Effectiveness of Capital Investments in Construction], SN 423-71, Moscow, Stroyizdat, 1972.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

"Instruktsiya po razrabotke proyektov organizatsii stroitel'stva i proyektov proizvodstva rabot" [Instructions on Developing Plans for Organization of Construction and Work Production Plans], SN 47-74, Moscow, Stroyizdat, 1976.

"Instruktsiya po ustroystvu pokrytiy i osnovaniy iz shchebenochniykh, graviynykh i peschanykh materialov, obrabotannykh organicheskimi vyazhushchimi" [Instructions on Installation of Pavement and Beds from Crushed Stone, Gravel and Sand Materials Treated with Organic Binders], VSN 123-77, Mintransstroy, Moscow, Transport, 1978.

Maryshev, B. S., A. K. Petrushin and A. M. Sheynin, "Skorostnoye stroitel'stvo dorozhnykh odezhd s tsementobetonnym pokrytiyem" [High-Speed Construction of Road Surfaces with Cement-Concrete Pavement], Moscow, Transport, 1978.

Pinus, E. R., S. V. Konovalov and A. M. Rodin, "Stroitel'stvo tsementnobetonnykh pokrytiy avtomobil'nykh dorog" [Construction of Cement-Concrete Highway Pavement], Moscow, Vysshaya shkola, 1975.

Polosin-Nikitin, S. M., "Osnovy tekhnologii dorozhnykh rabot" [Fundamentals of Highway Technology], Moscow, Transport, 1972.

Rayev-Bogoslovskiy, B. S., A. N. Zashchepin, B. I. Demin et al, "Predvaritel'no napryazhennyye pokrytiya aerodromov i dorog" [Prestressed Airfield and Highway Pavement], Moscow, Transport, 1972.

"Rukovodstvo po proizvodstvu zemlyanykh rabot skreperami" [Handbook on Excavation Work with Scrapers], Moscow, Stroyizdat, 1976.

"Rukovodstvo po razrabotke tipovykh tekhnologicheskikh kart v stroitel'stve" [Handbook on Working Out Standard Process Flow Charts in Construction], Moscow, Stroyizdat, 1976.

"Rukovodstvo po sovershenstvovaniyu organizatsii i provedeniya kontrolya kachestva pri proizvodstve stroitel'no-montazhnykh rabot" [Handbook on Improving the Organization and Conducting of Quality Control in Construction and Installation Work], Moscow, Stroyizdat, 1977.

"Rukovodstvo po statisticheskim metodam kontrolya i otsenki prochnosti betona s uchetom yego odnorodnosti po GOST 18102-72" [Handbook on Statistical Methods of Control and Estimation of the Strength of Concrete with Regard to Its Homogeneity According to GOST 18102-72], Moscow, Stroyizdat, 1974.

"Rukovodstvo po stroitel'stvu dorozhnykh asfal'tobetonnykh pokrytiy" [Handbook on Construction of Asphalt Concrete Highway Pavement], Moscow, Transport, 1978.

Sviridov, N. V., "Povysheniye dolgovechnosti tsementobetonnykh aerodromnykh pokrytiy" [Increasing the Life of Cement-Concrete Airfield Pavement], Moscow, Transport, 1979.

SNiP II-47-80, "Aerodromy. Normy proyektirovaniya" [Airfields. Planning Norms], Moscow, Stroyizdat, 1980.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

SNiP III-40-78, "Avtomobil'nyye dorogi. Pravila proizvodstva i priyemki rabot" [Highways. Regulations for Production and Acceptance of Work], Moscow, Stroyizdat, 1979.

SNiP III-46-80, "Aerodromy. Pravila proizvodstva i priyemki rabot" [Airfields. Regulations for Production and Acceptance of Work], Moscow, Stroyizdat, 1980.

SNiP III-15-76, "Betonnyye i zhelezobetonnyye konstruktsii. Pravila proizvodstva i priyemki rabot" [Concrete and Reinforced Concrete Structures. Regulations for Production and Acceptance of Work], Moscow, Stroyizdat, 1977.

"Spravochnik inzhenera-dorozhnika. Stroitel'stvo avtomobil'nykh dorog" [Handbook for the Highway Engineer. Highway Construction], edited by V. A. Bochin, Moscow, Transport, 1969.

"Spravochnik po dorozhno-stroitel'nym materialam" [Handbook on Highway Construction Materials], edited by N. V. Gorelyshev, Moscow, Transport, 1972.

Degtyarev, A. P., A. V. Kurtinov, V. F. Leshchilovskiy et al, "Spravochnik po obshchestroitel'nym rabotam. Zemlyanyye raboty" [Handbook on General Construction Work. Excavation Work], Moscow, Stroyizdat, 1975.

Goretskiy, L. I., V. I. Barzdo and S. M. Polosin-Nikitin, "Stroitel'stvo aerodromov" [Airfield Construction], Moscow, Transport, 1968.

"Tekhnicheskiye ukazaniya po ustroystvu osnovaniy dorozhnykh odezhd iz kamennykh materialov, ne ukreplennykh i ukreplennykh neorganicheskimi vyazhushchimi" [Specifications for Installation of Road Surface Beds of Stone Materials, Unstrengthened and Strengthened with Inorganic Binders], VSN 184-75, Mintransstroy, Moscow, Transport, 1976.

"Tekhnologicheskiye karty. Ustroystvo tsementobetonnykh i zhelezobetonnykh aerodromnykh pokrytiy" [Process Flow Charts. Installation of Cement-Concrete and Reinforced Concrete Airfield Pavement], Moscow, Orgtransstroy, 1976.

"Ukazaniya po primeneniyu v dorozhnom i aerodromnom stroitel'stve gruntov, ukreplennykh vyazhushchimi materialami" [Instructions on the Use of Soils Strengthened with Binder Materials in Highway and Airfield Construction], SN 25-74, Moscow, Stroyizdat, 1975.

"Ukazaniya po proyektirovaniyu aerodromnykh pokrytiy" [Instructions on Design of Airfield Pavement], SN 120-70, Moscow, Stroyizdat, 1970.

"Ukazaniya po proizvodstvu i priyemke aerodromno-stroitel'nykh rabot" [Instructions on Production and Acceptance of Airfield Construction Work], SN 121-73, Moscow, Stroyizdat, 1973.

Shestoperov, S. V., "Dorozhno-stroitel'nyye materialy" [Highway Construction Materials], Vol 1, Moscow, Vysshaya shkola, 1976.

Shestoperov, S. V., "Dorozhno-stroitel'nyye materialy" [Highway Construction Materials], Vol 2, Moscow, Vysshaya shkola, 1976.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

SUBJECT INDEX

[Original pagination]

A

Motorized graders 85, 89, 202
Motorized road oilers 206
Automation of construction and installation processes 7
Mineral power units 184
Crushed stone and sand drying and heating units 183
Agrotechnical operations 90-93
Reinforcement storage area 197
Asphalt concrete plants 179-188
--safety regulations 237, 238
Asphalt concrete pavement:
quality control of work during construction 226
materials 37-58
hauling the mixture 121-122
preparation and installation of bed 118, 123-125
acceptance of work 226, 227
placing the mixture 118, 119
packing the mixture 119, 120
Asphalt concrete mixtures:
granular composition 41
marks 37-40
materials 37, 41, 57, 58
types 37
Asphalt concretes:
from hot and warm mixtures 37-39
from cold mixtures 37, 40
marks 37-40
dents 37-41
porous 37-47
types 37-40
Asphalt mixing plants 180, 186
Asphalt spreading machine 207
Airfield 3

B

Organic binder bases 178, 179
DS-110 railless set of machines 207, 208
High-strength concrete 61-65
--highway 59-61
Concrete mixture 59-65, 227, 228
Concrete finishing machine 211
Concrete mixers 192-194
Concrete spreading machine 210, 211
Asphalt tank 186
Asphalt pastes for strengthening soils 26, 27
--emulsions 26, 58

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Asphalt melting units 185
Asphalt storage areas 179
Asphalts:
for asphalt concrete 37, 41 51, 56-58
--for strengthened soils 25, 26
highway 56-58
Brigade contract 15
Brigades:
in construction 15
for assembly of pavement from metal plates 129, 130
complex for installation of asphalt concrete pavement 122
complex for installation of crushed stone bed 144
for levelling dirt bed 141
for installation of armored concrete pavement 155
for installation of soil-cement bed 147
for installation of pavement of strengthened soils 113
Bulldozer-ripper units 190
Bulldozers 75, 200

C

Additives for strengthening soils 24
Moisture content:
of stone materials 116
of strengthened soils 20, 114, 115
of packed soils 86
Water for concrete mixture 62
Water saturation:
of asphalt concrete 46, 47
of soil strengthened with binder materials 20, 21
Water runoff ditches 98
Water intakes 99
Water-cement ratio 59
Air-attracting additives 60
Selection of means of mechanization 7
High-strength concrete 61-65
Channels:
excavation with bulldozers 73
excavation with grader-elevators 79, 80
excavation with scrapers 73-75
excavation with sxcavators 75-79
requirements 71
Binder materials:
for asphalt concrete 37, 41, 51, 56-58
for concrete 60, 61 64
for strengthening soils 19, 22-26
for strengthened mixtures of stone materials 34, 36, 37, 57, 58

D

Thiokol sealing agents 66, 67
Argillaceous soils 18, 19

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Clays 19
Gravel 30
--for asphalt concrete 41
--for concrete 61, 62
--keramzit 33
Grader-elevators 202
Towed graders 89
Soil-mixing machines 204, 205
Soils:
clay 18, 19
large-fragment 17
nonrocky 17
sandy 17, 18
rocky 17

E

Deformation joints:
filling 168-170
quality control during installation 228
cutting 160-168
Directive documents for airfield construction 6
Dispatcher service 15
Storm-water collecting pits 100
Crushed stone and sand proportioning-feed device 183
Permissible deviations from planned dimensions of pavement 224, 226, 229, 231
Highway concrete 59-61
Drain-runoff system:
quality control during installation 221-223
acceptance of work 221-223
construction 105, 106
diagrams 102, 103
safety regulations during construction 234, 235
components of system 97-102
Deep drains 100
--edge 100

F

Rigid pavement:
monolithic 132-172
precast 172-178
quality control during construction 227-230
acceptance of work 228-231
safety regulations during construction 236, 237
Stiffness of concrete mixture 63
Work logs 15, 16

G

Pouring devices 214
Setting retardants 63, 64

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Excavation work:
during winter season 95
in sandy deserts 93, 95
construction of fills 80-88, 93
quality control 218-221
in salinized soils 94, 95
in loess-like soils 95
levelling operations 89, 90
acceptance 220, 221
excavation of channels 71-80
safety regulations 233, 234
Granular composition:
of asphalt concrete mixtures 37, 41-45
of gravel 30, 33
of soils 17
of fillers for concrete mixtures 61, 62, 64
of stone material for strengthened mixtures 36
of mineral powders 55
of sand 31, 32, 61
of slag rubble 32
of crushed stone from gravel 29
of natural crushed stone 27, 28
Ashes for binders 34, 37
--waste for strengthening soils 25

H

Lime for strengthening soils 25
Industrialization of construction 6, 7

I

Stone materials:
gravel 30
keramzit gravel 33
sand 30-32
crushed stone 27-30, 32, 33
Rollers 203, 204
Sewage conduits 99
Pits:
storm-drain 100, 104, 105
precast 102
manholes 100, 104
thalweg 99
Complex mechanization of construction 6-8
Quality control:
input 217
operational 217
acceptance 217
production 217
engineering 217

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Quality control of work:
of excavation work 218-220
in construction of rigid pavement 227-230
in construction of flexible pavement 225-227
in installation of drain-runoff system 221-223
in installation of beds 224, 225
of preparatory work 218
Labor cooperation in construction 15
Master cords 133-137
Stump removers 199
Coefficients:
of water-resistance of asphalt concrete 46, 47
of specimens of mineral powder and asphalt mixture 55
utilization of intrashift time 8
--of calendar time 8
of cold resistance of soil strengthened with binders 20, 21
soil inhomogeneity 18
of sand porosity 18
prefabrication 7
of packing asphalt concrete pavement 120
of packing soil 220, 225
of packing layer of asphalt concrete mixture 120
Cranes mounted on truck chassis 215
----on caterpillar tracks 216
Brush cutters 119

J

Dirt chutes
--open

K

Marks:
of asphalt concrete 37-40
of concrete in strength 59, 62
of asphalt 41, 51, 57-59
of binder based on slags 36
of gravel by crushability in cylinder 30
of sand 32
of strengthened mixture in cold resistance 33, 35
-- -- -- of strength 33, 34
of cement 61, 64
of crushed stone in crushability 30
-- -- wear 28
-- -- wearability 30
-- -- cold resistance 29, 32
-- -- strength 28
Polymer-asphalt mastics 65, 66
Material and technical resources 14
Material and technical supply 13, 14

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Materials:
asphalt concrete and asphalt concrete mixtures 37-57
concrete mixtures 58-65
asphalts 57, 58
gravel 30
soils 17-26
sand 30-32
polymer-asphalt mastics 65, 66
rubber-asphalt binders 65
mixtures of stone materials treated with inorganic binders 33-37
thiokol sealers 66, 67
crushed stone 27-30, 32, 33
asphalt emulsions 58
Machines for cutting joints 214
Metal sectional-removable pavement:
designation 125
installation 126-131
characteristics 125, 126
Methods of manufacturing concrete and reinforced concrete articles 196, 197
Mechanization of construction and installation work 7
Machinery equipment supply 7, 8
Mineral powders 41, 55, 187, 188
Strength modulus of sand 30
Monolithic pavement:
quality control of work during construction 227, 228
general data 132, 133
acceptance of work 228-230
construction in negative temperatures 170, 171
installation of master cord and rail-forms 133-139
installation of deformation joints 160-170
--of bed 139-151
maintenance of concrete 158-160
shaping of pavement 151-158
Cold resistance:
of concrete 59, 62
of soils strengthened with binder materials 20, 22
of coarse filler for concrete 59
of strengthened mixture of stone materials 34, 35
of crushed stone 29, 32

L

Swelling:
of asphalt concrete 46, 74
of soils strengthened with binders 21
of specimens from mineral powder and asphalt mixture 55
Catch drains 99
Fills:
construction with motorized graders 84, 85
--with bulldozers 85
--under special conditions 93-95

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

--with scrapers 82-83
selection of drive machines 80-82
quality control of work during construction 219
filling by transverse method 80
--by longitudinal method 80
Scientific organization of labor 15
Flexible pavement:
asphalt concrete 118-125
of strengthened soils 107-115
--of crushed stone treated with organic binders 115-118
quality control during construction 225-227
metal 125-131
acceptance of work 226, 227
safety regulations during construction 235, 236
Normative documents on airfield construction 6

M

Operational planning 15
--control 15
Organizational and engineering preparation of construction 10, 11
Organization of labor 15
Beds:
soil 139-141
soil-cement 145-147
of strengthened soils 107-115
--of metallurgical slag 123-125
--of crushed stone materials treated with organic binders 115-118
sand-cement 147-150
safety regulations 235
crushed stone 142-145
Basic construction funds 11
Drying additives 115
Dryers 98
Evaluation of work quality 218

N

Overpasses 101
Supermoistened soil 115
Construction periods 10
Sands 17, 18
Sand:
for asphalt concrete 41
--concrete 61, 64
--strengthened mixtures of stone materials 34
crushed 32
natural 30-32
Levelling operations 89, 90, 139-141, 220
Plasticizing additives 60, 63, 64
Reinforced concrete slabs 133, 134, 173-176

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

--metal 125, 126
Soil density 86
Reinforcement embedder 210
Surfactants 60
Mobility of concrete mixture 60
Preparatory work 67-70, 218, 232, 233
Contract method of work production 5
Indicator of specific asphalt content 55
--of consistency of clay soil 19
Proving grounds and shops for manufacture of concrete and reinforced concrete articles 196-198
Polymer-asphalt mastics 65, 866
Sowing grasses 93
Continuous method of organizing work 12, 13
Need for machines, equipment and implements:
when constructing fills with bulldozers 84
-- -- -- with scrapers 83
--filling joints 170
--cutting joints 163-166, 169
--redeployment of rail-forms 139
--levelling soil bed 143
--assembly of pavement from metal plates 131
--laying asphalt concrete mixtures 122, 123
--installation of master cord 137
--installation of armored concrete pavement 156, 158
-- -- soil-cement bed 148
-- -- sand-cement bed 150
-- -- pavement and beds of strengthened soils 113, 114
-- -- precast pavement from reinforced concrete slabs 177
-- -- crushed stone bed 145
Ultimate strength
of asphalt concrete 46, 47
of concrete 59, 62
of rock 62
of soils strengthened with binders 20, 21
Acceptance of work:
of excavation 220, 221
for installation of drain-runoff system 221-223
-- -- of rigid pavement 228-231
-- -- of flexible pavement 226, 227
-- -- of beds 26
of preparatory 218
Principles of organizing airfield construction 5
Duration of airfield construction 11, 12
Construction organization plan 5, 6, 8, 9
--excavation work 95-97
-- -- work 5, 6, 8-10
Planning of construction and work production organization 8-10
Steaming 197, 198
Steaming chambers 198

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Impregnation during installation of pavement and beds 115, 116
Subgraders 207-209

O

Spreaders:
of concrete mixture 209
of film-forming materials 212
of construction materials 205, 206
cement 205
Consumption:
of binder for surface treatment when laying asphalt concrete mixture 118
--of strengthened mixture of stone materials 34
-- -- of strengthened soils 19
of steam to heat asphalt 178
of cement 63
of metallurgical slag 124
Rubber-asphalt binders 65
Rail-forms 137-139, 227
Rail-travel machines for installation of concrete pavement 213

P

Prefabrication of construction 6, 7
Prefabricated structures 6, 7
--of pavement from reinforced concrete slabs:
finishing joints 176
quality control of work 230, 231
acceptance of work 230
unloading and storage of slabs 173
placing of slabs 175
Network planning and management 16
Cement storage areas 191-193
Scrapers 76, 201
Caking of asphalt concrete 47
Replaceable equipment of excavator 77
Mixing units of asphalt concrete plants 184
On-site mixing during installation of pavement and beds 116-118
Manholes 100
Collectors 98
Stages of construction flow 12
Loams 19
Sandy loams 19

Q

Thalweg pits 99
Temperature of asphalt concrete mixtures 48, 119, 187
--concrete heating 117, 186
--metallurgical slag 123, 124

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Safety regulations:
at asphalt concrete plant 237, 238
--cement-concrete plant 238, 239
general data 231, 232
during excavation work 233, 234
--preparatory work 232, 222
--construction of drain-runoff system 234, 235
-- -- of rigid pavement 236, 237
-- -- of flexible pavement 235, 236
-- -- of beds 235
Engineering and economic indicators:
of cutting joints 162, 163, 165, 166
of levelling soil bed 142
of installation and removal of rail-forms 139
of installation of armored concrete pavement 154
--of sand-cement bed 150
--of crushed stone bed 144
Process flows heets:
of asphalt mixer 180
for installation of asphalt concrete pavement 121, 122
--of bed with subgrader 145, 146
--of sand-cement bed 147, 149
Production equipment for manufacture of asphalt concrete mixtures 181-186
Thiokol sealers 65-67
Grass mixtures 93
Runoff collector pipes 101
Laboriousness of performing work:
in cutting seams 163-165, 168
--levelling soil bed 141, 142
--installation and removal of rail-forms 139
--of master cord 135
--installation of armored concrete pavement 155
-- -- soil-cement bed 148
-- -- sand-cement bed 150
-- -- pavement of strengthened soils 109-112
-- -- precast pavement of reinforced concrete slabs 177

R

Placement of asphalt concrete mixture 118, 119
--of metal slabs 127, 128
--of precast reinforced concrete slabs 175, 176
Strengthening of soils:
selection of binders 19, 22-25
materials 19, 25-27
construction of pavement and beds 107-115
requirements on strengthened soils 19-25
physicomechanical properties of strengthened soils 19-21
Strengthened mixtures of stone materials 33-37
Packing:
of asphalt concrete mixtures 1119, 120

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

of concrete mixtures 152, 157
of soil 86-88, 219, 220
of beds 140, 143, 146
of strengthened soil mixtures 109, 114
of metallurgical slag 125
of crushed stone materials treated with organic binders 116-118
Level of mechanization 7, 8
Acceleration of concrete hardening 197
D-709 installation 206
Maintenance of hardening concrete 158-160, 228

S

Shaping monolithic pavement 151-158
Shaping concrete and reinforced concrete articles 197
Cutting soil 140
Hoes 204, 205

T

Cement-concrete plants 188-195
--safety regulations 238, 239
Cements:
for concrete 60, 61, 64
--strengthened soils 25
--strengthened mixtures of stone materials 34

U

Partial mechanization 7
Black stone 123-125
Plasticity number of clay soil 18, 19

V

Slags:
for binder 34, 36, 37
-- crushed stone 32
Joints in precast pavement of reinforced concrete slabs 176, 178, 230
--deformation 160-170

W

Crushed stone:
for asphalt concrete 41, 53-55
--concrete 61, 62, 64
--strengthened mixtures of stone materials 34
from gravel 29, 30
--natural stone 27-29
slag 32, 33

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3

Crushed stone pavement and beds:
construction by impregnation method 115-117
-- -- on-site mixing 116-118
Alkaline materials 26

X

Excavators 77
Emulsifiers 26
Asphalt emulsions 58
Power available per worker 8

COPYRIGHT: Izdatel'stvo "Transport", 1980

6521

CSO: 8344/0266

- END -

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500030055-3