



**APPROVED**

by Order of the Chief Executive Officer  
of Ilim Group JSC  
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**STANDARD OF ILIM GROUP JSC**

**ORGANIZATION OF SAFE EXCAVATION WORKS**

Saint Petersburg  
2019

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## 1. TERMS AND DEFINITIONS

1.1 The following terms, definitions, and abbreviations are accepted in this Standard:

- **OPERATIONS CERTIFICATE**— a written permit for the performance of works issued to a contractor to perform works at a separate production site or territory of the Company, as well as in a building or structure located outside the existing subdivisions of the organization allocated in the prescribed manner to perform works at (in) them by the contractor. The operations certificate includes safety requirements and shall be signed by authorized representatives of both legal entities.
- **EXCAVATION WORKS**—works related to excavation and/or placement of soil, violation of artificial or soil coating of the territory, including those carried out for laying, restructuring, repairing underground utilities, wells drilling, soil samples obtaining, vertical planning of soil, piles driving and sinking when erecting facilities and structures of any kind.
- **PERMIT TO WORK**—a written order for the safe performance of hazardous works executed on a special letterhead and determining the scope, place of work, time of its commencement and completion, conditions for safe performance, and composition of the crew.
- **FACILITY**— a building, structure, vehicle, technological installations, equipment, technical device, production area of structural subdivisions, products, and other movable and immovable property and tangible assets of the Company.
- **CONTRACTOR**—an organization that carries out works or provides services (repair, construction and installation, transport, etc.) at the facilities of the Company (branches) and pursuing the purposes of the Company (branches).
- **RECONSTRUCTION AND IMPROVEMENT WORKS**—works carried out to reconstruct the soil layer, artificial coatings of land plots, green spaces, road equipment, and other facilities damaged in the course of excavation works.
- **PERMIT TO EXCAVATION WORKS**—a document issued by the administration of the Company (branch) granting the right to perform excavation, drilling and other works in the course of construction or repair of buildings and structures, underground services, and utilities.
- **EXCAVATION WORKS SUPERVISOR**— a person who directly supervises the production of excavation works.
- **SUBCONTRACTOR**— an organization engaged by a contractor to perform works at the facilities and for the purposes of the Customer.
- **LRD**—Local Regulation.
- **CMP**—Construction Management Plan.
- **MS**—Method Statement.

## 2. SCOPE OF APPLICATION

- 2.1. This Standard has been developed with the purpose of organizing the safe excavation works in the territory of Ilim Group JSC (hereinafter, **the Company, the Customer**), as well as outside the territory of the Company, but for the purposes of the Customer.
- 2.2. Excavation works shall be carried out in compliance with the applicable rules of the Russian Federation (GOST, SNiP, operating instructions, occupational health and safety rules, etc.), as well as this Standard.
- 2.3. This Standard is binding for all subdivisions of the Company and contractors regardless of ownership and departmental affiliation, participating in the following activities related to the excavation works:
  - design, construction, modernization, reconstruction, re-equipment, operation and repair of industrial-purpose facilities (buildings and structures of all kinds, underground and aboveground services and utilities);
  - organization of excavation works and development of documents regulating the excavation works;
  - control and supervision of excavation works;
  - excavation works.
- 2.4. When drawing up terms of reference which includes works (services) specified in Clause 2.3, the employee drawing up the terms of reference is obliged to provide for a requirement on the need to reconstruct and improve of the land plot (if necessary).
- 2.5. This Standard is included in the list of documents provided to the counterparty (by reviewing on the Company's website) before concluding a contract on the activities related to excavation works.
- 2.6. When issuing an operations certificate, a permit to work, a permit to excavation works, an employee issuing such documents must provide for a requirement to ensure the safety of works, the integrity of underground and aboveground services, utilities and structures, and other infrastructure facilities and foundations located within or near the area of works.
- 2.7. On the basis of this Standard, the branches of the Company shall develop their own LRs regulating the organization of safe excavation works and describing safe methods of excavation works, taking into account local conditions and the specifics of activity and not contradicting this Standard.
- 2.1. This Standard is recommended for use by subsidiaries and affiliates of the Company. Application of the requirements established by this Standard in subsidiaries and affiliates shall be reached by approval and enforcement of the relevant local regulations by the authorized governing bodies of subsidiaries and affiliates.

### 3. ORGANIZATION OF EXCAVATION WORKS

- 3.1. Workers involved in the design, organization of excavation works, performance of excavation works, monitoring, and supervising the excavation works shall be trained and tested in health and safety knowledge.
- 3.2. Workers admitted to excavation works shall not have contraindications based on the results of a medical examination and shall use personal protective equipment.
- 3.3. When performing excavation works:
  - Permit to excavation works—in case of a depth of soil removal or drilling of 0.3 m or more.
  - Permit to work—in case of excavation works with a depth of soil removal or drilling from 0.3 m or more; closer than 1 m from any kinds of utilities, foundations of buildings, and structures; close to protective zones of utilities and structures; as well as if they relate to hazardous works, regardless of the depth of soil removal or drilling.
- 3.4. When transferring the territory to a contractor under an operations certificate, a permit to excavation works in the transferred territory shall be executed and issued to the contractor that has received the operations certificate, and all excavation works in the transferred territory shall be coordinated with the representative(s) of the owner(s) of the territory and utilities (structures). Without coordination of excavation works with the representative(s) of the owner(s) of the territory and utilities (structures), it is forbidden to commence the works.
- 3.5. When issuing an operations certificate, the employee issuing it must provide for the requirement specified in Clause 3.4.
- 3.6. Permit to excavation works shall be executed in three copies. The permit shall be accompanied by an approved plan (layout, drawing) issued by the responsible employee of the branch, showing all utilities, cablings, and structures. At the place of excavation works, there must be agreed upon and approved copies (originals) of the permits to work and permits to excavation works accompanied by a plan (layout or drawing).
- 3.7. By issuing their own LRs, the branches of the Company shall determine the positions of employees having the right to issue permits to excavation works in accordance with the duties assigned to them.
- 3.8. When performing excavation works in the areas specified in Clause 3.10 hereof, provided that the pipelines and networks, underground utilities and structures located in the territory of the Company are owned by the Company, the excavation works supervisor shall coordinate such works with the subdivisions of the Company that operate and maintain these facilities.
- 3.9. When performing excavation works outside the territory of the Company, the excavation works supervisor shall coordinate the performance of such works with the owner of the territory.
- 3.10. When performing excavation works in the areas specified in Clause 3.10 hereof, provided that the pipelines and networks, underground utilities and structures located in the territory of the Company are owned by a third party organization, the excavation works supervisor shall coordinate such works with the owner (owner's representative) of the said pipelines and networks, underground utilities and structures, as well as subdivisions of the Company that operate and maintain these facilities.
- 3.11. The employee responsible for issuing a permit to excavation works shall specify therein the names of the subdivisions with which the works shall be coordinated depending on the protective zones of utilities and structures that are within or near the excavation works area (in the protective zone and along its borders, along the right-of-way).

Such utilities and structures are:

  - Steam and hot water networks (pipelines)
  - Water supply and water disposal networks (pipelines) (including external fire fighting main)
  - Gas networks (pipelines)

- Other networks (pipelines)
  - Electric power networks up to and above 1,000 V and electric grid facilities located within the protective zones
  - Land plots provided for the placement of an electric power generation facility
  - Low power networks and communication networks, including control and power cables of fire fighting systems
  - Railway and crane tracks (including those along the border of the right-of-way)
  - Fire separation distances between buildings and structures, access paths for fire and rescue equipment to water sources and buildings and structures
  - Motorways and walkways (including those along the border of the right-of-way)
  - Foundations of buildings and structures
  - Water protection zone
- 3.12. By issuing their own LRs, the branches of the Company shall determine the positions of employees having the right to coordinate permits to excavation works in accordance with the duties assigned to them.
- 3.13. All permits to excavation works are subject to mandatory approval by the fire safety and emergency service of the branch, the service of the chief ecologist of the branch.
- 3.14. After coordination of the excavation works with the persons responsible for the operation of underground utilities, the permit shall be registered in the supervisory department.
- 3.15. If the excavation works are performed near underground utilities and structures, the structural subdivision owning the network, the territory shall issue a permit to work and specify the coordinating subdivisions.
- 3.16. In close proximity to underground utilities, excavation works shall only be performed under supervision of the works superintendent or supervisor, and in the protective area of operational utilities—under supervision of representatives of subdivisions operating these structures.
- 3.17. In case of excavation works in three meters or less from the outer edge of the outermost rail head of the railway track situated in the territory of the branch, approval shall be obtained from the head of the railway workshop of Fintrans GL LLC, whereas the permit to excavation works (Clause
- 17) shall specify supplementary safety precautions for performers of the works and for rolling stock service of Fintrans GL LLC railway workshop. Works without this approval shall be forbidden.
- 3.18. When performing excavation works closer than 3 m from the edge of the motorway, the structural subdivision performing these works (contractor) shall coordinate the possibility of performing such works with the master builder, HSE and industrial safety director, head of the Fire Safety and Emergency Service of the branch, head of the subdivision responsible for the organization of traffic safety.
- 3.19. A permit for excavation works shall be issued for a period not exceeding one month. If excavation works are performed for more than one month and/or the length of the trench is more than 500 m, the excavation works shall be divided into stages. Permit in this case shall be issued for each stage of excavation.
- 3.20. In case of transfer of obligations for the excavation works to another contractor, as well as if it is necessary to change the conditions for the excavation, a new permit shall be issued to replace the previously issued one. If timing of the excavation has been changed, the changes shall be introduced to the issued permit.
- 3.21. The structural subdivision (contractor) planning the excavation shall provide at least five business days prior notification of the intention to start the excavation to the owner(s) of the territory, as well as the services responsible for the operation of the underground structures and utilities.

- 3.22. In case of an accident, excavation works can be carried out without coordination and approval of layouts, subject to notification of the time and place of works provided to the dispatch service, chief power engineer service, health and safety service, industrial safety service, fire safety, and emergency service.

#### **4. SAFETY REQUIREMENTS FOR THE EXCAVATION WORKS**

- 4.1. When performing excavation works, it is necessary to provide for measures to prevent exposure of workers to the following hazardous and harmful production factors, as well as their sources:
- collapsing and eroded soils;
  - falling items;
  - moving vehicles and their working attachments, as well as items they handle;
  - location of the workplace near the height difference of 1.3 m or more at a distance closer than 2 m from the height difference edge in the absence of protective barriers or if height of protective barriers is less than 1.1 m;
  - high voltage in power grid which can form a circuit with human body;
  - chemical hazards and harmful production factors (methyl mercaptan, CO<sub>2</sub>, etc.), workplace air pollution with gas.
- 4.2. In presence of occupational hazards and harmful factors specified in Clause 4.1., and in case of installation of new utilities or overhaul of existing utilities, excavation works safety shall be ensured through implementation of the following safe working practices solutions contained in the process management documentation (CMP, MS, etc.):
- determining safe gradient of unshored slopes of foundation ditches, trenches (hereinafter excavations) taking into account the load from vehicles and soil;
  - determining types and structures of fastening of the pits and trenches walls, places and technology of their installation, as well as the place of installation of stairs for descent and ascent of employees;
  - selection of machines for soil excavation and places of their installation;
  - additional measures for control and stabilization of slopes due to seasonal changes;
  - determining installation places and types of pit and trench fencing, and stairs for descent of employees to the place of works;
  - methods for determining the workplace air pollution with gas.
- 4.3. Before starting excavation works near existing underground utilities, it is necessary to perform preliminary test drilling or diagnostic study (with a cable avoidance tool or other similar device) of the work area.
- 4.4. The soil excavation in the immediate vicinity of the existing underground utilities is allowed only with the help of shovels, without impact drivers and earthmoving equipment (except for ripping of pavement).  
The use of earthmoving machinery at the intersection of the excavations with existing utilities not protected against mechanical damage is permitted by agreement with the organization owning the utilities or subdivisions of the Company operating and maintaining these utilities.
- 4.5. The use of earthmoving equipment and impact drivers for excavation works in winter and on frozen soil is allowed upon agreement with organizations owning the utilities and/or subdivisions of the Company operating and maintaining these utilities. In this case, permit to work shall provide for additional measures to protect the utilities and prevent their damage.
- 4.6. If during excavation works, electrical cables, pipelines and other underground utilities, structures not marked on the plans (layouts) are discovered, as well as if they are damaged, if explosive materials and devices are found, it is necessary to immediately stop works and report the incident to the dispatch service. The resumption of works is possible only after obtaining permission from a representative of the structural subdivision operating the discovered utilities (owner) or from an authorized body (if explosive materials are detected).
- 4.7. When manually digging narrow recesses in which hazardous gas-air mixtures can be formed (trenches, pits, and other narrow recesses):
- workers in the recess must use a safety harness with safety ropes attached to them. At least two workers shall remain on the surface ready in case of danger to immediately

evacuate and assist workers in the pit. The presence on the surface of two safeguarding workers is also mandatory when using tripods with winches or similar devices.

- it is required to be guided by safety rules when working in confined spaces.

- 4.8. In case of detection of gas in recesses, works shall be immediately stopped and workers shall be evacuated from the hazardous area. This situation shall be immediately reported to the works supervisor and the dispatcher of the branch.
- 4.9. When using earth machines for soil excavation, employees are forbidden to stay or work in the area of operation of the excavator in less than 10 m distance from its bucket. Cleaning of the bucket from adhering soil shall only be performed when the bucket is lowered.
- 4.10. It is forbidden to use construction equipment, machinery, and tools for unintended purposes.
- 4.11. Soil loading in dump trucks shall be performed from the rear or side board. During loading and unloading of vehicles using excavators and hoists, the presence of workers in the body of vehicle, as well as in the hazard area of a possible materials fall is forbidden.
- 4.12. Dump trucks, any equipment for unloading at berms and filling of excavations shall be positioned in a distance of at least 1 m from the slope edge.
- 4.13. Removal of wall shoring in excavations, foundation ditches, and trenches shall be performed in direction from bottom to top in the process of trench or ditch filling with soil.
- 4.14. During winter, excavation of soil, excluding dry sandy soil, can be performed with vertical walls without shoring at the entire depth of frost penetration. Below frost penetration level, shoring must be performed. Excavation of dry sandy soils regardless of their freezing shall be performed with slopes or shoring.
- 4.15. Ditches and trenches started in conditions of frozen soil with or without shoring shall be shored or additionally stabilized if temperature rises above zero.
- 4.16. In case of mechanical loosening of frozen soils (with wedge or ball hammer), employees shall stay away from the loosening site in a safe distance of at least 20 m.
- 4.17. In case of arrangement of workplaces in the excavations, workplace size must be sufficient for arrangement of installations, equipment, mountings, and passageways at and to the workplaces with inner width in the clear at least 0.6 m, and sufficient space for workplaces at the work site.
- 4.18. Excavations in places of potential traffic of vehicles or people shall be fenced with protective barriers in line with the applicable requirements. The fencing shall be fitted with warning notices and overnight signal lighting.
- 4.19. At crossings over trenches, pits, and dikes, crossing bridges at least 1 m wide shall be installed, with at least 1.1 m high railings at both sides, 0.15 m high flanging and additional limiting plate at 0.5 m from the flooring.
- 4.20. For access to workplaces, it is necessary to install in the recesses ladders or flight stairs fenced on both sides with a railing not less than 1.1 m high, with 0.15 m height flanging and with an additional guard rail at a height of 0.5 m from the flooring or ladders.
- 4.21. When performing excavation works, it is forbidden to use wooden stairs.
- 4.22. Stairs and other scaffoldings shall be made according to standard designs and registered by the organization in inventory.
- 4.23. It is forbidden to use non-inventory stairs, ladders, gangways, and any scaffoldings.
- 4.24. The manufacturer's documentation describing the characteristics of the product shall be available for inventory stairs and other scaffoldings, as well as working drawings of the product; materials, and manufacturing methods; completeness of the product; product acceptance requirements; safe operation requirements; labeling, packaging, storage, and transportation requirements; permissible loads; necessary monitoring procedures and their types (methods); references to technical conditions or GOST in accordance with which the product was manufactured.
- 4.25. For descending and ascending of workers into pits and wide trenches (with widths of 2 m or more), step-ladders, flight stairs, gangways of at least 0.6 m wide, with railings at height of at least 1.1 m, and flanging to a height of 0.15 m shall be installed with an additional guard rail at a height of 0.5 m from the flooring; and for descending and ascending of workers into narrow trenches, ladders shall be used.
- 4.26. The angle of inclination of the gangway (ramp or walkway) for descending (ascending) of workers or equipment moving shall not exceed 15.
- 4.27. Ladders shall not be used in any recesses, pits, or trenches in which there is an opportunity



to use step-ladders, flight stairs, and gangways. Only if there is no technical feasibility to use step-ladders, flight stairs, and gangways, it is allowed to use ladders.

- 4.28. When using stairs and gangways, the possibility of their spontaneous shift or displacement shall be excluded. If such a possibility exists, step-ladders and gangways must be firmly fixed to stable structures.
- 4.29. Before the use, stairs and step-ladders shall be inspected by the responsible contractor (without a record in the scaffolds acceptance and inspection log).
- 4.30. It is forbidden to descend workers into trenches and pits and ascend them therefrom using the slopes shoring braces.
- 4.31. Works with the use of scaffoldings shall be carried out in accordance with the applicable Health and Safety Rules when working at heights.
- 4.32. If the employee is not protected against falling and if it is impossible to use protective barriers and devices during the construction at height of more than 1.3 m and at a distance of less than 2 m from the edge of the height difference, the work shall be carried out in accordance with the requirements of the Health and Safety Rules when Working at Heights, using appropriate safety systems for working at heights and issuing a permit to work.
- 4.33. When working with the step ladder at the height of more than 1.8 m, it is necessary to use a safety system fastened to the construction structure or to the ladder (if it is fastened to a building or other construction).
- 4.34. Hazard areas located below the place of works performed at heights must be identified, labeled, and fenced in accordance with the Health and Safety Rules when working at heights.
- 4.35. During works, a supervisor or brigade leader shall continuously inspect the state of ditch slopes and take necessary measures to prevent spontaneous soil collapsing.
- 4.36. To exclude soil erosion, landslides, and collapse of walls of the excavations in excavation work sites, ensure drainage of surface and ground water in advance. The work site should be cleared of stones, trees, and construction debris.
- 4.37. Works requiring presence of employees in excavations with vertical unshored walls in sandy, silty-clayed, and thawed soils above the level of ground waters and in absence of underground installations in the vicinity of the works are allowed at maximum depth, m:
  - 1.0—in non-packed filled and natural sandy soils;
  - 1.25—in sandy loam;
  - 1.5—in clay loam and clay.
- 4.38. At an average daily air temperature below 2°C, the maximum depth of vertical walls of excavations in frozen soils, excluding loosely frozen soils, can be increased vs. the depth specified in 4.37 by the depth of frost penetration, but not more than up to 2 m.
- 4.39. Works requiring presence of employees in excavations with unshored slopes in filled, sandy, and silty-clayed soils above the level of ground waters (taking capillary elevation into account) or soils drained through artificial water drawdown are allowed at the excavation depth and slope gradient specified in Appendix 2.
- 4.40. Slope gradients in excavations more than 5 m deep at all times and less than 5 m deep for hydrological conditions and types of soils not specified in 4.39, as well as for slopes exposed to wetness, shall be specified in the plan.
- 4.41. Shoring of vertical walls of excavations up to 3 m deep in natural humidity soils shall be performed on the basis of standard plans. At a greater depth, and for complicated hydrogeological conditions, wall shoring shall be made on the basis of an individual plan.
- 4.42. In the process of installation of wall shoring in soil excavations, adhere to the following requirements:
  - upper part of the shoring must be at least 0.15 m higher than the excavation edge;
  - shoring shall be installed from top to bottom in the process of excavation, to a depth of maximum 0.5 m;
  - shoring posts shall be installed at least each 1.5 m;
  - shoring braces shall be placed vertically at maximum distance of 1 m from one another; ends of braces (from top and bottom) shall be fitted with fixing lugs.
- 4.43. Prior to granting employee access to excavations more than 1.3 m deep, a designated competent person shall check the condition of slopes and reliability of the excavation walls shoring. Boulders, stones, and soil fractures discovered in the slopes shall be removed.
- 4.44. Access of employees to excavations with moistened slopes shall be allowed only after a

thorough inspection by the person responsible for safety of works. In this case, the condition of soil of the slopes shall be checked, and the collapse of unstable soil shall be prevented in places in case of detection of “canopies” or cracks (delamination).

- 4.45. Excavations made during winter should be inspected at thaw period. Measures for stabilization of slopes and shoring shall be taken based on the findings of the inspection.
- 4.46. Excavation works using rotary and trench excavators in cohesive soils (clay loam and clay) in excavations with vertical walls without shoring are only allowed at a maximum depth of 3 m. In sites where presence of employees is required, shoring or sloping should be performed.
- 4.47. In case of soil excavation using bucket hoisting, protection canopies shall be installed to ensure safety of people working in the excavation.
- 4.48. Excavation works shall be performed by a brigade consisting of at least three persons.

## 5. SUPERVISION OF COMPLIANCE WITH THE REQUIREMENTS OF THE STANDARD

- 5.1 Supervision of compliance with the requirements of the Standard shall be entrusted to the HSE and Fire Safety Directorate, which shall be performed by inspections of the activities of the Company’s branches.
- 5.2 The inspections specified in Clause 5.1 hereof shall be performed according to the checklist (Appendix 3).
- 5.3 Liability for the implementation of the requirements of the Standard shall be borne by the managers of investment projects and the heads of structural subdivisions whose area of responsibility includes the organization and management of excavation works.

## APPENDIX 1

### Form of Permit to Excavation Works

PERMIT TO EXCAVATION WORKS NO. \_\_\_\_\_

- 1. Issued to works manager
  
- 2. Name of the organization (structural subdivision) performing excavation works: \_\_\_\_\_
  
- 3. Location and description of excavation works
  
  
- 4. Documents provided (by the organization performing excavation works in the vicinity of cable networks and other underground utilities):  
Method Statement (specifications) approved by \_\_\_\_\_
  
- Approval date \_\_\_\_\_, 20...
- Copied layouts from plot plan approved by \_\_\_\_\_
  
- 5. Excavation works zone

6. Excavation works conditions (within safe area or in direct proximity to the underground utilities)

7. Special notes (actions) to ensure security of cable networks and other underground utilities:

8. Description and No. of underground utilities in the place of excavation

9. It is allowed to work (in presence of a representative, observer of the organization operating cable networks and other underground utilities)

10. Excavation works start date \_\_\_\_\_

11. Excavation works end date \_\_\_\_\_

12. The permit is valid  
from “ \_\_\_\_\_ ” \_\_\_\_\_ 20... to “ \_\_\_\_\_ ” \_\_\_\_\_ 20...

Full name and position of the employee issuing the permit

Date “ \_\_\_\_\_ ” \_\_\_\_\_ 20\_\_\_\_\_

13. Permit to perform excavation works in the zone of railway tracks, cable networks, and other underground utilities

Item No.	Works superintendent is familiarized with work conditions at the site. Security perimeter is marked, works are PERMITTED:			Conditions of safe excavation works and preservation of underground utilities are READ AND UNDERSTOOD:		
	Structural division	Position and full name Telephone number	Signature and date	Position, Full name Telephone number	Signature	Date
1	Subdivision No. 1					

2	Subdivision No. 2					
3	Subdivision No. 3					
4						

14. Works under this permit have been suspended at ... hours ... minutes on “ \_ ” \_\_\_\_\_ 20\_\_\_\_ due to unfulfilled requirements:

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_

Observer (full name) \_\_\_\_\_ Signature \_\_\_\_\_

15. I grant permission to continue the excavation works under this permit. Nonconformities have been eliminated.

Time \_\_\_\_\_ hour \_\_\_\_\_ min “ \_\_\_\_\_ ” \_\_\_\_\_ 20 ....

Observer (full name) \_\_\_\_\_ Signature \_\_\_\_\_

16. Copied extracts from plot plan (layouts):

17. Work management plan (to be filled out by the works manager)

## APPENDIX 2

### Tables for determining the slope steepness and the excavation depth

Soil characteristics	Excavation depth, m					
	up to 1.5		from 1.5 to 3		from 3.0 to 5.0	
	angle between the direction of the slope and the horizontal, deg.	ratio of the height of the slope to its base	angle between the direction of the slope and the horizontal, deg.	ratio of the height of the slope to its base	angle between the direction of the slope and the horizontal, deg.	ratio of the height of the slope to its base
Fill-up, natural moisture content	76	1:0.25	45	1:1	38	1:1.25
Sandy and gravel wet, but not saturated	63	1:0.5	45	1:1	45	1:1
Clay, natural moisture content						

Sand loam	76	1:0.25	56	1:0.67	50	1:0.85
Clay loam	90	1:0	63	1:0.5	53	1:0.75
Clay	90	1:0	76	1:0.25	63	1:0.5
loess dry	90	1:0	63	1:0.5	63	1:0.5

**Notes:**

1. In case of stratification of various types of soil, slope gradient is selected by the type of soil least resistant to slope failure.
2. Nonpacked filled soils are soils which have been filled maximum two years ago (for sands); maximum five years ago (for silty-clayed soils).

**Permissible depth of pits and trenches with vertical walls without slopes**

Soil characteristics	Depth, m
Sand and gravelly	max 1.0
Sand loams	max 1.25
Clay loams, clays, and loess dry soils	max 1.5
Particularly stiff requiring the use of crowbars, picks, and wedges for excavation	max 2.0