On approval of the Rules for the operation, maintenance and repair of artificial structures

Unofficial translation

Order of the Minister of Industry and Infrastructure Development of the Republic of Kazakhstan No. 477 as of July 3, 2019. Registered with the Ministry of Justice of the Republic of Kazakhstan on July 5, 2019, No. 18984.

Unofficial translation

In accordance with subparagraph 34-38) of paragraph 2 of Article 14 of the Law of the Republic of Kazakhstan "On Railway Transport" as of December 8, 2001, I hereby ORDER:

1. To approve the appended Rules for the operation, maintenance and repair of artificial structures.

2. In accordance with the procedure established by the legislation, the Transport Committee of the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan shall:

1) ensure state registration of this order with the Ministry of Justice of the Republic of Kazakhstan;

2) within ten calendar days of the state registration of this order, send it in Kazakh and Russian to the Republican State Enterprise with the Right of Economic Management " Institute of Legislation and Legal Information of the Republic of Kazakhstan" for its official publication and inclusion into the Reference Control Bank of Regulatory Legal Acts of the Republic of Kazakhstan;

3) place this order on the official website of the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan.

3. The control over the execution of this order shall be assigned to the supervising vice-minister of industry and infrastructure development of the Republic of Kazakhstan.

4. This order shall take effect ten calendar days after its first official publication.

Minister *R. Sklyar*

"AGREED"
Ministry of Internal Affairs of
the Republic of Kazakhstan

Approved by
Order No. 477 of the
Minister of Industry and
Infrastructure Development of the
Republic of Kazakhstan
as of July 3, 2019

Rules for the operation, maintenance and repair of artificial structures

Chapter 1.General provisions

1. These Rules for the operation, maintenance and repair of artificial structures (hereinafter referred to as the Rules) are developed in accordance with subparagraph 34-38) of paragraph 2 of Article 14 of the Law of the Republic of Kazakhstan “On Railway Transport” as of December 8, 2001 and establish the procedure for the operation, maintenance and repair of artificial structures.

2. The following basic terms are used in these Rules:

1) artificial structure – a structure erected at railway intersections with water barriers, other railways, roads, deep gorges, mountain ranges, built-up urban areas, and also the one erected to ensure the safe passage of people over railways and roadbed stability in difficult conditions;

2) pipe-culvert - an artificial structure laid in a railway embankment to allow the passage of a water stream at low water consumption;

3) railway bridge - an artificial structure serving as continuation of the railway track over an obstacle;

4) railway tunnel - an artificial structure serving as continuation of the railway track through a high or contour obstacle;

4) railways – real estate items (trunk, station, access roads) for the movement of rolling stock;

6) national infrastructure operator - a legal entity, the majority stake of which belongs to the National Railway Company, which operates, maintains, updates, constructs the main railway network and provides the services of the main railway network, and also provides priority military transportation.

Chapter 2. Procedure for the operation of artificial structures

3. The operational facilities include:

1) bridge shelters, chambers and niches in tunnels, cones and embankments;

2) mobile scaffolds for the inspection of tunnels, maintenance compressor stations with air ducts;

3) lighting, annunciating alarms, telephone communications, grounding of metal structures of bridges on electrified lines and given power lines, fencing of the contact line on overpasses and pedestrian bridges;

4) devices for laying utility lines, foul-to-gauge detectors, protecting signals;

5) holding signals and safety dead ends either derailing shoes or switches on detour bridges;

6) clearance gate and road signs in front of overpasses through highways, fencing of supports of these overpasses;

7) signs for snowplows, navigational alarms, firefighting equipment, as well as devices required by local conditions for the normal operation of artificial structures and safe movement of trains, vehicles, pedestrians, ships.

4. The operation of artificial structures includes the following types of inspections:

1) current and regular inspections;

2) checks and testing;

3) special monitoring.

5. Special attention during inspections shall be paid to weak elements of artificial structures, as well as to elements and components that significantly reduce their carrying capacity.

6. The inspection of artificial structures is carried out by employees of the National Infrastructure Operator.

When identifying malfunctions that threaten the safety of train traffic, an employee of the National Infrastructure Operator fences a dangerous place in accordance with the Railway Signaling Instruction approved by Order No. 209 of the Minister of Transport and Communications of the Republic of Kazakhstan as of April 18, 2011 (registered in the State Registration Register of Regulatory Legal Acts under No. 6954) and takes matures to repair malfunctions.

7. The procedure for the maintenance of artificial structures is established by the leadership of the National Infrastructure Operator.

8. The employees of the National Infrastructure Operator maintaining artificial structures shall:

1) monitor the condition of all elements of the bridge deck (bridge timbers, metal cross sleepers, reinforced concrete slabs of ballastless bridge deck, security devices, chamfered joints, adjustment switches);

2) check and tighten hook bolts, cap screws of slabs of the ballastless bridge deck, the anchorage of the anti-creep (protective) angles and girders, counter-angles (counter-rails), chamfered joints;

3) clean the railway track, chamfered joints, bridge deck, span elements at the level of passage from dirt, snow and ice;

4) clear stairs and ramps from the slopes of cones and embankments at bridges and pipes from snow and ice before the passage of spring water;

5) monitor the passage of spring water and ice drift, monitor the water level, the state of fortifications of the cones and slopes of embankments, water stagnation on tracks, chord cases , bridge seats, outside of the track and in ditches;

6) monitor the working condition of vision devices, firefighting equipment, fill barrels with water and boxes with sand;

7) keep the chambers and niches in tunnels clean, whitewash them, chip and remove the ice from the track, monitor the condition of the face, check the condition of tunnel exits and the adequacy of their heating in winter;

8) on the track within bridges or tunnels and on assigned approach sections, fix and lubricate bolts, set spikes, strengthen anti-creepers, clean rails and fastenings from dirt, keep clean the surface of the ballast bed, roadbed shoulders and drainage devices, and timely weed out grass.

9. The length of the track on approaches to artificial structures on each side is set by the head of the National Infrastructure Operator.

10. The employees of the National Infrastructure Operator keep a journal (in any form), in which, in addition to entries on taking over and passing of duty, they enter the results of inspections and checks of the track's upper structure, artificial structures, and also indicate the works performed during the duty.

11. The purpose of current inspections is:

1) to monitor general condition of artificial structures;

2) to identify all malfunctions to be repaired;

3) to determine the scope of necessary repair works.

12. The following components of artificial structures are subject to current inspection:

1) railway track;

2) bridge deck;

3) spans;

4) support bearing parts;

5) tunnel portals and face;

6) pipe heads and rings;

7) cones of the embankment, bed, including fortifications, culverts, regulation and shore protection structures.

13. Current inspections of artificial structures are carried out by employees of the National Infrastructure Operator in the sections assigned to them.

14. A bridge, tunnel supervisor or a foreman for artificial structures under his supervision conducts current inspection of artificial structures in the assigned section within the time frames set by the head of the National Infrastructure Operator for each artificial structure depending on its condition, with account of the following requirements:

1) if in good condition, railway tunnels, metal, reinforced concrete and stone bridges and pipes shall be inspected once every three months, and wooden bridges and pipes, as well as pedestrian bridges and tunnels - once a month;

2) more frequent inspections up to continuous monitoring are required for weak and defective artificial structures, and also for structures under repair, until malfunctions threatening the safety of train traffic are eliminated;

3) spans, designed with low-class carrying capacity, are inspected at least once every two months;

4) spans reinforced by welding, as well as spans of bridges located in northern conditions of the Republic of Kazakhstan and not meeting modern requirements for northern structures shall be inspected at least once a month in winter. Separate elements of old spans subject to the greatest dynamic effects (way and transversal beams of the carriageway, suspension attachment nodes) at an outdoor temperature below minus 30°C shall be inspected more frequently as established by the leadership of the national infrastructure operator depending on the state of the spans.

15. During the periods of heavy rainfall and spring flood discharge, employees of the National Infrastructure Operator inspect and check artificial structures to ensure uninterrupted and safe train traffic.

16. The employees of the National Infrastructure Operator carry out additional inspections of artificial structures in sections with heavy rains, before and after the heavy rainfall period, and also after earthquakes of 4+ magnitudes.

17. The results of current inspection of artificial structures with a description of detected malfunctions and indication of the scope of necessary repair works are recorded by the employees of the national infrastructure operator in a free-form journal.

18. The leadership of the National Infrastructure Operator Regular carry out inspections of all artificial structures depending on the condition of the structures, but at least twice a year - in spring (after the passage of high waters) and in autumn.

19. During regular inspection, the general condition of artificial structures is checked, if necessary instrumental measurements are made.

To ensure proper quality, it is mandatory to remove voltage from the contact line and wires of high-voltage lines during regular inspections of pedestrian bridges and overpasses in electrified sections.

20. The results of regular inspections are documented in acts along with listing identified defects and indicating the scope and timing of required repair works. These acts are signed by the heads of the National Infrastructure Operator, who performed the inspection.

21. Based on the results of regular inspections of artificial structures, measures are developed to eliminate identified malfunctions and deficiencies.

22. The heads of the National Infrastructure Operator inspect artificial structures.

23. Large and medium bridges with through metal spans are inspected (and, if necessary, tested) in terms of carrying capacity at least once a year, other large and medium bridges are checked (and, if necessary, tested) at least once every five years.

All other artificial structures are inspected at least once every 10 years.

24. Bolt-welded spans with hermetically enclosed box-shaped elements are subject to targeted inspection in the first year of operation to evaluate the quality of sealing of internal cavities of box-shaped elements.

25. Inspection of the underwater part of supports is carried out at least once every 10 years by a specialized underwater repair organization.

26. Artificial structures are tested upon acceptance for operation of newly constructed large structures, as well as new and experimental structures, if defects appear in the structure during operation (also after accidents).

27. The heads of the National Infrastructure Operator make decisions on restrictions of speed of trains and the carrying of traffic on artificial structures aimed at ensuring the safety of train traffic.

28. With regard to weak and defective artificial structures, as well as experimental and new types of structures, it is necessary to conduct special monitoring, the purpose of which is:

1) to prevent dilapidation of weak and defective structures which threatens the safety of train traffic;

2) to allow the passage of pedestrians on pedestrian bridges or tunnels and vehicles on road overpasses;

3) to clarify the causes of malfunctions;

4) to identify structural, construction and operational deficiencies for their timely elimination and prevention in further manufacture of this type of structures.

29. Defective artificial structures are monitored by the National Infrastructure Operator conducting the check with account of the design and condition of the artificial structure, and also operating conditions (train traffic density, climatic and weather conditions, the nature of the flood).

30. Weak and defective artificial structures, which require special monitoring, shall include:

1) weak ones, which are artificial structures that, because of their condition and carrying capacity (strength and stability), do not ensure the passage of running trains, and also those with unstable deformations of individual parts or elements (sinking, shifts and swelling of bridge supports, deformation of tunnel face, sinking of pipe rings) or elevated deflections and vibrations of spans and bridge supports (including pedestrian ones) under load;

2) defective ones, which are artificial structures with malfunctions, the further development of which can reduce the structure's bearing capacity (curvature of compressed elements and malfunction of their lacing, cracks in tension members or in the tension area of bending elements, cracks in welded spans, metal corrosion, weak concrete, exposure of working fittings, support washouts).

Chapter 3. Procedure for the maintenance of artificial structures

31. The maintenance of artificial structures is aimed at preventing the occurrence of malfunctions and eliminating existing malfunctions at an early stage.

32. The main works on maintenance of artificial structures include:

1) the maintenance of the upper structure of the track within artificial structures and on approaches thereto;

2) cleaning of bridge deck elements from dirt, cleaning and lubrication of chamfered joints and rail locks of movable spans, adjustment of joints and replacement of seasonal adjustment switches, securing the upper track structure from theft;

3) tightening and replacing bolts and single (selective) replacement of defective elements of the bridge deck, protection of bridge timbers from decay and mechanical wear;

4) cleaning of spans and bridge seats from dirt;

5) cleaning, lubrication, alignment of support parts and repair of protective cases;

6) cleaning of pipes, culverts, water cushions, beds from sediment and thickets;

7) preparation of structures for winter - closing the openings of pipes of small bridges with shields, repairing the insulation of culverts in tunnels;

8) the maintenance of anti-aufeis structures and refrigerator plants;

9) preparation for spring water drainage - clearing the bed from snow, breaking ice around the supports;

10) passage of flood and ice drift;

11) partial painting of individual places of metal structures (until they are completely painted);

12) replacement of single rivets and bolts, drilling and closing of cracks with overlays in the metal structures of bridges;

13) pointing of masonry joints and repair of cracks in massive structures, repair of drains, placement of separate fallen and displaced stones and blocks;

14) elimination of non-densities in wooden structures, the tightening and lubrication of bolts, chiseling of superficial sap rot and the sealing of cracks with wood antiseptics;

15) correction of local damage to cones, slopes of the embankment and regulation structures, drainage systems and their fortifications;

16) maintenance of firefighting equipment, replenishment of water and sand, repair of barrels and boxes;

17) cleaning and maintenance of drainage devices on the surface of and inside tunnels, chipping ice in tunnels;

18) maintenance of vision devices and operational facilities;

19) repair of flooring and steps of pedestrian bridges and tunnels;

20) maintenance of navigational alarm devices on bridges across navigable rivers;

21) maintenance and repair of lighting;

22) maintenance of watch posts, protective structures, gangways, flooring, stairs along the slopes of the embankment, territory and fencing of restricted areas at protected artificial structures.

33. Artificial structures are maintained according to half-month schedules, which are made on the basis of seasonal scheduled works, taking into account the results of current and regular inspections.

34. A half-month schedule for maintenance teams of artificial structures is made by a bridge foreman, and for track gangs – by a track supervisor together with track foremen. The schedules provide for the implementation of urgent work related to ensuring the safety of trains with set speeds, and also for the performance of scheduled works to prevent the occurrence of malfunctions.

Chapter 4. Procedure for repairing artificial structures

35. Repair includes works aimed at updating the elements of artificial structures, maintaining their strength features and extending their service life:

1) full replacement of bridge timbers;

2) replacement of ballastless slabs and bridge deck elements;

3) renewal of painting, replacement of waterproofing ballast tanks;

4) replacement of defective spans;

5) relaying of tunnel face and works on the replacement of individual worn-out elements or parts of structures;

6) strengthening of weak elements and parts of structures;

7) elimination of oversize;

8) partial reconstruction of structures;

9) anti-icing measures;

10) installation of vision devices, compressor stations and air ducts for air blowing, installation of points for connecting power tools and devices, improving the maintenance and operating conditions of structures, including the installation of utility and production facilities for bridge gangs. The frequency and scope of repairs of artificial structures are indicated in the Appendix to these Rules.

36. The terms and scope of repair works in each case are determined by the actual state of artificial structures based on inspections and checks, taking into account track classes and prospects for their development. When repairing an artificial structure, the necessary work related to the current maintenance is simultaneously performed.

37. Works on the repair of artificial structures are carried out according to monthly plans developed by a bridge or tunnel foreman based on annual work plans approved by the leadership of the National Infrastructure Operator, taking into account the results of regular inspections of artificial structures.

38. Works on the repair of artificial structures are carried out by specialized teams.

39. It is recommended to involve specialized construction and repair organizations in labor-intensive and complex repairs of bridges and tunnels.

40. The repair of bridges with the replacement of spans is carried out together with the repair of supports. When replacing metal spans and fully replacing bridge timbers, a ballastless bridge deck is laid on reinforced concrete slabs.

41. All-transportable metal spans and metal supporting parts shall be repaired under stationary (factory) conditions; they shall be removed from the bridge and replaced with permanent spans and bearing parts.

42. When repairing the track, the full scope of works is carried out to elevate bridge spans , lengthen the pipes and the necessary works on artificial structures. When repairing the track, it is not allowed to elevate upper track structures on bridges, install the raised spans on wooden beams and wooden fencing devices behind the abutments.

43. The bridge and track foremen inspect the bridge in order to identify possible damage caused by the operation of track machines or after they pass in working condition on ballast tanks, and if there is damage, take measures to eliminate them and ensure the safety of train traffic.

44. Technical supervision of the preparation and performance of repair works by specialized organizations is carried out by the bridge, tunnel foreman or employees appointed by the leadership of the National Infrastructure Operator.

45. An employee performing technical supervision monitors the quality of works, their compliance with the project, monitors the observance of all rules and requirements for ensuring the safety of train traffic and the operating mode established by the project for the period of works.

46. Selective acceptance of the stages of works performed, assessment of their completeness and quality are carried out by the National Infrastructure Operator.

Appendix to the Rules for the
operation, maintenance and repair
of artificial structures

Frequency and scope of repairs of artificial structures

Types of artificial structures	Repair works	Frequency (years)	Medium scope of repairs
1	2	3	4
1. Bridges, overpasses, overhead crossings, viaducts, tunnels, pipes, pedestrian bridges			
	Full replacement of wooden bridge timbers	12-15	100 %
	Replacement of wooden anti-creep (protective) girders	8-10	100 %
	Replacement of wooden flooring	4-5	100 %
			25 % of total

1) Bridge deck	Replacement of reinforced concrete flooring	8-10	number of slabs
	Replacement of ballastless deck of reinforced concrete slabs	25-30	100 %
	Replacement of a metal bridge deck (metal cross sleepers)	25-30	100 %
	Replacement of counter-angles (counter rails) and protective angles	When replacing the bridge deck	Adding up to 25 % of structures
	Replacement of rails, cleaning and replacement of ballast and sleepers	According to track repair norms	
	Replacement of wooden flooring on road bridges	3-5	100 %
	Replacement of wooden bars under the flooring of pedestrian bridges and cross sleepers on road bridges	8-10	100 %
	Replacement of asphalt on bridges: road ones	5-7	100 %
	pedestrian ones	7-10	100 %
2) Metal spans and supports	Replacement of metal spans with bearing parts and supports	50-60	100 %
	Replacement of damaged elements and fixing them with high-strength bolts and replacing defective rivets with high-strength bolts	25-30	5-7 % of the weight of metal in spans
	Partial replacement of bearing ports	25-30	50 %
	Strengthening spans over 33 meters long	If necessary	Adding up to 15 % of metal of a span weight
	Oil or polymer paint coating: in normal conditions; in adverse conditions; in case of air pollution by harmful impurities and in areas with a humid climate or a large amount of precipitation; in areas of transportation of salts and mineral fertilizers Replacement or concreting (making monolithic) of metal supports	If necessary 6-10 5 - 7 3 - 5 6 0 60	100 % 100 % 100 % 100 % 100 %
3) Reinforced concrete, concrete and stone spans and reinforced concrete elements of steel structures	Replacement of waterproofing	15-20	100 %
	Repair of protective layer	25	15 % of surfaces
	Injection or another type of crack repair	25	15 % of surfaces
	Extension of span sides	If necessary	100 %
	Replacement of spans made of reinforced concrete	70	100 %
	Replacement of spans made of stone or concrete	70-80	100 %

	Strengthening of concrete and stone spans	Once in a service life	Under special project
4) Wooden spans and supports	Replacement of damaged elements	5	25 % of volume of the timber
	Antiseptic works	5	100 %
		20	100 %
5) Stone, concrete and reinforced concrete supports	Replacement with capital structures. Partial relaying of stone and brick supports	30-40	25 % of the volume of masonry
	Injection or cementation of masonry, brick or concrete masonry	30-40	30 % of the volume of masonry
	Repair of concrete and rubble concrete supports	30-40	10 % of the volume of masonry
	Shotcreting or other types of surface repair of reinforced concrete and concrete supports	30-40	30 - 50 % of surfaces
	Installation of reinforced concrete “jackets”	35-40	100 % of outer surface
	Repair and replacement of damaged bed stones	35-40	50 % of the volume of masonry
	Extension and building of abutments	40	100 % under special project
	Replacement of supports with the dismantling of existing ones and the construction of new ones, including the displacement of the bridge axis	80-100	under special project if complies with feasibility study
	Relaying of heads	15-20	20 % of the

			volume of masonry
2. Pipes and culverts	Correction of sinking of separate rings	40-50	20 % of total number of rings
	Repair of internal surfaces of pipes and their culverts	50	50 % of entire surface
	Extension of pipes in connection with the reconstruction of the roadbed	Once ion the service life of pipes	Under the project
	Replacement of metal (corrugated) pipes with reinforced concrete ones	40	100 %
	Replacement of wooden pipes with permanent ones	15	100 %
	Replacement of stone, concrete and reinforced concrete pipes	100	100 %
3. Tunnels	Partial relaying of tunnel face: in normal conditions	40-50	20 % of the volume of masonry
	in adverse conditions	30	20 % of the volume of masonry
	Injection of grout behind faces of tunnels operating under normal conditions	35-40	Along 50 % of the length
	Repair of surfaces of concrete, reinforced concrete, brick or stone face	30	50 % of internal surfaces
	Replacement and re-installation of drainage facilities	60	Along 75 % of the length
	Repair of water-draining and drainage structures of tunnels	12	100 %
	Drainage (installation of new drainage adit, wells, culverts) of tunnels	If necessary	Under special project
	Installation of ventilation Partial relaying of masonry	If necessary 40-50	Under special project 20 % of the volume of masonry

4. Stone, concrete and reinforced concrete mudflow conduits, drain tunnels and hillside structures	Repair of surfaces of culverts, mudflow conduits and drop structures	20	50 % of effective area
	Repair of surfaces of body of masonry	35-40	50 % of the surface
	Cementing of body of masonry and concrete blocks	40 - 50 %	20 % of the volume of masonry
5. Sustainer walls and regulation structures	Partial relaying of masonry and brickwork, repair of concrete and rubble concrete structures	20-25	30 % of the volume of masonry
6. Strengthening of artificial structures and shores	Repair of double and single paving or coating of reinforced concrete and concrete slabs	10	Adding 10 % of new materials
	Cleaning heavily choked beds	3-5	50 % of the length of beds
	Strengthening of supports prone to washouts	5	Adding 50 % of the volume of materials
	Installation of anti-ice structures on watercourses with ice	10	Under special project
7. Repair of operational facilities of bridges and tunnels	Repair and installation of lighting, annunciating alarms, protecting signals and navigational alarms, air blowing, ventilation, electrical heating of culverts in tunnels, fencing of zones, office premises of bridge and tunnel gangs, vision devices and clearance gate at bridges	10	Adding 50 % of the volume of materials