Rules for setting the unit rates of the basic charge and the shunting charge applicable from 9 December 2018 taking into account the modifications introduced by Resolution No. 391/2018 of the Management Board of PKP Polskie Linie Kolejowe S.A. of 22 May 2018

The modification of the draft tariff resulted from the expectations of the railway market expressed by the interested parties during the administrative proceedings concerning the approval by the President of the Railway Transport Authority of the draft tariff in the part concerning the method of setting the unit rate of the basic and shunting charge for the railway infrastructure with track gauge 1435 mm for the timetable of trains 2018/2019.

Taking into account the expectations of the railway market in relation to the draft tariff of 8 March 2018, the size range of the train weight range was modified from 100 tons to 60 tons.

As a result of this modification, the following parts of the draft tariff were amended:

– Rate factors W_M according to total planned train gross weight,
– Sub rate varying according to type of transport services,
– Calculation of unit rates of shunting fees.

1. Method for the calculation of the costs that are directly incurred as a result of train movement

1.1. Calculation of the direct costs

The costs underlying the rates for the provision of access to railway infrastructure were calculated in accordance with the following provisions:

1) The Railway Transport Act of 28 March 2003 (Journal of Laws of 2017, item 2117) - hereinafter the Act;
2) The Regulation enacted by Minister of Infrastructure and Construction as of 7 April 2017 on the procedure of providing access to railway infrastructure (Journal of Laws of 2017, item 755) - hereinafter the Regulation;
3) The Commission Implementing Regulation (EU) 2015/909 of 12 June 2015 on the modalities for the calculation of the cost that is directly incurred as a result of operating the train service (OJ L 148, 13.6.2015, p. 17) - hereinafter the EC Regulation.

This is the first time that the direct costs incurred by the manager as a result of train movement are determined on the basis of the EC Regulation for the tariff concerning the 2018/2019 train timetable. Pursuant to Article 9 of the EC Regulation, PLK was required to submit a method for the calculation of the direct costs and a phasing-in plan no later than by 3 July 2017. Once the EC Regulation entered into force, i.e. on 1 August 2015, a team

of PLK's experts undertook work with the aim of establishing the concept to separate the costs relating to maintenance and renewal, rail traffic operation and depreciation of the costs that are directly incurred as a result of train movement. Since the basis for the calculation of the direct costs according to the EC Regulation was prepared for the draft tariff concerning the 2018/2019 train timetable, the phasing-in plan was not submitted to the President of the Railway Transport Office (UTK).

The calculation methodology was developed in accordance with the legal acts listed above.

The following assumptions were used for calculating the direct costs:

1) the costs that are directly incurred as a result of train movement are determined using the so-called 'difference in costs' method in accordance with Article 3 (1) of the EC Regulation:

   "Direct costs on a network-wide basis shall be calculated as the difference between, on the one hand, the costs for providing the services of the minimum access package and for the access to the infrastructure connecting service facilities and, on the other hand, the non-eligible costs referred to in Article 4."

   As a result of the exclusion of non-eligible costs, the rates for the minimum access to railway infrastructure include only the costs that are directly incurred as a result of train movement.

2) § 21 (13) of the Regulation reads:

   "the planned amount of the direct costs is determined on the basis of the amount of the relevant direct costs incurred in the last completed financial year".

   To ensure consistency, technical information relate to the same period as the financial data.

3) eligible direct costs underlying the rates are determined taking into account the operational work factor and the inflation rates for two subsequent years after the completed year; in the case of the costs of salaries - the planned real gross salary growth rates in the national economy (§ 21 (13) of the Regulation).

Additionally, it was established as follows:

1) the direct costs are to include only the costs which the team of experts found to be undeniably incurred directly as a result of train movement;
2) the direct costs include: infrastructure maintenance and renewal, rail traffic operation and depreciation;
3) for each of the above cost groups, there is a unique procedure of selecting costs that are only incurred as a result of train movement, i.e.:
   a) infrastructure maintenance and renewal - using the so-called binary method,
   b) rail traffic operation - based on the active working time of staff directly related to the operation of the train service,
   c) depreciation - based on real wear and tear of railway infrastructure due to train movement.

The first step included gathering technical data that are used for the determination of the direct costs of operation of the train service and the costs of depreciation according to real wear and tear of infrastructure due to train movement. After closing the accounts, the financial data was retrieved from the SAP Business Objects system which is supplied with data from accounts kept in accordance with the SAP FI, SAP FI-AA system and controlling data originating from the records kept in accordance with the SAP CO system.

To determine the costs underlying the rates for the provision of access to railway infrastructure under the tariff for the 2018/2019 train timetable, it was assumed as follows:

1) planned rates of change for 2018 and 2019[1]:

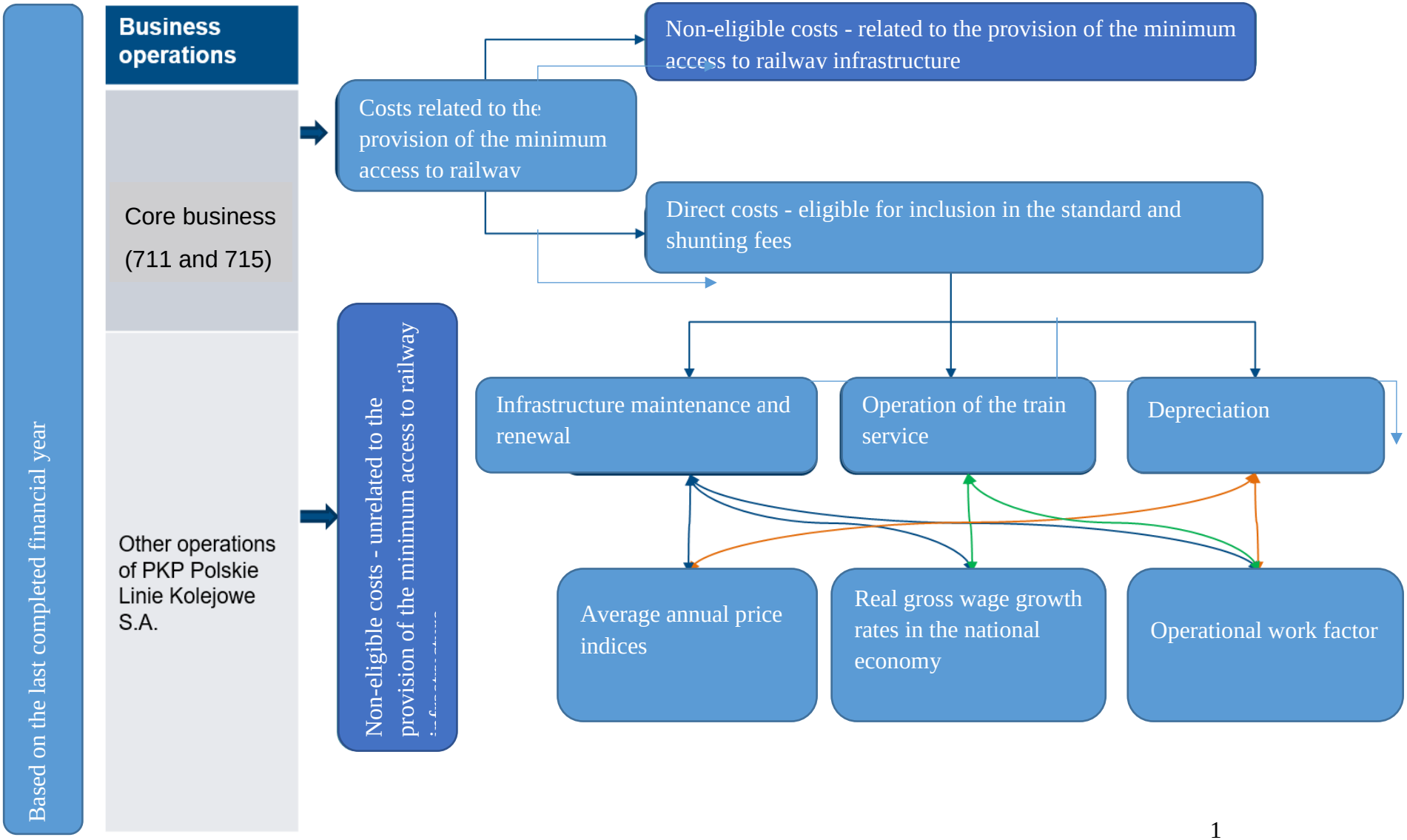
No.	Indicators	2018	2019	Change 2019/2017
1	Average annual consumer price index	102.3%	102.3%	104.7%
2	Average gross salary in the national economy - real growth index	102.4%	102.7%	105.2%

2) operational work factor:

No.	Period	Total days
1	The 2018/2019 Train Timetable (from 9 December 2018 to 14 December 2019)	371
2	2017 (from 1 January to 31 December 2017)	365
3	Operational work factor Z (item 1 / item 2)	1.0164

The calculated direct costs are included in the core business costs. The other operating costs of the Company are classified as non-eligible costs - unrelated to the provision of the minimum access to railway infrastructure. The process of the cost calculation is shown in the diagram below:

[1] Source: Guidelines on the use of uniform macroeconomic rates underlying the estimation of financial effects of draft acts and laws (updated: October 2017). Minister of Development and Finance


Based on the last completed financial year
Business operations
Core business (711 and 715)
Other operations of PKP Polskie Linie Kolejowe S.A.
Costs related to the provision of the minimum access to railway
Non-eligible costs - unrelated to the provision of the minimum access to railway
Non-eligible costs - related to the provision of the minimum access to railway infrastructure
Direct costs - eligible for inclusion in the standard and shunting fees
Infrastructure maintenance and renewal
Operation of the train service
Depreciation
Average annual price indices
Real gross wage growth rates in the national economy
Operational work factor

1

Cost groups were identified in the calculation process:

1) costs that are directly incurred as a result of train movement, including the costs related to:
    a) infrastructure maintenance and renewal,
    b) operation of the train service,
    c) depreciation;
2) non-eligible[2], including:
    a) non-eligible costs unrelated to the provision of the minimum access to railway infrastructure, including:
        i. financial costs,
        ii. other operating costs,
        iii. administrative and general enterprise-wide costs,
        iv. costs of sale of other services to external customers,
        v. costs of sale of materials,
        vi. costs of sale of services provided by the in-house social amenity facilities,
        vii. costs of the investment division,
        viii. costs of the Railway Police (SOK),
        ix. costs of maintenance of service facilities,
        x. costs of out-of-service railway infrastructure,
        xi. costs related to the provision of access to non-timetabled railway lines,
        xii. costs related to the provision of access to 1520 mm gauge railway lines,
        xiii. costs related to the provision of access to railway lines allocated to the privileged transit traffic,
        xiv. costs of manufacturing products for in-house purposes,
        xv. depreciation not classified as the costs related to the provision of the minimum access to railway infrastructure,
    b) non-eligible costs related to the provision of the minimum access to railway infrastructure, including some of the costs of depreciation, operation of the train service, maintenance and renewal, including those of:
        i. railway infrastructure - not assigned to any specific line or station,
        ii. recovery from damage due to railway accidents,
        iii. operation,
        iv. diagnostics,
        v. emergency repairs,
        vi. safeguards against thefts and the costs of recovery from damage due to thefts and acts of vandalism,

[2] Given the obligation arising from Article 4 (2) of the EC Regulation, the direct costs do not include any costs of investments which are not required to be repaid by the Company.

vii. maintenance, regular and major repairs, except the costs that are directly incurred as a result of train movement,
viii. related to the preparations for winter operations,
ix. the automatic control and telecommunication service,
x. the energy service, except the costs that are directly incurred as a result of train movement,
xi. the road transport service, except the costs that are directly incurred as a result of train movement,
xii. other services, except the costs that are directly incurred as a result of train movements: salaries and social insurance contributions related to train dispatchers, signallers, points operators and level-crossing attendants; the direct costs related to planning and line dispatchers, and the costs of salaries and social insurance contributions related to staff needed for preparing train timetables,
xiii. costs by nature:
- depreciation charges that are not determined on the basis of real wear and tear of infrastructure due to train movement,
- consumption of solid fuel,
- consumption of materials and energy, except the costs that are directly incurred as a result of train movement,
- staff salaries and benefits, except the salaries and social insurance contributions to the extent that they are directly related to train movement,
- outsourced services, except renewal and maintenance services, and any other services to the extent that they are directly related to the operation of the train service,
- other costs by nature,
- taxes and charges,
- purchased internal services.

The table below shows the Company's cost plan in million PLN for 2019 based on the multi-annual programme 'Assistance with costs relating to the management of railway infrastructure, including maintenance and renewal, until 2023',[34] including a specification of the costs that are directly incurred as a result of providing railway transport services and the non-eligible costs:

[3] Council of Ministers Resolution No. 7/2018 of 16 January 2018 on the implementation of the multi-annual programme 'Assistance with costs relating to the management of railway infrastructure, including maintenance and renewal, until 2023'

[4] The presented plan takes into account the costs of depreciation in the form of monthly charges due to received subsidies of PLN 928.1 million for financing fixed assets under construction. To determine the amount of financing from public funds under the multi-annual programme, it was not necessary to include the above depreciation charges, which are classified as operating costs and other operating revenues of the same amount in the profit and loss account.

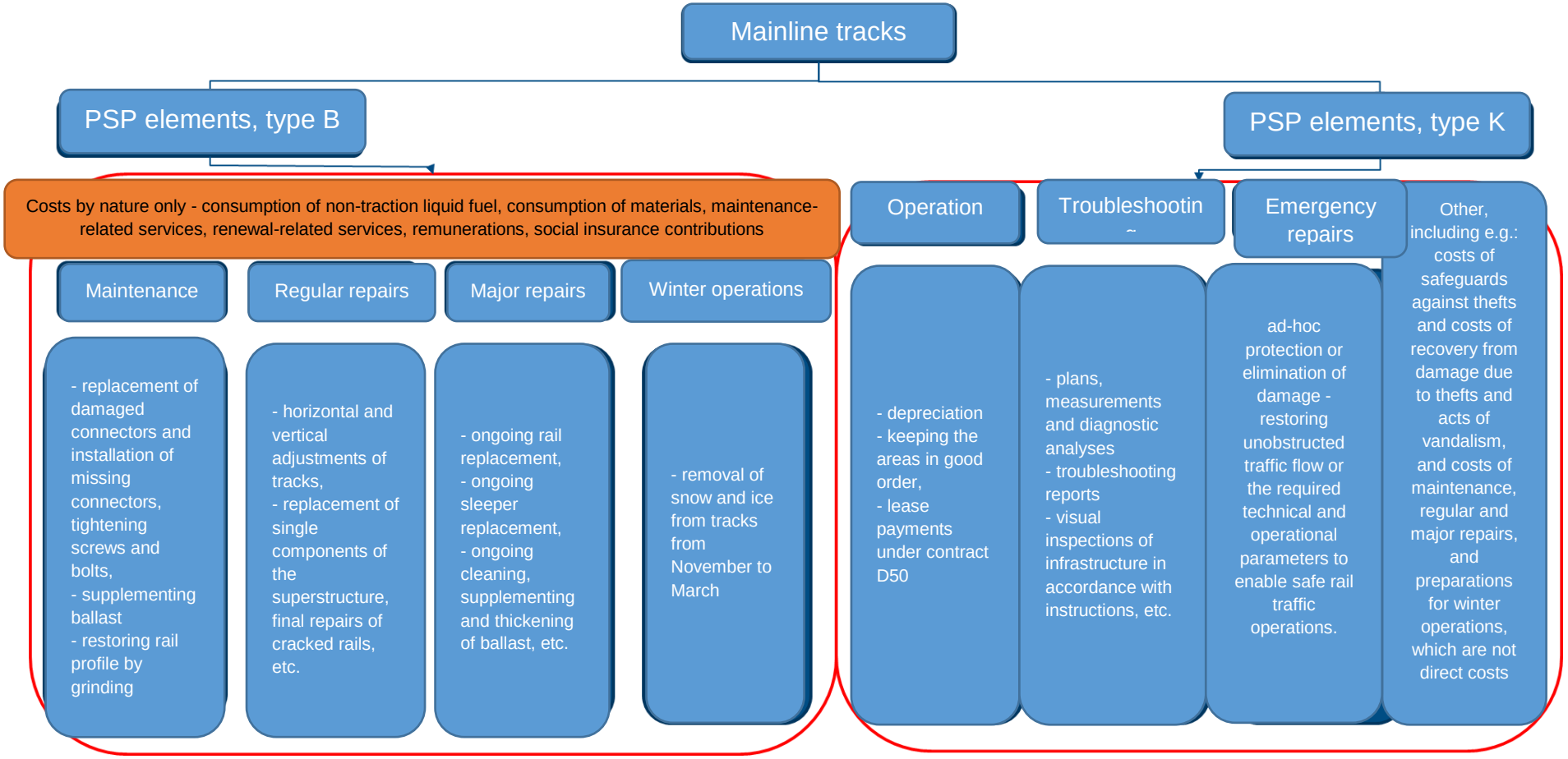
in million PLN

No.	Specification	The 2019 Plan	Costs unrelated to the provision of the minimum access to railway infrastructure - non-eligible costs	Costs related to the provision of the minimum access to railway infrastructure, including:	Costs that are directly incurred as a result of train movement	Non-eligible costs
A	Administrative and general enterprise-wide costs	826.24	826.24	0.00	0.00	0.00
B	Costs of operation of the train service	1,320.40	4.49	1,315.91	776.12	539.79
C	Costs of infrastructure maintenance and renewal	3,082.90	172.62	2,910.28	1,024.63	1,885.65
D	Depreciation	1,821.29	116.44	1,704.85	109.63	1,595.22
E	Costs of the Railway Police (SOK)	252.55	252.55	0.00	0.00	0.00
F	Other costs (not classified as infrastructure-related costs)	31.15	31.15	0.00	0.00	0.00
G	Other operating costs	132.60	132.60	0.00	0.00	0.00
H	Financial costs	70.05	70.05	0.00	0.00	0.00
I	TOTAL COSTS OF BUSINESS OPERATIONS (A+B+C+D+E+F+G+H)	7,537.18	1,606.14	5,931.04	1,910.38	4,020.66

1.2. Costs of maintenance and renewal of railway infrastructure

The costs that are directly incurred as a result of infrastructure maintenance and renewal were calculated using the so-called binary method which involves an assessment of the individual types of economic events in terms of their direct relation to train movements. To classify the individual economic events into those that are generated by train movements and those that give rise to non-eligible costs, some modifications were introduced to the controlling policy of the Company as shown and commented in the List of Controlling Items. The group of economic events generating direct costs include only those events that raised no doubts as to whether they are directly related to train movements. If at least some of the operations involved in a specific economic event were not found by the team of experts to be related to train movements based on their studies and consultations, the event was not classified into direct costs. The costs of such events are therefore classified

as non-eligible costs related to the provision of the minimum access to railway infrastructure. The titles of economic events that are classified as direct costs and non-eligible costs are specified and commented in the List of Controlling Items, which is approved by resolution of PLK'S management board. To ensure accurate separation of the costs that are directly incurred as a result of train movement in the SAP CO system, a new dedicated type of controlling items was developed, so-called type B PSPs (type M PSPs for registering the direct costs incurred in the area managed by another Regional Railway Unit). Additionally, to ensure that costs are properly recorded, the SAP CO system was provided with validation procedures. The correctness of the cost registration is also verified based on a three-step procedure, i.e. at the stage of assignment (technical review), at the stage of recording in the SAP system (review by means of validation) and at the stage of reporting - the specifications developed for the SAP BO system make it possible to identify any costs that are not posted in conformity with the guiding principles. The non-eligible costs, described and commented in the List of Controlling Items, are also registered via separate controlling items, so-called type K PSPs (type L PSPs for registering the non-eligible costs incurred in the area managed by another Regional Railway Unit). The diagram below shows an example of how economic events are divided into direct and non-eligible costs for operations on mainline tracks, which generate 84% of direct costs.


Mainline tracks
PSP elements, type B
PSP elements, type K
Costs by nature only - consumption of non-traction liquid fuel, consumption of materials, maintenance-related services, renewal-related services, remunerations, social insurance contributions
Maintenance
Regular repairs
Major repairs
Winter operations
- replacement of damaged connectors and installation of missing connectors, tightening screws and bolts,
- supplementing ballast
- restoring rail profile by grinding
- horizontal and vertical adjustments of tracks,
- replacement of single components of the superstructure, final repairs of cracked rails, etc.
- ongoing rail replacement,
- ongoing sleeper replacement,
- ongoing cleaning, supplementing and thickening of ballast, etc.
- removal of snow and ice from tracks from November to March
Operation
Troubleshootin
~
Emergency repairs
Other, including e.g.: costs of safeguards against thefts and costs of recovery from damage due to thefts and acts of vandalism, and costs of maintenance, regular and major repairs, and preparations for winter operations, which are not direct costs
- depreciation
- keeping the areas in good order,
- lease payments under contract D50
- plans, measurements and diagnostic analyses
- troubleshooting reports
- visual inspections of infrastructure in accordance with instructions, etc.
ad-hoc protection or elimination of damage - restoring unobstructed traffic flow or the required technical and operational parameters to enable safe rail traffic operations.

2

1.3. Costs of operation of the train service

The costs of operation of the train service that are calculated to determine the unit rates for the minimum access to railway infrastructure are generated by:

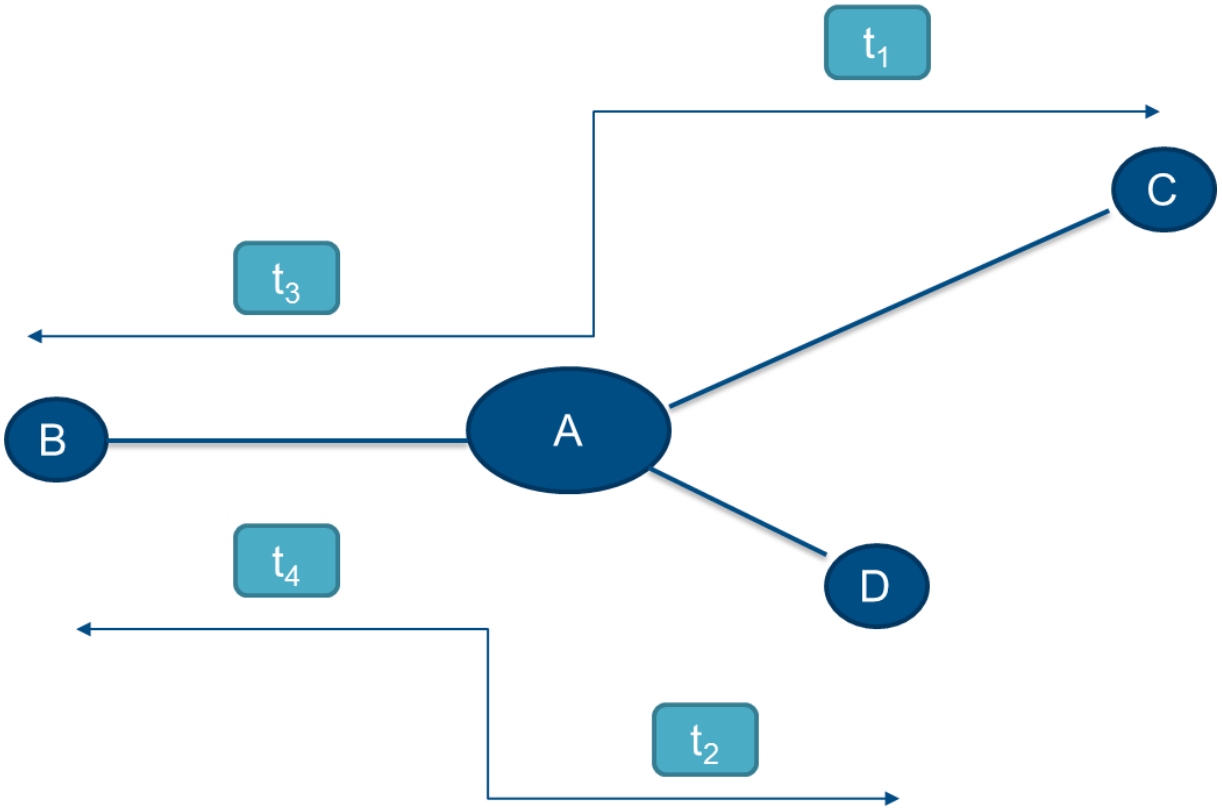
1) train dispatchers, signallers and points operators,
2) level-crossing attendants,
3) production planning dispatchers and line dispatchers,
4) staff needed for preparing train timetables.

The cost that is directly incurred as a result of train movement is the cost incurred during the active working time of the above staff members. The active working time is the time used for operations related to train movement and shunting.

The direct costs include the costs of salaries and social insurance contributions that are paid by the employer, which are the costs of the active working time of train dispatchers, signallers and points operators, level-crossing attendants, production planning dispatchers, line dispatchers, and the staff needed for preparing train timetables. The non-eligible costs are the costs related to train movements, which, however, are not direct costs, in particular the costs of readiness to operate train service stations in the absence of train movements, annual, additional, training and sick leaves, time off work for renewal examinations and medical check-ups.

1.3.1. Train dispatchers, signallers and points operators

The duration of train-related services provided by train service stations is determined in accordance with the diagram below:



where:

A - a train service station for which the time is calculated,

B, C, D – adjacent train service stations,

train service station - a station (representing a single station, regardless of the number of dispatching areas, signalling areas, groups of tracks, etc.), branch-off station, siding station, block station,

section - a route, distance, section with remote traffic control,

t_1 – duration of train movement from station B to station C,

t_2 – duration of train movement from station B to station D,

t_3 – duration of train movement from station C to station B,

t_4 – duration of train movement from station D to station B,

Whenever station A was the start / end point, the time interval was measured as follows:

t_1 – duration of train movement from station A to station C,

t_2 – duration of train movement from station A to station D,

t_3 – duration of train movement from station A to station B,

Note: In the Local Traffic Control Centres (LCS), where train traffic is controlled by a linear traffic controller, the time is calculated from a station adjacent to the LCS section to a station adjacent to the LCS section.

Regional Railway Units modify the working time of train service stations in accordance with the requested train paths. Train service stations are not staffed on a 24/7 basis if no train movements are planned during a certain period of time in accordance with the train timetable in place. This means that in the absence of train movements on specific railway line sections, no costs of employment of level-crossing attendants, signallers, points operators and train dispatchers are incurred, and therefore the costs related to the staff needed for the operation of the train service depends on the requirements of carriers and the actual allocation of train paths under a given train timetable.

If no train paths are allocated on given railway line sections, there is no need for staffing the above train service stations located along these railway line sections. Train dispatchers, signallers, points operators and level-crossing attendants are relocated to other railway line sections, where there are train movements in the relevant time interval. The working time of level-crossing attendants, signallers, points operators and train dispatchers at specific stations, routes and train service stations is related to actual train movements on given railway line sections. In accordance with PLK’s working regulations, train dispatchers, signallers, points operators and level-crossing attendants can operate a single or several train service stations, however, not more than three stations. One to three such train service stations are indicated in contracts of employment. As follows from the guidelines on the Company Collective Bargaining Agreement for PLK’s employees, the working place of the staff of LCSs is defined by indicating one permanent geographical location, and in the case of other staff - one or several (not more than three) permanent

geographical locations in the area managed by one executive organisational unit. The individual train service stations are not staffed on a 24/7 basis if no train movements are planned during a certain period of time in accordance with the train timetable in place. This means that in the absence of train movements on specific railway line sections, no costs of employment of level-crossing attendants, signallers, points operators and train dispatchers are incurred.

In accordance with Article 4 (1) (a) of the EC Regulation, a manager of railway infrastructure, when calculating network-related direct costs, does not take into account e.g. fixed costs related to granting access to a line section, which must be incurred by the railway infrastructure manager even when there is no train movement. In accordance with the legal assessment,[5] the costs of salaries for level-crossing attendants, signallers, points operators and train dispatchers are undeniably related to the provision of access to railway lines or their sections. However, Article 4 (1) (a) of the EC Regulation contains no reference to all the fixed costs incurred by the manager in relation to the provision of a stretch of line which the infrastructure manager must bear even in the absence of train movements. On the contrary, the fixed costs relating to the provision of a stretch of railway line, which are incurred only when there are actual train movements, are not considered non-eligible costs referred to in Article 4 (1) (a) of the EC Regulation.

The linguistic interpretation shows clearly that the legislator refers to a situation when there are no train movements, i.e. no trains run through given railway line sections. The English language version also refers to the total absence of train movements. This is undeniably the total lack of train movements (over a longer period of time - such as the period of existence of a train timetable), and not e.g. a gap between movements of subsequent trains (there are no train movements as such during that time). It has thus to be concluded that “the absence of train movements” refers to a situation when no train movements are planned in accordance with the train timetable in place (there are no trains in the train timetable for a given section of the railway line).

Given the foregoing, it should be considered that if the absence of train movements on the individual railway line sections, which are provided by PLK, no costs are incurred in relation to salaries for level-crossing attendants, signallers, points operators and train dispatchers, who control rail traffic on these sections (the relevant train service stations are not staffed in the absence of train movements on these sections), the costs of salaries for level-crossing attendants, signallers, points operators and train dispatchers are not classified as the costs referred to in Article 4 (1) (a) of the EC Regulation.

Based on the general definition of direct cost, provided in Article 2 (1) of the EC Regulation, it could be examined if a given cost or a portion thereof is “assignable” to train

[5] The EC Regulation does not contain any enumeration of the costs of operation of the train service, including any direct costs related to train dispatchers, signallers, points operators or level-crossing attendants. Given the above, for prudential reasons, it was decided to solicit services of Law Firm Prof. Wierzbowski & Partners to support the interpretation of the above regulation by completing the task: “What interpretation should be given to direct costs of providing transport services, i.e. can the remuneration for level-crossing attendants, signallers, points operators, rail traffic controllers be accounted for by the railway infrastructure manager as direct costs of operation of train traffic in the context of Article 4 (1), Article 1, Article 3 (1) and (4) of the Regulation 2015/909?”

movement. If a given cost is incurred in order to enable train movement, then this cost is undoubtedly a direct cost. It should also be noted that the English language version of this definition uses the term ‘train service’ which denotes rather railway services, and not only a single train movement. In view of the authors of the legal assessment, this means that a given cost is a direct cost not only when it is “classified” as the result of the movement of a specific train, but also when it is “classified” as the result of movements of all trains which ran through the provided section of the railway line within a given period of time.

Since the calculate portion of the direct costs does not include the total salaries for the staff related to the operation of the train service, but only a portion thereof related to the active working time, which is to be calculated on the basis of measurable and verifiable objective criteria, these costs can be included in the direct costs in accordance with Article 3 (4) of the EC Regulation.

The active working time of train dispatchers was determined on the basis of the train movement register. The active working time of train dispatchers starts when a train leaves the train service station preceding the station operated by a given train dispatcher and ends when the train enters the next train service station. The train dispatcher performs then a number of operations, as described in technical regulations, rules and instructions, to ensure that the train can safely reach the next train service station. Based on the diagram for measuring the duration of train movements between station A and stations B, C and D, it is possible to calculate the (active) working time of train dispatcher at station A for all train movements using the following formula:

$$T_{pd} = \sum t_1 + \sum t_2 + \sum t_3 + \sum t_4$$

where:

T_{pd} – working time of train dispatcher at station A for all train movements,

$\sum t_1$ – total duration of all train movements from station B to station C,

$\sum t_2$ – total duration of all train movements from station B to station D,

$\sum t_3$ – total duration of all train movements from station C to station B,

$\sum t_4$ – total duration of all train movements from station D to station B.

The above information originates from the Operational Work Record System (SEPE). The time calculated for the train service stations at junction stations is therefore frequently greater than that resulting from a contract of employment. This situation is due to the fact that train dispatchers also operate the adjacent line sections. A solution was developed, which prevents the effective time from being greater than that resulting from the contract of employment.

Trains can run along train service stations also as a result of the rail traffic control operations performed by signallers and points operators. However, it was assumed for these positions, based on relevant expertise, that only some of their time is used during train movement. The active working time of signaller in the operation of the train service is calculated from when train dispatcher is notified (after a train is reported by a train dispatcher of the preceding train service station) to when the train leaves the station,

including the time needed to reset the rail traffic control equipment into the standard position. On average, this represents 0.75 of the working time of a train dispatcher. The active working time of signaller in the operation of the train service is calculated from when train dispatcher is notified to when the train leaves the station, including the time needed to reset the rail traffic control equipment into the standard position. On average, this represents 0.5 of the working time of a train dispatcher. The other portion of the working time is used for operations related to train movements, however, it was not classified as a portion of time directly related to train movements. The active working time also includes information about the time of operating equipment to enable rail operations, however, it does not include the time required to operate rail traffic on the 1520 mm track gauge lines, lines provided for privileged transit traffic and operation of rail traffic for which no train timetables are developed, as well as the ineffective time, including in particular holiday leaves, additional leaves, training periods, sick leaves, leaves for medical check-ups.

1.3.2. Level-crossing attendants

The active working time of a level-crossing attendant was calculated for each level crossing on a case-by-case basis by the individual Regional Railway Units on the basis of their technical and maintenance records. Given the different time intervals from when a level-crossing attendant is notified to when a train leaves the level crossing, separate calculations were performed for trains moving in the even and odd directions on the same line. If a level-crossing attendant operates several level crossings or a level crossing covers several lines, the total working time of the attendant was calculated as a sum of individual time intervals for all level crossings operated on each line. The active working time of level-crossing attendants was calculated for each level crossing according to the formula:

$$T_{przej} = X_{avg\ niep} * t_{avg\ niep} + X_{avg\ parz} * t_{avg\ parz}$$

where:

T_{przej} – the active working time of a level-crossing attendant related to train movements over level crossings,

$X_{avg\ parz}$ – the average number of trains in the odd direction per 24 hours,

$t_{avg\ parz}$ – the average time interval from when a level-crossing attendant is notified to when a train leaves the level crossing in the odd direction,

$X_{avg\ parz}$ – the average number of trains in the even direction per 24 hours,

$t_{avg\ parz}$ – the average time interval from when a level-crossing attendant is notified to when a train leaves the level-crossing in the even direction.

The active working time provides the basis for calculating the costs which are directly incurred as a result of train movement. To calculate the above costs, the first step should be to determine the actual working time of level-crossing attendants related to train movements through level crossings in relation to the total operating time of the level-crossing gatehouse. The operating time of level-crossing gatehouse is determined based on the calculated number of stations operated by level-crossing attendant, where a single

calculated station is a single one-man level-crossing gatehouse operating on a 24-hour basis.

$$P_{invol} = T_{work} / T_{mov}$$

where:

P_{zaang} – percentage of engaged level-crossing attendants in relation to train movements,

T_{work} – working time of level-crossing attendants,

T_{przej} – total working time of level-crossing gatehouse

1.3.3. Production planning dispatchers and line dispatchers

The work of dispatchers is to ensure compliance with the train timetable, including enabling train movements in the case of obstructions in the transport process, such as operational difficulties, train cancellations and launch operations. The sequencing of train movements by dispatchers in accordance with their rights takes place in close cooperation with the appointed representatives of operators taking part in the transport process. The timely implementation of train timetables that is directly related to train movements is monitored and coordinated on a continuous basis. Similarly to train dispatchers, signallers, points operators and level-crossing attendants, it was established that line dispatchers and production planning dispatchers dedicate some of their working time to perform operations which generate direct costs. As a result, the rates for the minimum access to railway infrastructure do not include all the costs related to dispatchers, but only a portion thereof, which is directly incurred as a result of train movement.

The active working time of one production planning dispatcher on duty was calculated taking into account information about the number of freight trains that need to be timetabled[6] and the time needed to timetable a single train. The active working time of one line dispatcher on duty was calculated taking into account information about the number of delayed trains and the time needed to record information about delays, the number of trains and the time needed for supervision operations.

1.3.4. Developers of train timetables

In accordance with Article 3 (4) (d) of the EC Regulation, the costs of staff required to allocate train paths and to develop train timetables can be accounted for as direct costs to the extent that they are incurred as a result of train movement.

As seen by PLK, it is legitimate, therefore, to classify the costs of salaries and social insurance contributions related to the staff developing train timetables as eligible costs.

A train timetable is a plan governing all train movements on a given railway line or a portion thereof during the existence of the train timetable. Train timetables are modified within the time limits prescribed in the Act or as necessary.

[6] This value is related to the number of timetabled trains running through the area managed by the Regional Railway Traffic Management Centres

Train timetables are to ensure the punctuality of train movements and they are developed in coordination with the interested applicants. Train timetables are prepared after the staff become acquainted with the technical and operational parameters of the individual railway line sections. All operations performed by the staff preparing timetables, at various stages of train timetabling operations, are directly related to the allocation of specific train paths under train timetables developed by PLK.

The costs of staff needed for preparing train timetables meet the requirements referred to in Article 3 (4) (d) of the EC Regulation and can be classified as direct costs.

1.4. Depreciation costs

Having regard to Article 4 (1) (n) of the EC Regulation, the need to apply a prudential approach to the calculations, and the international practice, PLK decided to use the support of an external expert in the implementation of the task “Formulation of the concept for estimating the amount of depreciation charges which are determined on the basis of real wear and tear of infrastructure due to the train service operation and development of relevant IT tools”. At the same time, the conformity of the method developed with the applicable rules of law was assessed by Law Firm Prof. Wierzbowski & Partners by soliciting a response to the query: “Can depreciation, which is determined based on real tear and wear of infrastructure due to the train service operation (Article 4 (1) (n) of the EC Regulation), be considered direct costs in the context of the exclusion from eligible fixed costs (Article 4 (1) (a) of the EC Regulation)?”

To establish a method for the calculation of the direct costs of depreciation on the basis of the actual wear and tear of railway infrastructure due to train movements, a study was conducted to analyse European practices related to the assessment of wear and tear of railway infrastructure due to train movements. The level of wear and tear of railway infrastructure (tracks, overhead contact lines, engineering structures) depends on a number of factors. This infrastructure is subject to wear and tear both due to train movements and natural degradation (which is always present, regardless of train movements) (e.g. biological corrosion, atmospheric corrosion, hydro-erosion). Factors related to train movements, which contribute to wear and tear of railway infrastructure, add to the complexity of this process. As a result of the analysis, given the limited information about relationships between wear and tear of infrastructure and train movements, the difficulty to use it in practice or the absence thereof, it was decided not to determine the depreciation of overhead contact lines and engineering structures on the basis of the actual wear and tear of railway infrastructure due to train movements. Given that the research into the wear and tear of tracks relative to train movements is definitely most abundant, the calculations were performed for mainline tracks. The wear and tear of mainline tracks due to train movement depends on a number of structural and operational parameters related to moving vehicles, such as weight, speed, power, axle load, number of axles, structural geometry, etc.

Pursuant to sections 4 and 5 of the recitals and Article 3 (3) of the EC Regulation the direct costs of depreciation were calculated using the historical values of fixed assets, based on the amounts paid to purchase them, which were required to be paid by PLK. The fixed

assets (subtype: mainline tracks) retrieved from the SAP FI-AA system were assigned with a nominal service life based on the SOKON method for assessing operational suitability of railway superstructure[7] and technical information providing the basis for adjustment of the nominal service life by real traffic rates (effects of train speed and axle load on the degradation of railway superstructure, effects of freight trains on the service life of tracks, effects of the quality of track geometry - vertical / horizontal irregularities expressed by synthetic coefficient J, effects of curvatures on the service life of rails and wooden sleepers). This is the basis for calculating the adjusted service life. The annual wear and tear on fixed assets due to train movement is calculated subsequently as a ratio of annual use and adjusted service life. On the other hand the costs of depreciation which is directly related to train movements are equal to the depreciation of fixed assets to the extent that they are financed internally multiplied by the ratio of the wear and tear factor and the accounting rate of depreciation.

Using the method for the determination of the depreciation costs based on the actual wear and tear of railway infrastructure due to train movement, the depreciation calculated in accordance with accounting principles is considered a non-eligible cost. The diagram below shows the process of the calculation of depreciation costs determined on the basis of real wear and tear of infrastructure due to train movements:

[7] Bałuch H. Metoda oceny zdatności eksploatacyjnej konstrukcji nawierzchni kolejowej „SOKON", Centrum Naukowo-Techniczne Kolejnictwa. Warszawa 2004

$$Wz = \frac{Q_a}{T_s}$$

W_z – rate of wear and tear
Q_a – annual use
T – adjusted service life

$$A_b = \frac{W_z}{A_k} * A_m$$

W_z – rate of wear and tear
A_b – direct depreciation
A_k – accounting rate of depreciation
A_m – depreciation financed from sw.

1. **Assignment of nominal service life (based on "SOKON", H. Bałuch*) to individual assets according to the combination of rails, tracks and sleepers, taking into account the nominal parameters of speed, axle loads, track maintenance rates and percentage rates of freight trains.**

2. **Adjustment of nominal service life according to real speed, axle load, track maintenance rate, percentage rate of freight trains and percentage rate of curvatures (using the formulas provided in "SOKON", H. Bałuch*).**

3. **Calculation of the annual wear and tear due to train movements as a ratio of the annual use and the adjusted service life.**

4. **Ratio of the annual wear and tear and the depreciation rate equals the accounting depreciation which arises directly from train movements.**

Non-eligible costs - depreciation calculated in accordance with accounting principles

Operational work factor

Average annual consumer price indices

2. Calculation of the unit rate for the standard fee based on the sub rates and adjustment factors, including their values, and calculation of the unit rate for the shunting fee

2.1. Rules for the calculation of the unit rates of the standard and shunting fees

In accordance with Article 33 (4)-(6) of the Act:

- the manager charges a railway undertaking fee for services provided as part of the minimum access to railway infrastructure in relation to the completed train movements, hereinafter the “standard fee”,
- the standard fee is calculated as the distance travelled by train multiplied by the unit rate determined for train movement over one kilometre,
- the unit rates for the standard fee are determined by the manager on the basis of direct costs that are incurred by the manager as a result of train movement. To recover the total costs incurred, the manager can increase relevant rates, provided that it demonstrates that such an increase is possible in the context of the state of the market,

In accordance with Article 33 (8)-(9) of the Act:

- the manager can charge railway undertakings a fee for services provided as part of the minimum access to railway infrastructure in relation to the completed shunting operations, hereinafter the “shunting fee”,
- the unit rates for the shunting fee are determined by the manager on the basis of direct costs that are incurred by the manager as a result of shunting operations.

In accordance with § 21 (1) - (4) of the Regulation:

- the unit rate of the standard fee, as referred to in Article 33 (4) of the Act, for services performed as part of the minimum access to railway infrastructure in relation to the train service operations is defined as a sum of the sub rate varying according to direct costs referred to in Article 33 (6) of the Act and the sub rate varying according to type of transport services,
- the sub rate varying according to direct costs is calculated as a sum of the sub rate varying according to train weight and railway line category and the sub rate varying according to train traction,
- the sub rate varying according to train weight and railway line category is calculated by multiplying the average rate according to train weight and railway line category by:
  1) rate factor varying the average rate according to train weight;
  2) rate factor varying the average rate according to railway line category

In accordance with § 21 (10) (3) and § 21 (11) (3) of the Regulation:

- the planned revenues from the standard and shunting fees, excluding the revenues related to the type of traction and the type of transport services, are to be equal to

the planned direct costs, excluding the costs of the provision of equipment supplying traction power.

In accordance with § 21 (12) of the Regulation, the sub rate varying according to traction:

1) is determined as the ratio of the planned direct costs of the provision of equipment supplying traction power and the planned operational work for trains using electric traction,
2) is 0 PLN/train-km for trains using traction other than electric traction.

In accordance with § 24 (1) of the Regulation:

- the shunting fee for services performed as part of the minimum access to railway infrastructure, related to completed shunting operations, is determined in the same way as the standard fee for train movement on a railway line of the lowest category.
- the manager can specify in the Network Statement the average weight of multiple railway vehicles to be shunted or the average distance of travel to be used for calculating fees.

2.2. Sub rates of the standard fee

2.2.1. Sub rate varying according to direct costs

2.2.1.1. Sub rate varying according to train weight and railway line category

2.2.1.1.1. Average rate varying according to train weight and railway line category

The determination of the average rate varying according to train weight and railway line category involves the following steps:

1) defining the direct costs of the minimum access to railway infrastructure:

   The planned amount of direct costs was determined on the basis of the amount of the relevant direct costs incurred in the last completed financial year, including:

   1) operational work factor, calculated as the ratio of the number of days in the annual train timetable for which the rates are determined and the number of days in the last completed year,
   2) the planned inflation rates for two subsequent years after the completed year or, in the case of the costs of salaries, the planned real gross salary growth rates in the national economy.

   The direct costs were determined in accordance with the Commission Implementing Regulation (EU) 2015/909 of 12 June 2015 on the modalities for the calculation of the cost that is directly incurred as a result of operating the train service (OJ L 148, 13.06.2015, p. 17).

   The unit rates for the minimum access to railway infrastructure were calculated on the basis of the following direct costs:

Specification	Planned costs (PLN)
Direct costs varying according to train weight and railway line category	1,868,208,609
Direct costs relating to the provision of equipment supplying electric power	42,179,059
Total	1,910,387,668

2) determination of the planned level and structure of operational work given by train-kilometres (train-km) and kilometres (km) of shunting operations.

The planned operational work was determined on the basis of the operational work in the last completed annual train timetable (2016/2017), taking into account the operational rate factor taken as the ratio of the number of days in the annual train timetable, for which the rate are being determined, and the number of days in the last completed annual train timetable.

The operational work rate is as follows:

Specification	Value
Number of days in the 2016/2017 Annual Timetable – L_1	364
Number of days in the 2018/2019 Annual Timetable – L_2	371
Operational work rate (number of days) $W_L = L_2 / L_1$	1.0192

The planned operational work during the existence of the 2018/2019 Annual Timetable is as follows:

Specification	All types of traction	Electric traction
Operational work (km)	240,332,421	195,699,707

The average rate ***S*** varying according to train weight and railway line category is equal to the ratio of the planned direct costs, excluding the costs of the provision of equipment supplying traction power, and the planned operational work:

$$S = \frac{1{,}868{,}208{,}609 \text{ PLN}}{240{,}332{,}421 \text{ km}} = 7.77 \text{ PLN/km}$$

2.2.1.1.2. Categories of railway line sections

In accordance with § 21 (5) of the Regulation:

- the manager defines the railway line categories according to parameters that have a significant impact on the costs of maintenance and renewal of relevant railway lines,
- the manager can in particular define railway line categories according to maximum acceptable speed or the maximum acceptable axle load,
- the individual categories are assigned a digit code so that the number of the category decreases as the line parameters increase,

- the railway line category is assigned to the entire railway line or its individual sections.

Factors related to train movements, which contribute to wear and tear of railway infrastructure, add to the complexity of this process. This is due a very large number of factors impacting the wear and tear and to how they are related to each other. The impact of a moving train on the wear and tear of components of railway infrastructure depends on a number of structural and operational parameters related to moving vehicles, such as weight, speed, power, axle load, number of axles, structural geometry, etc. As a result, studies aimed at establishing the relationship between the wear and tear of components of railway infrastructure, i.e. degradation of the permanent way, and the individual operational parameters are usually limited to the selection of one or several parameters and the determination of its/their impact, where the most important parameters are as follows:

- train speed,
- amount of transport (Tg/year),
- axle load,
- condition of the surface,
- percentage of freight trains,
- track geometry.

The superstructure degradation is a complex process which depends on a number of factors, where of greatest importance are the following[8]:

- structural properties of the permanent way (type of rails, type of sleepers, type of fastenings, thickness of the ballast layer, etc.),
- properties of the substructure (type of soil, dewatering system, protection against the negative effects of floods, etc.),
- track geometry (radius of curvature, track transition curve, cant, etc.),
- quality of works related to the construction and maintenance of the superstructure and substructure,
- operational properties (speed, transport intensity, features of rail vehicles, axle load, unsprung mass, stiffness of suspension, quality of maintenance, train weight, frequency of train movements).

The above parameter “operational properties”, which includes in particular the acceptable speed and the acceptable axle load referred to in the regulation, is also a function of multiple variables which are related to each other. The railway superstructure is composed of a large number of elements which are not exposed to uniform wear and tear. This means that all the attempts of scientists to estimate the wear and tear on the permanent way due to train movement are simplified procedures to a certain degree.

[8] Bałuch M. Interpretacja pomiarów i obserwacji nawierzchni kolejowej. Zakład Poligraficzny Politechniki Radomskiej. Radom 2005.

An analysis of wear and tear of the permanent way as an integral system of rails and sleepers is reflected in the expert system 'SOKON' developed by Prof. Henryk Bałuch, where various operational factors are determined for the individual combinations of different permanent ways. The relationships presented further in this document were used in the expert system SOKON.

Given the above, the categories of railway line sections were defined based on 2 parameters that have "a significant impact on the costs of maintenance and renewal of relevant railway line sections":

a) **maximum acceptable speed**, taking into account the following ranges:

Speed range	1	2	3	4
Average maximum acceptable speed defined for a railway line section	V_{max}> 120	80<V_{max}≤120	40<V_{max} ≤80	0<V_{max} ≤ 40

The above ranges take into account the classification of railway lines in accordance with the Regulation of Minister of Transport and Maritime Economy of 10 September 1998 on the technical conditions which should be met by railway structures and their locations (Journal of Laws of 1998 No. 151, item 987, as amended) in relation to trunk and primary lines (120 km/h and 80 km/h). The limit between intervals 3 and 4 was assumed at 40 km/h given the significant differences in the expenditure required for maintaining the line in technical condition which guarantees safe operation of the train service at speeds within these intervals.

The acceptable speed on a railway line, in accordance with the technical standard of the provided portion of the railway line, is determined as the average maximum speed, taking into account permanent limitations, calculated for a given section of the railway line. The average acceptable speeds for a section, taking into account permanent limitations for the odd and even directions, are calculated based on the information in the database of the Network Description System (POS) and the information about permanent limitations for the next train timetable. The algorithm takes into account the type of limitation - continuous or point limitations, and the impact of limitations on the maximum acceptable run-through speed. For the purpose of determination of the category of a section, the lower value of the calculated values of average permissible technical speed is selected, i.e. in case of a single-track line the lower of the 2 calculated values for even and odd directions, and in case of a double-track line the lower of the 2 calculated values taking into account the speeds for track 1 and 2 for even and odd directions.

After determining the average acceptable speed, it is checked whether the lower speed limit in the determined interval is applicable to at least half of the length of tracks of the selected direction for which a speed was assumed to determine the category. If the above condition is not satisfied, the category according to speed is reduced by 1 (e.g. from 3 to 4), and then the condition is re-evaluated.

b) **class of the railway line**

The class of a railway line section is determined using the digit codes given below, based on the maximum acceptable axle and linear loads as follows:

Code	Axle load (kN/axle)	Linear axle load (kN/m)
A	157	49
B1	177	49
B2	177	63
C2	196	63
C3	196	71
C4	196	78
D2	221	63
D3	221	71
D4	221	78

The classes of railway lines are defined based on Module A1 “Classification of the use of railway lines and vehicles” included in the “Technical requirements for the maintenance of permanent way on railway lines (Id-1)” (D-1). Module A1 was developed based on the methodology of PN-EN 15528:2015-12 Railway applications - Line categories for managing the interface between load limits of vehicles and infrastructure.

In the case of different axle loads or linear loads present on railway line sections, the class of the line section is determined based on the lowest axle load or linear load.

Information about the classes of individual railway line sections is the database of the Network Description System (POS).

Taking into consideration the acceptable speeds and the classes railway lines classified into one of the 4 classes (A, B, C, D), the following 4 categories of railway line sections were defined:

Speed range	Railway line class for determination of rates	Railway line section category
4	A	4
4	B	4
4	C	4
4	D	4
3	A	4
3	B	4
3	C	3
3	D	3

Speed range	Railway line class for determination of rates	Railway line section category
2	A	4
2	B	4
2	C	3
2	D	2
1	A	4
1	B	4
1	C	3
1	D	1

and the above railway line class includes for the purpose of determination of rates:

- class B: B1 and B2 lines,
- class C: C2, C3 and C4 lines,
- class D: D2, D3 and D4 lines.

2.2.1.1.3. Rate factors varying the average rate according to railway line category

The rate factors varying the average rate according to railway line category were determined on the basis of:

1) coefficient of degradation v_s depending on the average acceptable speed according to the formula relating the train speed and the degradation of the permanent way:

$$v_s = \sqrt[3]{(1 + 0.012V)^2}$$

where:

v_s – degradation rate,

V – train speed.

2) the coefficient η expresses the impact of axle load due to rail vehicle movements on the service life of rails according to the formula:

$$\eta = 5 \cdot 10^{-3} \cdot P_n,$$

where:

P_n – axle load (kN)

The above formulas were used in the SOKON method for assessing operational suitability of permanent way[9], which was developed by Prof. Henryk Bałuch.

[9] Bałuch H. Metoda oceny zdatności eksploatacyjnej konstrukcji nawierzchni kolejowej SOKON. Podstawy opracowania oraz instrukcja użytkowania. Centrum Naukowo-Techniczne Kolejnictwa. Warszawa 2004

The procedure for calculating the rate factor varying the average rate according to railway line category is described below:

1) determination of the tariff category for each section in accordance with 3.2.1.1.2;
2) calculation of coefficient v_s, which varies according to average acceptable speed calculated for a railway line section, for each j-th section according to the formula:

$$v_{sj} = \sqrt[3]{(1 + 0.012Vj)^2}$$

3) calculation of coefficient η, which expresses the impact of axle load due to rail vehicle movements on the service life of rails, for each j-th section according to the formula:

$$\eta = 5 \cdot 10^{-3} \cdot P_{nj}$$

4) calculation of the product of the coefficients for each j-th section:

$$W_{kat\ j} = v_{sj} * \eta_j$$

5) determination of rate factor $W_{kat\ n}$ (where n - digit for the category number) for each railway line category (a total of 4 tariff categories are defined: 1, 2, 3 and 4) as an average value (weighted by the length of sections of a given category) of the product of coefficients v_{sj} and η_j calculated for each j-th section;
6) the 4 rate factors $W_{kat\ j}$ calculated in section 5 are used to determine a function defining the rate factor varying the average rate according to railway line category for average categories calculated for individual train paths with an accuracy to the first decimal place, i.e. for an average category 1.0, 1.1, ... 3.9, 4.0);
7) the function determined in section 6 is used to calculate rate factors W_K varying the average rate according to railway line category defined with an accuracy to the first decimal place;

   The above procedure results in rate factors W_K for 31 average categories calculated for individual train paths (starting from the average category 1.0, 1.1, ... to 3.9, 4.0).
8) determination of the average railway line category, for which the rate factor varying the average rate according to railway line category is 1, rounded to the first decimal place, based on the data relating to all train movements during the existence of the 2016/2017 train timetable, taking into account the categories of the planned sections as at the date of implementation of the 2018/2019 train timetable, as an average weighted by the length of sections covered by train movements on railway lines of a given category.

$$K_{avg} = 2.3$$

9) the rates determined in accordance with section 7 are adjusted so as to ensure compliance with the condition referred to in § 21 (11) (1) of the Regulation:
   - it was 1 for an average railway line category.

   The rate factors determined in accordance with point 7 are converted based on the ratio of the rate factor determined for each of 31 average categories calculated for the individual train paths (from the average category 1.0, 1.1 ... to the average

category 3.9, 4.0) and the rate factor determined for the average railway line category K_{avg} = 2.3.

2.2.1.1.4. Rate factors varying the average rate according to train weight

In accordance with § 21 (9) of the Regulation:

- the manager specifies in the Network Statement a formula for determination of the rate factor varying the average rate according to train weight,
- alternatively, the manager can establish equal weight intervals of at least 10 tonnes and not greater than 100 tonnes, for which rate factors varying the average rate according to train weight are calculated.

Equal weight intervals of 60 tonnes were used, for which rate factors varying the average rate according to train weight are calculated.

In accordance with § 21 (25) of the Regulation:

- the manager determines the train weight to calculate the unit rate for the standard fee and the standard fee on the basis of the existing or the planned status.

The unit rate for the standard fee and the standard fee were **calculated on the basis of the planned train masses**.

The rate factors W_M varying the average rate according to train weight were determined based on the transport intensity factor ϖ which describes the relationship between degradation of permanent way and the transport intensity:[10]

$$\varpi(q) = 0.38 + 0.08 \cdot q - 0.0009 \cdot q^2$$

where:

ϖ – transport level factor,

q – amount of transport [Tg/year].

For each weight interval, the transport intensity q was calculated as a ratio of the average train weight in a given interval and the average number of trains per 1 kilometre of tracks during the period of existence of the 2018/2019 train timetable.

The procedure to determine rate factors varying the average rate according to train mass is as follows:

1) determination of transport intensity q_i for each i-th mass range according to the formula:

$$q_i = M_{avg\ i} * N_{train}$$

where:

$M_{avg\ i}$ – average train gross weight in the i-th weight range,

N_{poc} – average number of trains per 1 km of tracks.

[10] Bałuch M., Interpretacja pomiarów i obserwacji nawierzchni kolejowej. Zakład Poligraficzny Politechniki Radomskiej. Radom 2005.

The average train gross weight in the weight interval is determined as an average weighted by the length of sections covered by trains of given weight.

In the absence of movements of trains in a given weight range, the average weight is taken as the median of the range.

2) determination of transport intensity rates W_{Mi} for each i-th weight range according to the formula:

$$W_{Mi} = 0.38 + 0.08 * q_i – 0.0009 * q_i^2$$

3) determination of the average train weight with an accuracy to 1 tonne based on information about trains allocated under the 2016/2017 train timetable as an average weighted by the length of distances travelled by trains of given weight,

$$M_{avg} = 660 \text{ tonnes}$$

4) adjustment of rate factors W_{Mi} for individual weight intervals so that the rate factor W_M is 1 for the interval 660 ≤ M < 700 tonnes, containing the average weight M_{avg} = 660 tonnes.

The rate factors determined in accordance with point 2 are converted based on the ratio of the rate factor determined for a given weight interval and the rate factor determined for the average train weight.

The calculated rate factors WMi are used for varying the average rate according to train gross weight and for checking, taking into account the rate factors WK varying the average rate according to railway line category, calculated in accordance with point 3.2.1.1.2, that the planned revenues, including the revenues related to the type of traction and the type of operations, equal the direct costs, excluding the costs of equipment supplying traction power.

2.2.1.1.5. Adjustment of rate factors varying the average rate according to train weight based on the relationship “planned revenues = direct costs”

Based on the following components:

- average rate varying according to train weight and railway line category in accordance with section 3.2.1.1.1,
- rate factors W_K varying the average rate according to railway line category in accordance with point 3.2.1.1.3,
- rate factors varying the average rate according to train weight W_{Mi} in accordance with section 3.2.1.1.4,
- operational work of trains in the individual 84 weight ranges and 31 average railway line categories, and shunting work, provided that the average weight of a train set to be shunted lies in the range 120 ≤ *M* < 180 tonnes and the railway line category is 4 as determined based on § 24 (1) of the Regulation,

the planned revenues from the standard and shunting fees are calculated.

If there is a difference between the planned revenues from the standard and shunting fees, and the direct costs varying according to train weight and railway line category, the rate factors W_{Mi} varying the average rate according to train weight are adjusted.

The rate factors W_K varying the average rate according to railway line category, calculated in accordance with point 3.2.1.1.3, were assumed as final rate factors on the ground that the parameters underlying the railway line category (acceptable speed, class of the line) impact the costs of maintenance and renewal as described with the relationships given herein.

Given that the unit rates are rounded to two decimal places, the difference “planned revenues - direct costs” arising from the adjustment of the rate factors varying the average rate according to train weight is nearly equal to 0 (zero).

2.2.1.2. Sub rate varying according to traction

The sub rate ***T*** varying according to train traction equals the ratio of the planned direct costs of the provision of equipment supplying traction power and the planned operational work for trains using electric traction, including the planned number of kilometres of shunting operations using electric traction.

$$T = \frac{42\ 179\ 059\ \text{PLN}}{195\ 699{,}707\ \text{km}} = 0.22\ \text{PLN/km}$$

2.2.2. Sub rate of the standard fee varying according to type of transport services

The sub rate related to the type of transport services was determined based on the results of a market study conducted by the Warsaw School of Economics (SGH) in 2016 and its updated version of 2017, which takes into account the regulation of 7 April 2017.

In the 2016 market study, the following segments were included:

1) passenger:
   - Regional passenger trains
   - Interregional passenger trains
   - Regional passenger transport with PSC
   - Regional passenger transport without PSC
   - Interregional passenger transport with PSC
   - Interregional passenger transport without PSC
   - Annual timetable
   - Individual timetable
   - Domestic transport
   - International transport;
2) freight:
   - Dangerous Goods
   - Other goods
   - Intermodal transport

- Transport by rail only
- Bulk transport
- Single-wagon transport
- Annual timetable
- Individual timetable
- Domestic transport
- International transport
- Trains providing special carriage services
- Other trains
- Return freight trains servicing loading stations along the line
- Freight trains other than return trains.

The calculations performed and the sub rate varying according to type of transport services, as determined on the basis of market studies carried out in 2017, take into account:

- specification of the sub rate varying according to type of transport services by a single numerical value which is independent from the railway line category and the train gross weight range,
- the "application" of the sub rate varying according to type of transport services to freight trains other than "intermodal" trains, and calculation of the sub rate varying according to type of transport services for left-closed train weight intervals, starting from weight *M* in the interval: 660 ≤ M < 720 tonnes,
- the amount required to cover the difference between planned revenues to be derived from fees in accordance with the multi-annual programme 'Assistance with costs relating to the management of railway infrastructure, including its maintenance and renewal, until 2023', as amended by the Council of Ministers Resolution No. 7/2018 of 16 January 2018, and reduced revenues due to the specification of unit rates for the 2018/2019 standard and shunting fees on the basis of direct costs determined in accordance with the Commission Implementing Regulation (EU) 2015/909.

  The table below shows the calculated sub rate varying according to type of transport services.

No.	Specification	Value
1	Revenues to be derived from fees resulting from the sub rate varying according to type of transport services (million PLN)	66.8
2	Planned operational work of trains covered by the sub rate varying according to type of transport services (million PLN)	52.2
3	Sub rate varying according to type of transport services for freight trains of at least 660 tonnes gross weight, except intermodal transport (PLN/train-km): item 1 / item 2	1.28

2.3. Unit rates for the shunting fee

The unit rate for the shunting fee is equal to the average unit rate varying according to train weight and railway line category multiplied by:

1) rate factor varying the average rate according to train weight, determined for shunters with weight within the interval 120 ≤ M < 180 tonnes;
2) rate factor varying the average rate according to railway line category, determined for 4 railway line categories.

2.4. Unit rates for the standard and shunting fees

Based on the calculations performed in accordance with the methodology described in sections 3.1-3.3, a draft tariff for the 1435 mm track gauge railway infrastructure was developed, effective from 9 December 2018, which contains in particular information on how the standard and shunting fees are determined. The unit sub rates for the standard fee, rate factors and unit rates for the shunting fee are given below.

Unit rate for the standard fee

Sub rates

Sub rate varying according to direct costs

Sub rate varying according to train weight and railway line category

The sub rate varying according to train weight and railway line category is calculated by multiplying the average rate according to train weight and railway line category by:

1) the rate factor W_M varying the average rate according to total planned train gross weight;
2) the rate factor W_K varying the average rate according to railway line category.

Average rate according to train weight and railway line category **S = 7.77 PLN/train-km**.

Rate factors

Rate factors W_M according to total planned train gross weight

Gross weight (t)	Rate factor W_M
M<60	0,3800
60≤M<120	0,5100
120≤M<180	0,6200
180≤M<240	0,7400
240≤M<300	0,8400
300≤M<360	0,9000
360≤M<420	0,9600
420≤M<480	0,9800
480≤M<540	0,9850

Gross weight (t)	Rate factor W_M
2520≤M<2580	2,3359
2580≤M<2640	2,3792
2640≤M<2700	2,4380
2700≤M<2760	2,4634
2760≤M<2820	2,5076
2820≤M<2880	2,5407
2880≤M<2940	2,5789
2940≤M<3000	2,6300
3000≤M<3060	2,6520

Gross weight (t)	Rate factor W_M
540≤M<600	0,9910
600≤M<660	0,9980
660≤M<720	1,0000
720≤M<780	1,0644
780≤M<840	1,1016
840≤M<900	1,1422
900≤M<960	1,1698
960≤M<1020	1,2132
1020≤M<1080	1,2471
1080≤M<1140	1,2849
1140≤M<1200	1,3466
1200≤M<1260	1,3742
1260≤M<1320	1,4230
1320≤M<1380	1,4621
1380≤M<1440	1,5000
1440≤M<1500	1,5655
1500≤M<1560	1,5914
1560≤M<1620	1,6427
1620≤M<1680	1,6814
1680≤M<1740	1,7225
1740≤M<1800	1,7899
1800≤M<1860	1,8199
1860≤M<1920	1,8686
1920≤M<1980	1,9065
1980≤M<2040	1,9490
2040≤M<2100	2,0142
2100≤M<2160	2,0395
2160≤M<2220	2,0922
2220≤M<2280	2,1245
2280≤M<2340	2,1686
2340≤M<2400	2,2323
2400≤M<2460	2,2551
2460≤M<2520	2,3073

Gross weight (t)	Rate factor W_M
3060≤M<3120	2,6939
3120≤M<3180	2,7244
3180≤M<3240	2,7633
3240≤M<3300	2,7972
3300≤M<3360	2,8232
3360≤M<3420	2,8524
3420≤M<3480	2,8874
3480≤M<3540	2,9204
3540≤M<3600	2,9467
3600≤M<3660	2,9745
3660≤M<3720	3,0102
3720≤M<3780	3,0202
3780≤M<3840	3,0540
3840≤M<3900	3,0772
3900≤M<3960	3,0958
3960≤M<4020	3,1159
4020≤M<4080	3,1458
4080≤M<4140	3,1630
4140≤M<4200	3,1790
4200≤M<4260	3,1961
4260≤M<4320	3,2093
4320≤M<4380	3,2298
4380≤M<4440	3,2431
4440≤M<4500	3,2497
4500≤M<4560	3,2614
4560≤M<4620	3,2717
4620≤M<4680	3,2823
4680≤M<4740	3,2903
4740≤M<4800	3,2959
4800≤M<4860	3,3011
4860≤M<4920	3,3045
4920≤M<4980	3,3069
4980≤M<5040	3,3083

Rate factors W_K varying the rate according to railway line category

The railway line category for a given train path is determined as an average railway line category weighted by the length of individual sections, rounded to the first decimal place.

The available railway line categories are specified in the List of the 1435 mm track gauge railway lines managed by PKP Polskie Linie Kolejowe S.A. and their tariff categories, effective from 9 December 2018, published in the 2018/2019 Network Statement.

Average category	Rate factor W_K
1.0	1.2191
1.1	1.2069
1.2	1.1936
1.3	1.1793
1.4	1.1642
1.5	1.1482
1.6	1.1315
1.7	1.1142
1.8	1.0962
1.9	1.0778
2.0	1.0588
2.1	1.0395
2.2	1.0198
2.3	1.0000
2.4	0.9799
2.5	0.9598

Average category	Rate factor W_K
2.6	0.9397
2.7	0.9196
2.8	0.8996
2.9	0.8798
3.0	0.8602
3.1	0.8410
3.2	0.8222
3.3	0.8039
3.4	0.7862
3.5	0.7690
3.6	0.7526
3.7	0.7369
3.8	0.7220
3.9	0.7080
4.0	0.6951

Sub rate varying according to traction

Part of the rate according to traction for trains and shunting operations based on electric traction **0.22 PLN/km.**

Sub rate varying according to type of transport services

The sub rate varying according to type of transport services for freight trains of at least 660 tonnes gross weight, providing transport services other than intermodal services, is **1.28 PLN/train-km**.

The revenues from the basic and shunting fee for the use of the railway infrastructure with the track gauge of 1435 mm in the period for which the 2018/2019 train schedule applies, shall be monitored and reported to the President of the Railway Transport Office (UTK) as at 31 March 2019, 30 June 2019, 30 September 2019 and 14 December 2019 until the end of the following month. After the end of the 2018/2019 train schedule application, the difference between the revenues from the basic and shunting fee and the planned revenues from the basic and shunting fee for the use of railway infrastructure with a track gauge of 1435 mm for 2019 will be determined according to the multi-annual program.

The part of the unit basic fee rate related to the type of performed transport services shall be reimbursed in full to the carriers when the actual revenue from the basic fee and the shunting fee for the use of the railway infrastructure with the track gauge of 1435 mm are higher than the revenue planned under the multi-annual program, i.e. PLN 66.8 million.

The part of the unit basic fee rate related to the type of performed transport services shall be reimbursed in part to the carriers if the difference between the actual and planned revenues from the basic fee and the shunting fee for the use of railway infrastructure with the track gauge of 1435 mm is greater than zero and lower than PLN 66.8 million, as provided for in the multi-annual program. The part of the rate to be reimbursed to the carriers relating to the type of performed transport service shall be set as the difference between PLN 1.28 per 1 train km and the updated rate part relating to the type of performed transport service. The updated part of the unit basic fee rate relating to the type of performed transport service shall be determined as the quotient of the difference between the actual and planned revenues from the basic fee and the shunting fee and the service provided by freight trains subject to a part of the rate depending on the type of transport service, as provided for in the multi-annual program.

After the end of the 2018/2019 train schedule application, at the latest by 31 January 2020, correction invoices shall be issued taking into account the reimbursement of the part of the unit basic fee rate relating to the type of performed transport service, in whole or in part.

The table below shows the planned average unit rates of the standard fee in accordance with the 2018/2019 draft tariff.

Specification	Average unit rate for the standard fee according to the draft of 2018/2019 tariff (PLN/train-km)
Passenger and goods carriers, where:	8.28
Passenger carriers	6.10
Goods carriers	12.80

Unit rates for the shunting fee

No.	Specification	Unit rate for the shunting fee (PLN/km of distance travelled)
1	Single or multiple motive power units using electric traction	3.57
2	Single or multiple motive power units using another type of traction	3.35