

AL-FARABI KAZAKH NATIONAL UNIVERSITY

«Approved»
Al-Farabi Kazakh National University
Member of the Board – Vice Rector for the
Scientific and innovative activities
Zh. Aitzhanova
2024 y.

Calculation of bicycle parking on the territory at the Al-Farabi Kazakh National University Campus

Calculation of bicycle parking on the territory of KazNU Campus

According to (1) in KazNU named after Al-Farabi 2224 academic staff and 29058 students of all levels of education carry out activities.

Based on the calculation that 30% of faculty and 60% of students will use bicycle transport, then:

Estimated number of faculty members using bicycle transport

2224*30%= 667 academic staff.

Estimated number of students using bicycle transport

29058*60% = 17435 learners.

The recommended number of car parks can be calculated using the following formula (2):

Qb.p. =
$$\frac{Q_1}{t_1} * \frac{t_2}{60} * n + Q2$$

Here:

Qb.p. - required number of bicycle parking places, pcs;

 Q_1 - number of visitors per day, people. $Q_1 = 17435$ people;

Q₂ - number of bicycle parking places for employees, Q2=667 academic staff;

 t_1 - number of hours in a working day, t1 = 8 hrs;

 t_2 is the average length of stay of a visitor in your institution, 5.5*60=330 min (average time of stay of students on campus);

n - percentage of visitors who use a bicycle n = 95% (confidence probability of statistical security of the use process).

Qb.p. =
$$\frac{17435}{8} * \frac{330}{60} * 0.95 + 667 = 12054$$
 seats

This number of car parking spaces is in line with indicative values for countries in Europe and the USA (2), where the norms prescribe 0.4-0.8 spaces per student and 0.4 spaces per teacher.

According to the current Road Traffic Rules of the Republic of Kazakhstan, electric bicycles are equal to classic bicycles or electric scooters. But there is one important nuance: the speed limit of such a vehicle must not exceed 25 km/h. If it is exceeded, such equipment is equated to mopeds. Then, according to Table B1 (3), unless otherwise stated, this equipment will be classified as category I motor vehicles and may require separate parking facilities from conventional bicycles. It is possible that such parking facilities for electric bicycles could be located next to car parks.

In this case, the minimum distance from the building shall not be less than 10m with the number of car spaces equal to 11-50.

It should also be considered that for persons with disabilities, the distance from the building should not exceed 50 metres.

Let's assume that 10 % will be needed for electric bicycles. Then the estimated number of car parks for conventional bicycles is:

12054*0,9=10849 places

According to (4, 5), to ensure that cycle parking facilities are user-friendly and do not interfere with pedestrians, the required distances between the racks and other objects should be maintained (Figure 1):

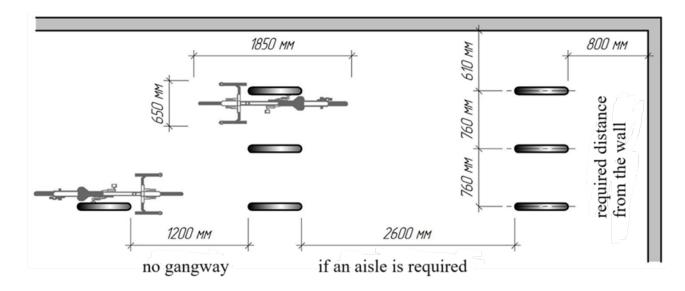


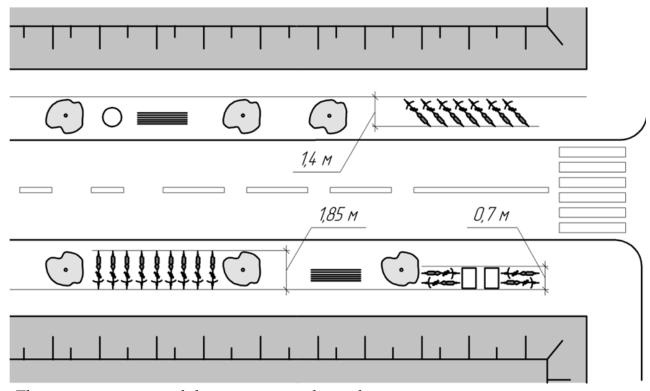
Figure 1 - Minimum required distances for the creation of cycle parking facilities

Each row of parked bicycles should have a space of 1850 mm. Normal bicycles are slightly shorter in length and can easily be accommodated in this space.

- 1. The required distance from the wall or other obstacle to the posts is 800 mm. Side clearance 610 mm.
- 2. the interval between the racks is 760 mm. This distance provides sufficient access space and allows two bicycles to be mounted on one rack.
- 3. If more than two rows are installed, aisles are built between them. The minimum distance between the posts in such an aisle is 2600 mm. The width of the aisle between the outermost points of the bicycle tyres will be sufficient for one person to walk and roll the bicycle. In areas with a high flow of cyclists, where several people leave and pick up bicycles at the same time, the recommended minimum distance between the racks is 3100 mm.
- 4. When two rows are arranged and there is sufficient space for access from both sides, the minimum distance between the posts is 1200 mm.

In tight spaces, angled and parallel types of parking can be used. Bicycle parking at an angle of 45 degrees saves more space. The length of the row can be reduced to 1.4 metres. It also has a number of advantages:

- less chance of bike handlebars getting tangled, even with a small distance between them;
 - easier to get the bike out of the car park;
 - A bicycle parked at an angle requires less manoeuvring space.



The minimum required distances are indicated

Figure 2 - Different types of parking (angled, transverse and parallel):

If there are a large number of bicycles in tight spaces, two-level car parks can be used (Figure 3a). One disadvantage is the lifting of the bicycle to the second level, which sometimes requires secure attachment structures to prevent unwanted injuries and fractures.

Suspended cycle parking (Figure 3b) is characterised above all by its space-saving properties. It is usually placed where it is difficult to store bicycles horizontally: in narrow passageways, in underground car parks of future and existing buildings, at workplaces, etc. If such parking is placed in open, unprotected areas, it must be accompanied by additional structures for U-locks and ropes.





Figure 3 - Two-level-a and suspended-b car parks

With storage safety and stability in mind, designs with single wheel attachments socalled toasters, hangers, butterflies and school fences are inefficient and inconvenient to use.

Sources used:

- 1 https://farabi.university/university/about#infografica
- 2 https://veloparkovki.com.ua/ru/kak-rasschitat-nuzhnoe-kolichestvo-velosipednykh-parkovok
- 3 Code of rules of RK 3.03-105-2014 Car parking places. Astana: KazNIISA JSC 82c.
- 4 GOST IC 33150-2014. Automobile roads of general use. Designing of pedestrian and bicycle paths. General requirements. Moscow: Standardinform, 2015 11 pp.
 - 5 file:///C:/Users/user/Downloads/veloparkovka rukovodstvo po razmescheniyu.pdf