



AL-FARABI KAZAKH NATIONAL UNIVERSITY

«Approved»

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_____ 2024 y.



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

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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

$$2224 * 30\% = 667 \text{ academic staff.}$$

Estimated number of students using bicycle transport

$$29058 * 60\% = 17435 \text{ learners.}$$

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

$$Q_{b.p.} = \frac{Q_1}{t_1} * \frac{t_2}{60} * n + Q_2$$

Here:

$Q_{b.p.}$ - required number of bicycle parking places, pcs;

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

Q_2 - number of bicycle parking places for employees, $Q_2 = 667$ academic staff;

t_1 - number of hours in a working day, $t_1 = 8$ 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).

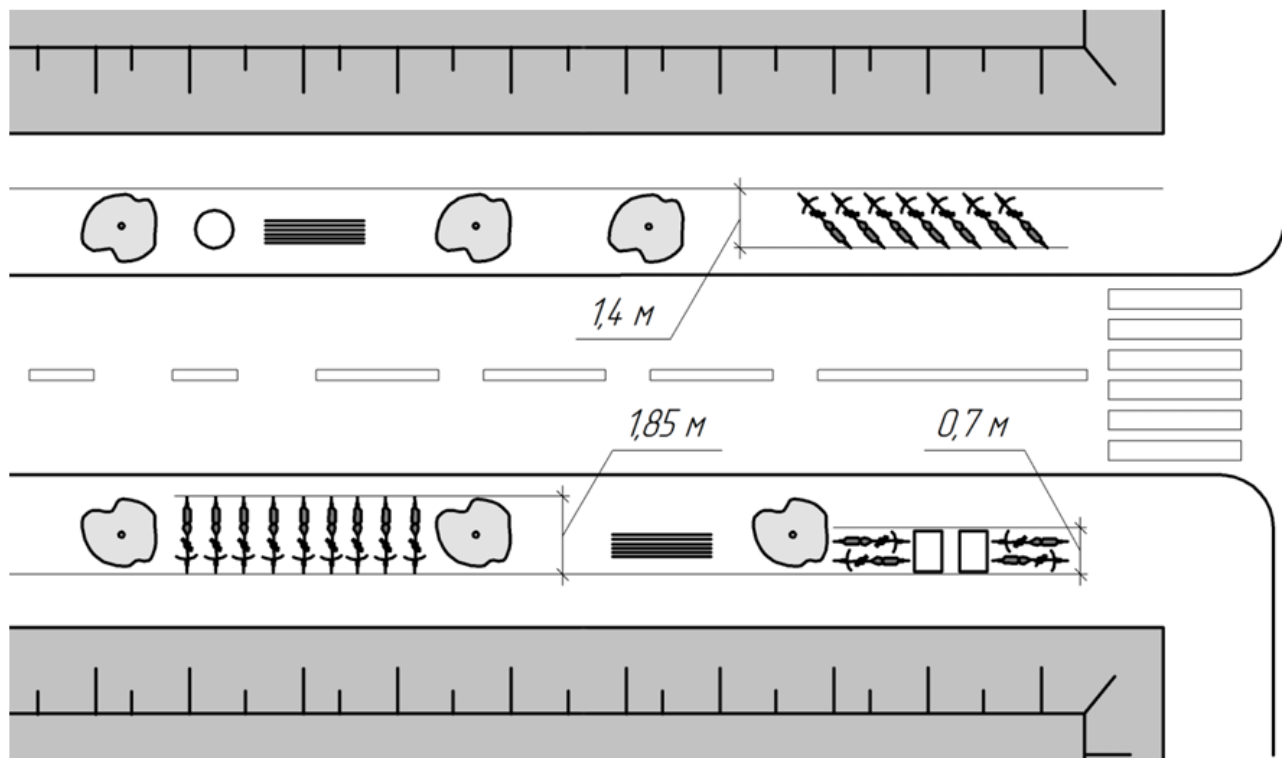
$$Q_{b.p.} = \frac{17435}{8} * \frac{330}{60} * 0.95 + 667 = 12054 \text{ seats}$$

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.

- 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.

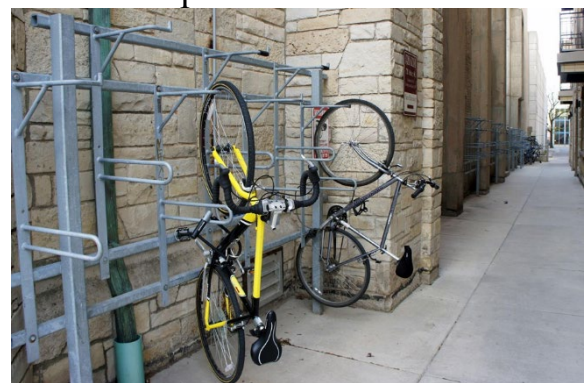
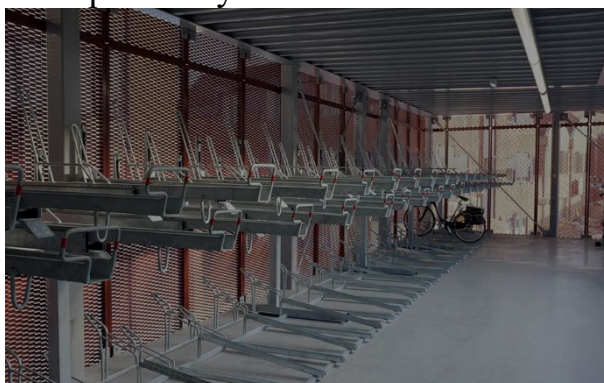


Figure 3 - Two-level-a and suspended-b car parks

With storage safety and stability in mind, designs with single wheel attachments so-called 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_ukovodstvo_po_razmescheniyu.pdf