

## TECHNICAL ELEMENTS IN SUBURBAN FORESTS USED FOR RECREATION

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### **Abstrakt**

The aim of the paper is to present the possibilities of improving the recreational function of certain localities by designing suitable equipment and technical elements. On the one hand, the public can enjoy spending their free time in nature by locating certain facilities and designing routes. On the other hand, it is necessary to regulate the movement of visitors to avoid collisions with forestry or collisions between different groups or operators of different sports activities. The implementation and modification of rest areas, nature trails, information boards, restoration and maintenance of wells or monuments can make localities more attractive. These modifications can serve as a destination for short trips in locations where there are no interesting views, nice meadows, or other beautiful natural environments.

Earth screws can be used to anchor wooden structures and elements instead of concrete foundations.

**Key words:** nature trails, rest areas, wooden structures, Earth screws

### **Introduction**

Suburban forests, as specified in the Forest Act (No. 289/1995 Coll., the Forest Act and on Amendments to Certain Acts), fall into the category of special purpose forests, which are forests where the public interest in improving and protecting the environment or other legitimate interest in fulfilling non-productive functions of the forest is superior to production functions. In most large cities, the recreational function predominates in suburban forests. People use this forest environment for physical and mental rest, for walking, relaxation or sport. In addition to the recreational function, these forests are assumed to have a bioclimatic function (mitigating wind speed or temperature extremes, increasing humidity, etc.) or a hygienic function (trapping dust, micro-organisms, noise, regenerating and ionising the air, etc.).

Health affects all areas of a person's life. It determines the integration of people in society, classifies or, on the contrary, excludes people from certain jobs. Disability, especially physical, mental or sensory disability, limits a person in his life (Buřvalová, 2007). Especially for the physically disabled, their condition does not allow them to perform some types of sports, but can be a complication in the actual transportation if the roads are not wheelchair accessible. Physical disabilities often prevent people from realizing even walking in the forest. In order to help people with disabilities to live independently and to participate in society, it is necessary to make not only buildings but also nature accessible and to allow free movement in them. Removing barriers will fulfil the right to freedom of movement. Barriers do not only affect disabled people, but a much wider range of people, namely older people with reduced mobility, people with prams and small children, or people temporarily disabled after an accident.

### **Materials and methods**

For the creation of barrier-free routes and for the design of technical accompanying elements in the suburban forest, it is possible to rely on Decree No. 398/2009 Coll. (Decree on general technical requirements ensuring barrier-free use of buildings). The results of a project focused on the issue of identifying the necessary requirements and setting parameters for designing forest paths for wheelchair users in the Czech Republic, Poland and Slovakia (Fialová et al., 2015) were used in the preparation of this article.

Which technical elements should be proposed in suburban forests is clear from the results of the survey, which was the basis for the "Concept of the use of suburban forests of Brno" (Sekanina et al., 2011). People mostly look for wells, sitting areas with shelters or nature trails (see Figure 1), but with the main principle of quality routing through interesting nature and with quality marking of the route.

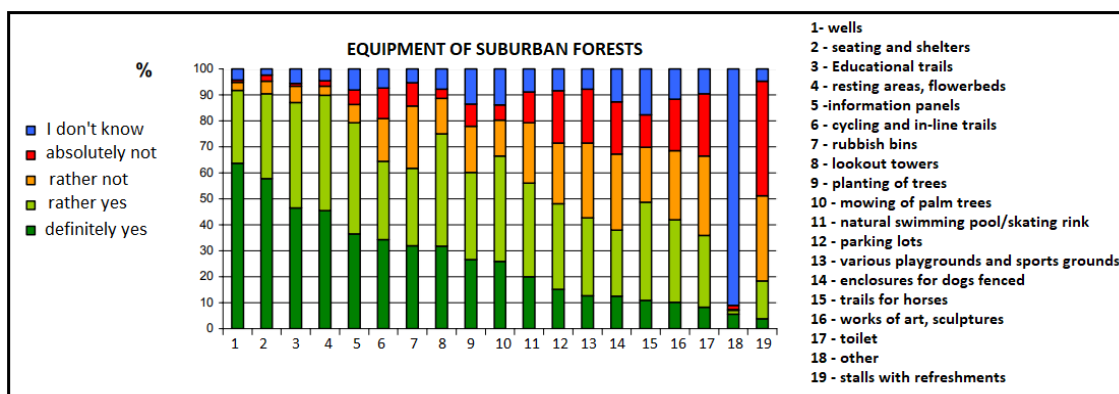


Fig. 1: Preference for suburban forest amenities (lesweb.brno.cz)

Forest paths will never be fully accessible, so information about "barrier" or "barrier-free" will need to be communicated to groups of people who have any mobility limitations. According to the methodology developed in cooperation with the Prague Wheelchair Organisation (POV) and adopted by the Ministry of Regional Development as a methodology for off-road routes, the Czech Tourist Club classifies routes for wheelchair users into three levels of difficulty. Accessible routes - blue are intended for less able wheelchair users, unaccompanied wheelchair users, handbikes and electric wheelchairs, where the routes must lead on paths with asphalt, concrete or natural paved surface, which does not get wet and muddy even in rainy weather, the terrain roughness should not exceed 20 mm. The gradient should have a slope of up to 2% or a maximum gradient of 8% for a section length of up to 9 metres. The cross slope is to be a maximum of 2 %. The road should be 1,8 m wide, short straight passages may be 1,0 m wide. Partially accessible routes - red are intended for able-bodied wheelchair users, wheelchair users with an escort, handbikes and electric wheelchairs, which must lead along paths with asphalt, concrete or even natural paved surface, which, however, does not get wet and muddy even in rainy weather, the terrain unevenness should not exceed 50 mm. The gradient should have a slope of max. 6 %, or max. 12 % for the length of the section up to 9 metres. The cross slope shall be a maximum of 2 %. Cross slope max. 2 %, or 4 % only in the case of a longitudinal slope of max. 2 %. Path width min. 1,2 m, short straight passages min. 0,9 m. Difficult to access routes - black routes are suitable for wheelchair users with an escort and all-terrain electric wheelchairs. Routes may also lead on natural surface paths, which may become slightly waterlogged or muddy in places in wet weather, the terrain roughness should not exceed 70 mm. Gradient up to 12%, or max. 20% for sections up to 9 m long. Cross slope max. 2 %, cross slope max. 6 % only in case of longitudinal slope max. 2 %. Path width in straight sections min. 1 m, in curves 1,2 m, short straight passages min. 0,8 m. (kct.cz/vozickarske-trasy)

## Results

When walking in the forests, people will welcome natural attractions (rocks, springs, watercourses, fauna and flora) as well as man-made ones (small buildings and technical elements in the landscape). Characteristic features of a recreational forest are certain stand modifications (choice of tree species, stand structure, increase in clearing age, aesthetic treatment of stands), restrictions on certain economic activities (heavy mechanisation, application of pesticides, fertilisation) and recreational facilities. It is not desirable to build in the suburban forest buildings for recreational facilities of the type of hotels, guesthouses, cottages, kiosks, but only furnishings - small shelters, benches, tables, covered fireplaces, etc. Although the construction of lookout towers will also be a frequent destination for walks. Educational trails and quality paths can be used to direct the movement of visitors through the forest so that the quiet parts of the suburban forest with minimal traffic are also preserved.

When designing the technical elements, care must be taken to ensure the aesthetics and suitability of the materials used. Devices made of natural materials will be suitable not only from an aesthetic but also from an ecological point of view. Stone and wood are therefore the best materials, and wood is also the most natural. Most of the structures will be lightweight timber, but we can also use stone masonry, e.g. for the low walls forming the base of a bench, the retaining walls of a well, the lower part of a shelter, the lower part of a footbridge, etc.

The timber structure needs to be anchored while ensuring structural protection of the timber. The elements are most often anchored to concrete footings or stone walls. Anchoring by means of fittings is the most suitable way to avoid direct contact between the timber and the soil or foundation. It is least suitable to anchor timber elements directly to the concrete. An excellent alternative to the

conventional types of anchoring of timber structures to concrete is ground screws, see Figure 2. The ground screw, when screwed into the ground, compacts and compresses the soil in its surroundings thanks to its cone-shaped body, thus creating a very solid foundation that can be immediately loaded thanks to the regular threaded surface on the screw body. Thanks to earth screws, any wooden element or structure can be fitted quickly, easily and without the use of concrete. Their main advantages are their easy installation but also their low price. The screws do not pollute the soil, and no unused concrete footing remains in the ground after the wooden structure has reached the end of its life, as the earth screw can be dismantled and can be reused elsewhere after dismantling. We minimize interference with the surrounding environment, almost completely eliminating land reclamation after the relocation of the structure. Also, in the case of the existing structure, the often unsightly foundation footings are not visible at the anchorage point, see Figure 3. The entire structure of the small building can then be prepared in the factory and assembled on site in a relatively short time. The site is thus not burdened by construction activity for a long time.



Fig. 2: Ground screw for anchoring wooden elements and Fig. 3: Inappropriate anchoring of wooden elements from an aesthetic and safety point of view

If we choose a roofing material for small buildings in a forest environment, it is again advisable to design a natural material. The most suitable natural roofing material is shingle roofing, see Figure 4. We can also design a roof made of plastered or unplastered boards (without removing the curve), where the boards can be laid parallel to the eaves or perpendicular to the eaves. Another natural covering that can be used is a thatched roof made of straw bundles. It can be implemented as plain or graded, depending on the way the bundles are tied. If there is no requirement for a natural material, asphalt shingles of a suitable shape and less distinctive colour can be used on the formwork, see Figure 5.



Fig. 4: Shingle roofing



Fig. 5: Asphalt shingle roofing

The wooden roof structure can also be used to cover the wells. The water intake is most often realized by a terrain cut or a water intake with a pre-set sedimentation tank. A wooden carpenter's canopy construction with the aforementioned natural coverings can then be installed on the stone base forming the spring water sump. For the masonry wall, it is advisable to use stone from the local area to ensure that the building blends in well with the terrain.

These pleasant resting places can be a problem for the disabled, especially those in wheelchairs, but also for families with pushchairs.

In some locations, particularly on flat terrain, there are only minor barriers that can be removed at little cost. This can create a "barrier-free" route, which can then be marked with tourist signs. In the field, the difficulty of the route according to the POV methodology is indicated by the colour of the wheelchair symbol in the signpost tip, see Figure 6.



Fig. 6: Directional sign indicating the route for wheelchair users - accessible route blue (kctkv.cz)

If the route is suitable for wheelchair users on the basis of the methodology mentioned above, it can be supplemented with educational panels of the necessary height to be legible for this group of people. Shelters for such routes should be spacious enough to allow wheelchair movement underneath. The minimum space for turning the trolley is a circle with a diameter of 1.5 m. If possible in the locality, we can also access wells where a certain height difference needs to be overcome, with a low-slope ramp and a staircase for other pedestrians.

## Conclusion

If suburban forests have a mainly recreational function, it is possible to define human activities by appropriate placement of technical elements of visitor infrastructure. The majority of people then move mainly in the locations offered in this way. Such elements are information boards, but also boardwalks, bridges and footbridges over watercourses or benches, shelters, etc. It is advisable to design the technical elements in natural materials and to use earth screws for the installation of wooden posts.

However, there is also a need to focus on removing barriers that prevent a certain segment of people from visiting suburban forests. Accessible trails can also make the forest accessible to disabled visitors seeking short-term recreation close to home. There is an effort to design trails where wheelchair users can navigate independently. Specifically, this means identifying suitable forest trails and designing routes suitable for wheelchair users with firm surfaces and low elevations that allow safe passage for wheelchairs. When implementing rest areas, remember to allow sufficient space for wheelchairs to stop, as well as for pushchairs or information boards of the necessary height. Wheelchair routes are then marked with directional signs, which are placed especially at junctions to indicate the next direction of the route.

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## Souhrn

Pokud mají příměstské lesy funkci zejména rekreační, je možné vymezit lidské aktivity vhodným umístěním technických prvků návštěvnické infrastruktury. Většina lidí se pak pohybuje převážně v takto nabízených lokalitách. Takovými prvky jsou informační tabule, ale i povalové chodníky, mosty a lávky přes vodní toky nebo lavičky, přístřešky apod. Je vhodné technické prvky navrhovat z přírodních materiálů a pro osazení dřevěných sloupků využít zemní vruty.

Je však také potřeba zaměřit se na odstraňování bariér, které určitému segmentu lidí brání příměstské lesy navštěvovat. Díky bezbariérovým stezkám může být les přístupný i tělesně postiženým návštěvníkům, kteří vyhledávají krátkodobou rekreaci v blízkosti bydliště. Je snaha navrhnout takové trasy, kde by se mohl vozíčkář pohybovat samostatně. Konkrétně to znamená vytipování vhodných lesních cest i pro vozíčkáře s pevným povrchem a malým převýšením, které umožňují bezpečný

průjezd na invalidních vozících. Při realizaci odpočinkových ploch pamatujme na dostatečný prostor pro zastavení invalidního vozíku, ale i kočárku. Informační tabule na takových trasách musí být potřebné výšky.

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