Problems of Military Cemeteries Greenery - Case Study of the Military Cemetery in Zvolen

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Abstract. The intention of this work is to highlight the importance of understanding military cemeteries as objects of cultural and historical heritage and as a part of garden design history. The design and maintenance of cemeteries and graves is a manifestation of the national culture. This is even more evident in military cemeteries, the maintenance of which is regulated by international agreements. Objects of military cemeteries are important places not only from the historical and architectural point of view, but also as green space. Most military cemeteries in Slovakia originated from World War I and II. In Slovakia, 160,000 soldiers were buried, 75,206 of them lost their lives in World War I and 93,000 in World War II. 32,495 war graves are registered by The Ministry of the Interior of the Slovak Republic - 23,316 war graves from World War I and 9,179 from World War II. From the period of World War II, there are 22 cemeteries and graveyards in Slovakia, established for soldiers of the Soviet, German, Romanian and Czechoslovak army. Military cemeteries and memorials are mostly high quality works of architecture and art. This paper focuses on the current situation and restoration issues of military cemeteries by examining the Military Cemetery in Zvolen. In the context of its planned reconstruction, a comprehensive tree assessment has been started in 2016. The Military Cemetery in Zvolen, being one of the largest military cemeteries in Slovakia, consists of The Cemetery of the Soviet Army with 17,628 buried soldiers and The Romanian Cemetery with 11,000 buried soldiers. The Romanian Cemetery is one of the largest cemeteries of the Romanian Army in Europe. Both cemeteries were declared national cultural monuments in 1963. In the cemetery, dendrometrical parameters and the health condition of trees were evaluated. In total, there are 825 woody plants. In both cemeteries, coniferous trees prevail, mainly individuals of the genus Thuja (49.4 %). Moreover, the maintenance of greenery and the aesthetics of the landscape composition were assessed. Based on the assessment of woody plant species composition, health condition of trees and their aesthetic qualities, necessary changes in the cemetery landscape composition were designed.

1. Introduction
The aim of this work is to highlight the history and current state of the military cemeteries in Slovakia with a focus on their landscape design. Military Cemeteries should be seen as objects of historical garden art that require special care. The two global military conflicts, the 1st and 2nd World Wars, struck the territory of Slovakia in the 20th century. Slovakia entered The Second World War already as part of Czechoslovakia. Loss of life was about 350,000 inhabitants, of which 235,000 people were killed in concentration camps, the number of fallen soldiers was 25,000 and the number of civilian victims was 63,000. 90 villages were burned partially or wholly as act of reprisals in Czechoslovakia.
Overall, 2.39% of the population died in Czechoslovakia. In Slovakia, 160,000 soldiers were buried, 75,206 of them lost their lives in World War I and 93,000 in World War II. 32,495 war graves are registered by The Ministry of the Interior of the Slovak Republic - 23,316 war graves from World War I and 9,179 from World War II. In the article, we focused on assessment of the current state of the Military cemetery in Zvolen, the largest military cemetery of World War II in Slovakia. State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

2. Material and Methods

2.1. Cemeteries of World War II.
From the period of World War II, there are 22 cemeteries and graveyards in Slovakia, established for soldiers of the Soviet, German, Romanian and Czechoslovak army. Construction of military cemeteries after World War II in Slovakia began in 1946. They are not in the form of frontline cemeteries like some of military cemeteries from World War I in Eastern Slovakia, but they are concentrated in several places in Slovakia. They typically have large numbers of buried victims and mass graves. Cemeteries were built separately by the affiliation of each army, namely 1st Czechoslovak Army, Red Army, Romanian Army, and the German army. Choosing a place for cemeteries was not random, it binds to major military operations during the liberation of Slovakia. The cemetery in Zvolen (10,000 buried soldiers), the cemetery in Michalovce (17,000 buried soldiers), Slavín in Bratislava (5000 buried soldiers), Svidník, Trebišov, Košice, Humenné, Žilina - Bôrik are the largest cemeteries of the Red Army. The Romanian Army has the largest cemetery in Zvolen, while the 1st Czechoslovak Army has the largest cemetery in Liptovský Mikuláš, at Dukla and in Martin - Priekopa. The German army has six cemeteries in the territory of Slovakia. In connection with cemeteries of the German Army it should be noted, that in the early postwar years, the only marginal attention was dedicated to the registration and maintenance of military graves of the German army, in accordance with international treaties. In the first years after the war it was largely related to the trauma from the war, but later associated more with the ideology of the political regime. After the regime change in 1989, exhumation work of graves of soldiers of the German army was started in Slovakia. So far six cemeteries were built or reconstructed, in Zborov, Humenné, Prešov, Hunkovce, Važec and Bratislava. The German War Graves Commission was an investor into these works.

2.2. Registration and maintenance of military graves
Registration and maintenance of military graves in Slovakia is based on international agreement. The most important agreement was signed on 10. 9. 1919 in Saint-Germain-en-Laye, for registration and maintenance of military graves and cemeteries of World War I. International agreements are reflected in national legislation, in the Act No. 130/2005 Coll., "The Act of war graves". Under this Act, the municipality, in whose territory the war graves are located, are obliged to take care of the war graves. To ensure the care of the war graves, the government will provide to each local government a financial contribution to each war grave in the amount of five times the minimum hourly wage every year. Care for the cemeteries of the German army was taken over by The Society of German war graves in Slovakia in Prešov. This Society was established under the Agreement of war graves between the Governments of the Slovak Republic and Germany, on 12 August 2000.

2.3. Landscape design of military cemeteries
During the construction of military cemeteries and memorials associated with World War II there was special attention given to construction of each monument and their sculptural decoration, often with high artistic value. On the other hand, landscape design has not always been equivalent element of cemetery composition [1], [2]. Landscape design often consisted of planting trees, which were biologically and aesthetically foreign in the current environment. Vegetation often disturbs and competes with architecture [3]. In terms of greenery maintenance, large areas of planted roses, annuals
and bulbs were used, demanding intense amounts of maintenance, usually on the mass graves. A typical feature was the use of conifers, especially of genus *Thuja* and *Picea*. Vreštiak [4] criticized this situation and proposed the following general principles for landscape completion of memorial cemeteries in 1985: greenery should not be a competitive element to the architectural elements; recommended are symbolic trees, weeping and red-forms of trees, groundcover plantings as compensation for flower plantings; the background of memorials should be formed by massive plantings of trees and greenery on the perimeter of the cemetery connecting the cemetery with the surrounding countryside or the greenery system of the city.

2.4. History and description the solved area

The Military Cemeteries of World War II in Zvolen are located on the hill in the northeast part of the city Zlatý Potok, where there is also a housing estate with the same name. The cemetery is divided into three parts, the Cemetery of Red Army, the Symbolic cemetery of victims of the Slovak National Uprising and the Cemetery of Romanian Army. Cemeteries differ in architectural design and materials. The military cemetery of Red Army is bordered on the south and east sides with the civilian cemetery. The cemetery of Romanian Army borders on the eastern side with civil urn cemetery burial, which was originally the area of the Cemetery for the Romanian Army. On the west side of the cemetery is the landscape designed entrance area, which is connected with the symbolic cemetery. These three parts of the cemetery are not separated from each other. The complex of cemeteries and their monuments are registered as national monuments in the Central List of the Monuments Fund of the Slovak Republic since 1963. The total area is 3.07 hectares.

2.4.1. The Cemetery of the Red Army

The Cemetery of the Red Army in Zvolen is one of the largest military cemeteries for the Red Army in Central Europe, an area of 1.15 hectares. In the cemetery 17,682 soldiers are buried as well as officers of the Red Army, who died in seventeen districts of this region. The proposal to build the central military cemetery with a monument was approved in 1950, exhumation work began in 1952, construction was completed in 1960. On the main compositional axis, directed from the entrance to the memorial located on the highest point of hill, officer’s graves are placed on both sides of the axis with granite tombstones. The soldiers were buried in 18 mass raised graves with rhyolite rims. The walkways are made of white stone grit. The dominant element of the cemetery is a 15-meter-high monument, the pylon on a tiered pedestal topped with laurel branches and five-pointed star, with greek flame on both sides of pedestal. The Monument of the Red Army was built between 1959 -1960 from the design by architect Mikuláš Buda from rhyolite and granite stones. Reconstruction of the memorial was carried out in 1989 and in 2004. The landscape design of cemetery was originally based on the planting of roses on mass graves and also annuals and bulbs (red tulips) on the graves of the officers. In the 90’s roses on the mass graves were replaced by groundcover woody plants (genus Juniperus) for simpler and less expensive maintenance. At present, the groundcover planting of conifers on the mass graves have been replaced by lawn. Also on the graves of officers, annuals were replaced by different cultivars of conifers. This solution has created inappropriate colours, shapes and species richness in the cemetery. An allée of *Salix alba* 'Tristis', which formed the boundary with neighbouring civilian cemetery, was demolished due to the poor health the trees and a new planting has not been realized as yet.

2.4.2. The Cemetery of the Romanian Army

The Cemetery of the Romanian Army in Zvolen is the largest military cemetery of the Romanian Army in Europe with 10,382 soldiers buried from the entire territory of Slovakia. The cemetery was designed by architect Mikuláš Buda and was built between the years 1945 to 1960. The cemetery is located north of the Cemetery of the Red Army with an original area of 3.23 hectares. White travertine monument dominates the area of cemetery, at the end of the main compositional axis directed from the entrance gate to the highest point of the cemetery. A monument in the shape of a Cenotaph stands on a
concrete patio paved with travertine stone. An elevated terrace is bounded by balustrade railings and four staircases leading up to it. The memorial was restored in 1998 and 2004. In contrast to the Cemetery of the Red Army, mass and individual graves are not raised and are without rims. Each area of graves is defined by low rhyolite curbstones. The graves are covered with lawn, and travertine tombstones. The walkways are made of white stone grit. The landscape design is based in lawn areas defined by roads with allées of trees. In direct contact with the entrance area and the cemetery of the Romanian army is a symbolic cemetery, reminding visitors of the victims of the Slovak National Uprising. One area of the symbolic cemetery is paved with grey granite stones and a sculpture of a wounded soldier and women, by sculptor A. Grom, is sited there. Behind a low wall with an inscription and stands for garlands is a green space with an illegible design. The cemetery complex was previously a regular place of ceremonies of remembrance of the anniversary of the Slovak National Uprising, the liberation of Zvolen and the end of World War II. currently the number and popularity of pious ceremonies is decreasing.

2.5. The evaluation methodology of trees and landscape composition

The tree inventory was done in 2015 and 2016, the number of the evaluated trees is 835. The inventory of woody plants consists of data identification connected to woody plants, dendrometric value assessment, landscape value of trees, health condition of woody plants, and proposals for the tree treatments or eventual felling. The collected data consist of dendrometric values (height of trees, crown width, trunk perimeter, and age of trees) and landscape value of trees determined according to the methodology of Machovec (1987) [5]. The evaluation of health condition of woody plants consists of a 5-point classification system created by Juhásová (2009) [6], in which 1 point is allocated to the most damaged tree species, intended for felling (5 - healthy, with no signs of diseases, 4 - healthy, with signs of diseases, 3 - with signs of damages and diseases, dried branches, 2 - with signs of damages and diseases, 2/3 of tree dried, 1 - the highest degree of damages, dried tree). The evaluation of landscape value of woody plants created by Machovec (1987) [5] consists of 5-point classification system, in which 5 points are allocated to the most valuable trees from an aesthetics and landscaping composition point of view (5 - the most valuable woody plants, 4 - above-average valuable woody plants, 3 - average valuable woody plants, 2 - below average valuable woody plants, 1 - unfit woody plants). Each cemetery was evaluated separately due to their different landscape compositions. The Symbolic cemetery was evaluated as part of the Cemetery of the Romanian Army.

3. Results and discussions

3.1. The results of woody plant abundance

In the Cemetery of the Romanian Army there are 528 individuals woody plants, in the Cemetery of the Red Army are 307 individual trees and shrubs. The results of the woody plant abundance in both cemeteries shows that the most abundant species in both cemeteries are conifers, individuals of genus Thuja, 413 individuals represent together 49.4% of all the individuals (table 1, table 2). In the Cemetery of the Romanian Army there is a significant representation of individuals of the genus Acer with 83 individuals (18%). Overall 33 species of woody plants were found in the Cemetery of the Romanian Army, of which 28 species are represented by less than 15 individuals, which is less than 3% of the woody plant abundance (table 3). Overall 13 species of woody plants were found in the Cemetery of the Red Army, of which 8 species are represented by less than 8 individuals, which is less than 3% of the woody plant abundance (table 4).

| Table 1. Woody plant abundance in the Cemetery of the Romanian Army |
|---------------------------------------------------------------|
| **Coniferous trees** | **Deciduous trees** | **Evergreen trees** | **Total** |
| Abundance (pcs)    | 376            | 129             | 24         | 528        |
| Percentage representation (%) | 71            | 24             | 5          | 100        |


Table 2. Woody plant abundance in the Cemetery of the Red Army

|                  | Coniferous trees | Deciduous trees | Evergreen trees | Total |
|------------------|------------------|-----------------|-----------------|-------|
| Abundance (pcs)  | 297              | 9               | -               | 528   |
| Percentage       |                  |                 |                 |       |
| representation (%)| 97               | 3               | -               | 100   |

Table 3. The most abundant species of woody plants in the Cemetery of the Romanian Army

| Species                        | Abundance (pcs) | Percentage representation (%) |
|--------------------------------|-----------------|-------------------------------|
| Thuja occidentalis L.          | 213             | 40                            |
| Acer platanoides L. (L.) Karst.| 83              | 16                            |
| Picea abies Engelm.            | 75              | 14                            |
| Picea pungens Engelm.          | 25              | 5                             |
| Buxus sempervires L.           | 17              | 3                             |
| Other species represented <3% | 114             | 22                            |

Table 4. The most abundant species of woody plants in the Cemetery of the Red Army

| Species                        | Abundance (pcs) | Percentage representation (%) |
|--------------------------------|-----------------|-------------------------------|
| Thuja occidentalis L.          | 200             | 65                            |
| Chamaecyparis lawsoniana L.    | 58              | 19                            |
| Picea pungens Engelm.          | 17              | 6                             |
| Juniperus chinensis L.         | 8               | 3                             |
| Other species represented <3% | 22              | 7                             |

3.2. The results of landscape value and health condition of woody plants

From the point of view of landscape value of woody plants, most of the represented trees have an average landscape value of 3, represented by 543 individuals, which is 65% of all the individuals. Woody plants with above-average landscape value of 4 have significant representation with the number of individuals at 160, which is 19.1% of the total number of species (table 5, table 6). The most valuable trees are mainly found in tree allées in the Romanian cemetery. There are not plants with the lowest landscape value because of inadequate regular care. From the same reason, there are only a few trees with a high degree of damage with proposals for felling. Other plants are healthy, mostly with small signs of diseases and injuries (table 7, table 8).

Table 5. Landscape value of woody plants in the Cemetery of the Romanian Army

|               | 5   | 4   | 3   | 2   | 1   |
|---------------|-----|-----|-----|-----|-----|
| Abundance (pcs)| -   | 149 | 275 | 91  | 13  |
| Percentage    |     | 28  | 51  | 17  | 2   |
| representation |     |     |     |     |     |

Table 6. Landscape value of woody plants in the Cemetery of the Red Army

|               | 5   | 4   | 3   | 2   | 1  |
|---------------|-----|-----|-----|-----|----|
| Abundance (pcs)| -   | 11  | 268 | 27  | -  |
| Percentage    |     | 4   | 88  | 9   | -  |
| representation |     |     |     |     |     |

Table 7. Health condition of woody plants in the Cemetery of the Romanian Army
3.3. Evaluation of landscape design and composition

The landscape composition of the evaluated cemeteries is different. The landscape composition of the Cemetery of the Romanian Army is based on tree planting in form of evergreen trees allées along the road and along the perimeter of the cemetery. Allées of the species *Thuja occidentalis* 'Malonyana' are the most valuable trees on the graveyard at present, although use of these trees in this environment is questionable. In the grave fields are also plantings of small groups of trees that create a contrast of dark green color with white travertine monuments. Conifers were later planted in the background of monuments, mostly of the genus *Picea*, and now this part is too dense with an illegible composition at present. Deciduous trees in the cemetery allées are in poorer health due to their dense planting. In the symbolic cemetery woody plants of genus *Thuja* are dominant and *Buxus*, in too dense plantings creates danger area for visitors. The landscape composition of the Cemetery the Red Army is based on large areas of raised mass graves, which are currently covered by lawns. Planting trees are at present reduced to the planting of conifers (*Thuja* and *Chamaecyparis*) at the graves of officers. They enhanced symmetry of the main compositional axis and perspective view, but they make access impossible to the tomb. At the entrance area of the cemetery, there is a large number of groundcover plants which are overgrown and cover the artistically valuable gateway.

3.4. Draft measures

For the future adaptations of cemeteries, we propose to focus on the removal of unsuitable conifer plantings, mainly from reconstructions of 80’s and 90’s., for example removal of conifers at the entrance area and on graves, or thinning of dense plantings. Lawns on elevated mass graves we propose to replace with extensive floral mixtures of perennials, the conifers at graves of officer are to be replaced with red flowering perennials, which is consistent with original symbolism and composition of floral plantings on graves, but also with the climate change and is less costly for maintenance. Instead of the dense plantings of evergreen shrubs in the symbolic cemetery we propose a flower meadow. It is also necessary to supplement lighting and park furniture.

4. Conclusions

After World War II close attention was paid to the construction of military cemeteries and memorials, a large number of memorials and military cemeteries were built. While the architectural, artistic and material design was in many cases at a high level, landscape design received less attention. Large areas of roses, annuals and bulbs were planted on graves, also typical was the planting of conifers. In the context of trends in garden architecture in the 80's and 90’s, coniferous woody plants were used in the reconstruction of military cemeteries at that time, whether in the form tree allées or groundcover plantings. Artist themes of memorials and cemeteries were however often associated with the promotion of the communist regime. Artist themed cemeteries were also associated with the promotion of the communist regime, especially at the beginning their construction and their maintenance was financially well supported. It was also common for volunteers and the involvement of various organizations to maintain those places. After the change of political regime in 1989, there

| Abundance (pcs) | 5 | 4 | 3 | 2 | 1 |
|-----------------|---|---|---|---|---|
| Percentage representation (%) | - | 20 | 51 | 5 | - |

| Abundance (pcs) | 5 | 4 | 3 | 2 | 1 |
|-----------------|---|---|---|---|---|
| Percentage representation (%) | - | 177 | 104 | 23 | - |

Table 8. Health condition of woody plants in the Cemetery of the Red Army
was a decline of care and maintenance of these cemeteries, because of financial reasons as well from ideological reasons. As the number of living witnesses of World War II is declining, acts of remembrance and celebrations associated with these objects are infrequent and slowly are disappearing from the awareness of society. At present, due to the technical condition of buildings and the vegetation status, most of the military cemeteries and memorials will require significant reconstruction interventions. With time the negative ideological overtones are fading and these objects now have slowly become popular tourist attractions connected with the history of our nation. Using the example of the military cemetery in Zvolen we highlighted the problems of the military cemeteries in terms of their composition and the maintenance of their greenery. In this case, it is necessary to redesign the greenery of this cemetery to be more attractive to visitors, to adapt to modern trends in landscape architecture, and for a significant reduction in the cost of maintenance. It will therefore suitably lead, particularly by lawns and flower beds, to extensive forms of vegetation.

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