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Development of the nineteenth century unplanned cemetery

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ABSTRACT

This paper through a use of syntactic descriptive tools explores a presence of Catholic morphological implications that are discreetly woven into the organic spatial configuration of Bernardines cemetery – culturally and historically significant afforested scape. A case study is approached as a sum of internal connections, able to communicate attitudes to death and memory in the nineteenth-century Vilnius, Lithuania.

The article involves overlaying axial network, topography, burial directions and chronological occupation data over each other, aiming at understanding correlation between them, and how they help to explain the configuration of unplanned burial ground.

Bernardines cemetery functioned as a suburban branch of overcrowded churchyard burial ground that was in need of extension. A chapel was built 15 years after cemetery foundation. Even today chapel is a central figure in the spatial composition of Catholic cemeteries – in Bernardines cemetery the centrality of the chapel is not that apparent. After processing topographical and syntactical analysis it was possible to detect network's structural potential gathered around the chapel, its configurative relation to the burial directions and the location on the highest altitudes of the whole plot. In this case spatiality of religious hierarchy was implemented discreetly, but a tight dialogue with the natural terrain enabled Catholic cemetery to be identified with a pagan forest necropolis.

KEYWORDS

Cemetery, burial ground, organic development, small networks

1. INTRODUCTION

This paper aims at understanding the logic behind the unplanned cemetery that turned out to be one of the most significant nineteenth-century burial grounds in Vilnius. Pathway network in Bernardines cemetery in Vilnius do not show any planned logic. No project for cemetery design has been ever found in the archives. The only projects are for a chapel and for some tombstones.

However, through the set of beliefs Catholic Church structured cemeteries in a particular way different from other religious beliefs. This paper explores how much this unplanned morphology of the Bernardines cemetery corresponds to Catholic dogmas that are implicit in the structure though being unidentified at the first sight.

Therefore, together - Space Syntax theory, ArcGIS analysis and chronological research of cemetery occupation – were expected to unveil configurative relation between the entrance and the chapel, orientation of burial and their morphological links to the cardinal directions, the chapel, and understand the importance of terrain for location of the chapel and burial orientations.

Previously part of church precinct burial grounds acquired typological independence only by the end of the eighteenth-century. Territory of death was not just religious issue anymore - death became political and didactic. Modern necropolises were carefully designed and acquired either geometrical or organic shapes. Particularity of organic settings of nineteenth-century Lithuanian cemeteries set them aside from their contemporaries abroad - apparently their architectural expression had never been on political agenda and their development was left unplanned.

French revolution contributed to understanding death as educational device that besides religious meaning contained political value (Etlin, 1987 pp. 269–273; Oliveira, 2007 pp. 80–93). Cemeteries became public spaces celebrating memory of the great men - a privilege previously available only to the wealthy dead. Noble death even of the lowest social class members that exercised good morals or lived for the better of society, were attributed post-mortal honouring.

New typology was structured on the foundations of political connotations and hygienic worries. Its seclusion from the church precinct was managed by city councils, but the Church continued to be burial ground protagonist especially in those countries where liberal forces were suppressed or arrived later (Rugg, 2013 pp. 22, 25–26). New suburban cemeteries were set away from urban centres, but incorporated chapel on top of the structural spine. Cemeteries continued to serve only one particular religious faith, and the dead of the different beliefs were not buried in the same cemetery.

The spatial dimension of Lithuanian cemeteries and canonical Catholic cemeteries are quite different. Besides dissimilarities in the spatial layout, relations with buildings of symbolic importance such as chapel, volumetric scale of tombs and vegetation differ as well. Canonical Catholic cemetery is an enclosed territory, geometrical and organized hierarchically, with a temple as a core figure located on the axis of the main entrance, marking a visual and physical centre of necropolis. Burials, both underground and above the ground, are located along the pathways of different width, offering several options of burial with different price range, shaping a symbolically-ordered space, representing a city of the living in a territory of the dead.

On the contrary, traditional Lithuanian cemeteries have low walls; cemeteries' plans represent features of organic development; only in-ground burial (inhumation) is practiced; in rare cases community mausoleums are available as well. Every citizen since his/her birth has a right for a little plot for the last resting place for free, and this right has been always exercised in Lithuanian territory.

Thus, it is possible to consider that Lithuanian cemeteries follow a symbolically-organic model while Catholic cemeteries are symbolically-ordered spaces, replicating different social contexts.

Lithuania spent nineteenth-century in the margins of Europe. It was as well in the margins of Russian Empire to which historical Lithuanian region was annexed in 1795 after the third division of the Commonwealth of Poland and Lithuania. In the sequence of these events

Figure 1 - Vilnius city churchyards and cemeteries in the nineteenth-century. The diagram is based on the city plan of 1840.

Vilnius became the third largest city of the empire. However, city's nobility still lingered on political independence: intellectual elite, not without masonic influence explored local myths, contributed to fortifying memory of historical greatness and catalysed movements of liberation. Few revolutions followed, provoking Russian government and bringing a fame of being disobedient and unruly to Lithuania. Roman Catholic church functioned as a stronghold of Lithuania's political independence, and in result of unsuccessful uprising of 1830-1831 a lot of Roman Catholic monasteries and churches were closed down or transformed into Orthodox shrines (Briedis, 2008 p. 128).

Probably more for the lack of space and less for scientific cautions or liberal philosophy, in 1801 - six years after the annexation - the first suburban cemetery was founded in Vilnius. Rasos cemetery served as a burial ground of St.Joseph and Nicodemus church - its churchyard cemetery was closed in 1799 by the government for not satisfying hygienic requirements. A new cemetery in the terrain was given by government to be managed by St.Joseph and Nicodemus church (Girininkienė, 2004 p. 64).

Bernardines cemetery was established few years later after the order and city council agreed on the conditions of land use and the fees that the order committed to pay to the city government. Established in 1810 the cemetery was first to be used only for burying the members of the order. Bernardines parish was founded only in 1814 (monastery had been functioning since 1469) and Bernardines burial ground became a cemetery of the parish to be used by all its residents, and not just members of the order. They were to be buried in all the territory - no part was reserved

exclusively to any social class. The cemetery was quickly filled up. In the middle of the century it started to require expansion. Bernardines initiated a new series of correspondence asking for the land. Cemetery was expanded in 1861, and functioned until 1966. Statistics count up to 30 000 people that had been buried in this cemetery during its active period.

During the period of functioning it was administered by Bernardines order - German Catholic St.Martin Congregation at the St. Ann Church, located 1,1 km away from the cemetery in the territory surrounded by the city wall. Parish in 1936 embraced 31 ha territory and included suburbs and villages as far as 6 km away from Bernardines church situated by St.Ann's church. When Bernardines monastery was closed in 1864, cemetery continued to be administered by the same parish church that was handed to Roman Catholic priests.

Natural environments as spaces for afterlife are usual in Baltic mythology, and therefore a common practice to bury the dead in a forest or a meadow continued after christianization. Several Church reports describe the burial situation in 16th-17th century Lithuania – few people were burying their dead in the graveyards by church, most of them interred in the forests and meadows (Vėlius, 1996; Vėlius, 2003; Vėlius, 2005), in open spaces – not enclosed territories as Catholic cemeteries were meant to be, without a presence of priest and Catholic ritual.
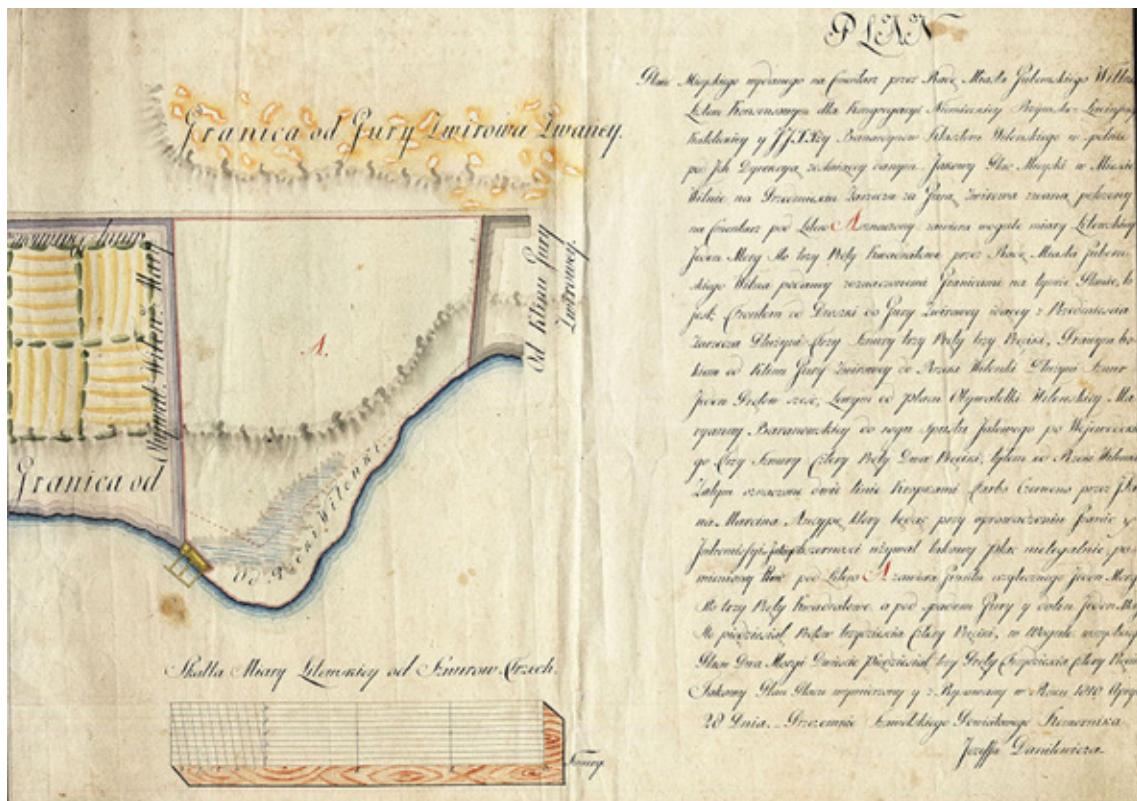

Figure 2 - The first plan of Bernardines cemetery, drawn by Józef Danilewicz and submitted to the city council for approval on the 28th of April, 1810 (in Girininkienė, 2010 p. 141). Cemetery was open in October of the same year.

This spatial texture developed through informal movement was brought deep into the nineteenth-century, embodying the shapes of natural scape, organic pathway network and apparently undisciplined burial and tomb layout.

There are very few iconographical sources of Bernardines cemetery. The earliest one is a plan of the cemetery, drawn by Józef Danilewicz, dating 28th of April, 1810 (Fig.2). Another plan by Danilewicz is of the 7th of May, 1810, but it doesn't include more data than the first one (Girininkienė, 2010 pp. 141–142).

A plan of the cemetery dating the 23rd of January, 1860, was prepared for the extension (Kasperavičienė, 1989).

2. METHODOLOGY

Cemeteries have not been studied through Space syntax theory. Nevertheless there are some attempts to the study organically developed natural landscapes, and using space syntax techniques to understand the types of affordances provided by them (Dalton & Hanson, 2007; Zhai & Baran, 2013; Mahmoud & Omar, 2014).

Following Hillier and Hanson (1984) approach, spatial patterns incorporate and give shape to social patterns. The topological structure is a primary element by which society creates and establishes roles to develop social patterns that shape social relationships. Accordingly, this paper is also an attempt to understand how this approach can contribute to cemetery analysis. The ultimate goal is to scrutinize the spatial texture of Bernardines cemetery and explore how social representations are reproduced in space.

Explorative spatial analysis of Bernardines cemetery was performed in four stages:

Firstly, axial network of internal movement in the cemetery is processed to retrieve integration HH data. Permeable tomb layout is approached as a city plan. Every tomb or tomb enclosure is seen a neighbourhood: axial lines pass in-between the tombstones as the routes of the movement. This study leads to understanding syntactic logic behind the pathway development identifying which directions were the most probable for pathway development.

Secondly, topographical map was produced by ArcGIS software using available data of cemetery's terrain, retrieving data on terrain's inclination and orientation. This enabled to see integration values in relation to topographical qualities.

Thirdly, burial directions were drawn in order to understand their relation to topography, chapel's location and integration data.

Fourthly, chronological development of the cemetery was analysed by mapping all the burials from the early years of the cemetery throughout the nineteenth-century.

All four analyses were laid over each other in order to retrieve a complete portrait of the whole cemetery network configuration. Unplanned logic of cemetery configuration is dissected and questioned in the light of historical context, mythological data and genius loci. Overlaying few sheets of cemetery plan data aimed at finding correlations between terrain, burial directions and integration measure of cemetery network, retrieved from Depthmap software (Turner, 2001; Varoudis, 2012). Three layers of information proved to be an effective tool to understand the internal behaviour of Bernardines cemetery.

Archive of Vrublevskis library in Vilnius holds death registers of all the burials in the cemetery until 1965, when the cemetery was closed (Girininkienė, 2010 pp. 21–47).

Following available inventorial data, published in "Vilniaus Bernardinų kapinės 1810-2010" (Girininkienė, 2010 pp. 419–765), all the nineteenth-century burials in the cemetery were mapped, organising data for each decade since the cemetery foundation (Fig.3). It showed that Bernardines cemetery's development embraced all its territory since the earliest decades: grave layout extended throughout the entire cemetery and became denser along the decades. There are three main correlations that the article focuses on: 1) terrain and burial directions, 2) terrain and integration HH measures, 3) burial directions and integration HH measures. Some values correlated to others more, but most importantly such overlaps attracted attention to those parts of burial ground textures that are unnoticed without dissecting the network.
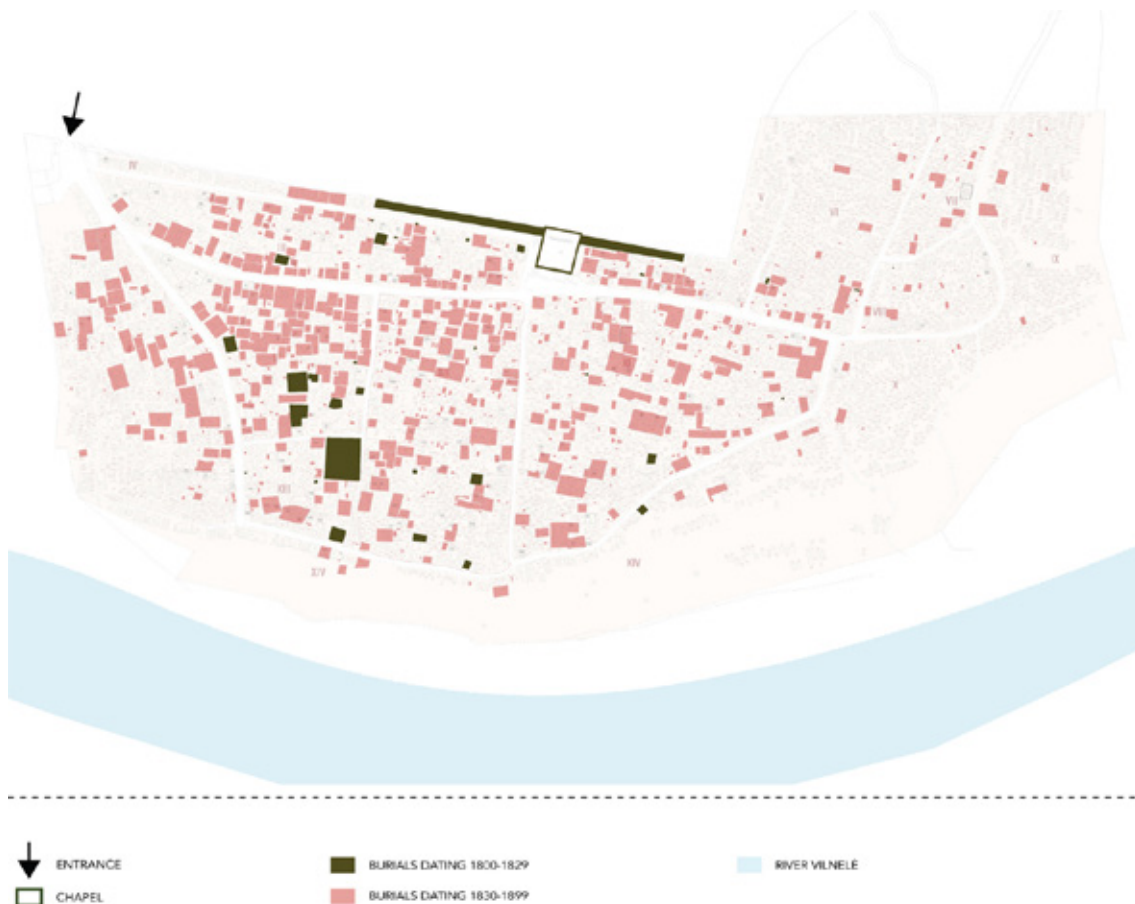
Figure 3 - Mapping of the burials of the nineteenth-century that have survived in identifiable conditions until nowadays.

The premises of the syntactical study were set expecting confirmation of existent centralities gathered around entrance, shrine and main walking directions. Highest integration measures were expected to appear in the comfortable walking topography - the flattest and the least inclined. The densest texture of burials was to emerge in the least challenging topography, and therefore coincide with the pathways of the highest integration measures.

Cemetery, even when it assembles an image of city of living, functions more as a building or a park. It is a space that is entered, walked around or through and left in the relatively short period of few hours at maximum. Entrance therefore is most frequently walked through and this feature can be practically seen as cemeteries' centre. A shrine - a chapel or a church - is often placed on the entrance axis becoming a focal point in the entire network.

What is more, cemeteries have different speed than the cities. What is considered a normal walking speed in the city where 400 m is walked in 5 minutes (Al Sayed 2014:72) wouldn't happen in cemetery. Exploratory visits to the cemeteries showed that walking speed in there usually range around 1.33m/min, that is about 200 m to be walked in 15 min, or even slower like in museums and galleries.

Cemetery as typology is a segregated walled network inside or outside the urban fabric, in many cases having defined visiting hours (Lithuanian cemeteries are open 24h). "Life" in the cemeteries consists of various types of motion: ceremonial (funeral), contemplative (grave visit, touristic walk) and functional (daily maintenance).

3. SYMBOLICAL LOGIC OF NETWORK INTEGRATION

3.1 ENTRANCES

Bernardines cemetery is more homogenous in its network than other nineteenth-century cemeteries, for example Rasos cemetery (Bazaraitė et al., 2016). Bernardines cemetery is filled with family graves, only a far Northeast contains more individual graves. The main and only entrance leads to a chapel through a curved line stretching Eastwards from the gateway. Integration value for the entrance is quite above the average (Table 1, Fig.4).
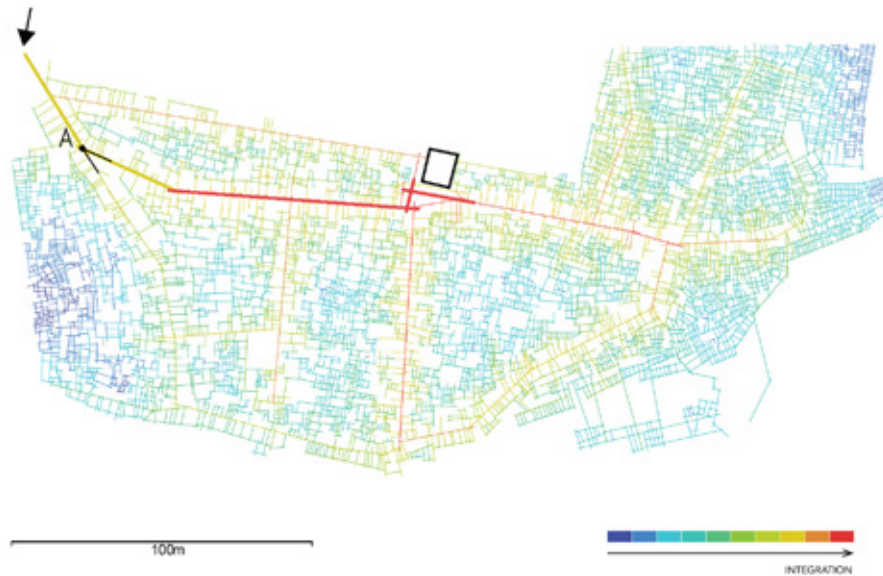

Figure 4 - Axial map with integration HH measures

Minimum	0,508165
Average	1,03073
Highest	1,79847
Entrance	1,49518

Table 1 - Integration (HH) measures of Bernardines cemetery network

Bernardines cemetery has been accessed exclusively from the North side through Žvirgždyno street since its foundation (Fig.5), possibly an entrance from the South could have existed – a little pier is marked in the earliest plan drawn by Danilewicz. By the year 1828 it was finally enclosed and included a gateway with a bell tower. A gateway of the cemetery was not shaped with pompousness - Žvirgždyno street is a blind-end coming from Polocko street - a big route passing through the whole Užupis neighbourhood. The small street is discreet scenery for cemetery visitor. The city plans from 1840, 1859, 1871 and 1890 confirm that the cemetery has always been accessed through this narrow route, and no documents are found to refer to any spatial arrangements for funerals including public rituals of greater scale.

Traditionally an axis connecting entrance to the chapel serves as a structural spine of the whole network in Roman Catholic cemeteries (Auzelle, 1965 pp. 67, 94, 104), however integration values not necessarily show that: Depthmap reads the network not as a closed structure but as a clipping out of the bigger system. However, enclosure is a common feature for cemiterial typology.

Figure 5 - A view from the entrance where the pathways bifurcate (point A in Fig.4). Following the left pathway one arrives to the chapel that stands invisible looking out from the entrance.

3.2 CHAPEL CENTRALITY

The spine of Bernardines cemetery does not posses the linearity typical to Canonical Roman Catholic cemeteries. Organic nature of the cemetery development sets the chapel on the route of the curvy pathway, winding through the terrain dotted with naturally growing trees of local species.

Preparing axial map of the cemetery, it was expected to see the most integrated lines in the proximity with the chapel. In the case of Bernardines cemetery such correlation between the most integrated lines and the chapel exist. Besides high integration measure, chapel centrality is expressed in its position in cemiterial topography - it stands on the highest point of the terrain, with the altar facing South. In Canonical Catholic cemeteries the altars of the chapels face the entrances, and in the case of Bernardines chapel the altar doesn't stand on the entrance axis and it is turned to the opposite direction than the entrance - it is accessed laterally through a pathway stretching from West to East.

Figure 6 -A view from a South side looking Northwards in the direction of the chapel.

In comparison to Rasos cemetery - another unplanned nineteenth-century cemetery in Vilnius - access to the chapel is organised through the winding pathway, running along the Western side of the cemetery. The altar faces Southwest and has no tête-à-tête relation to the entrance.
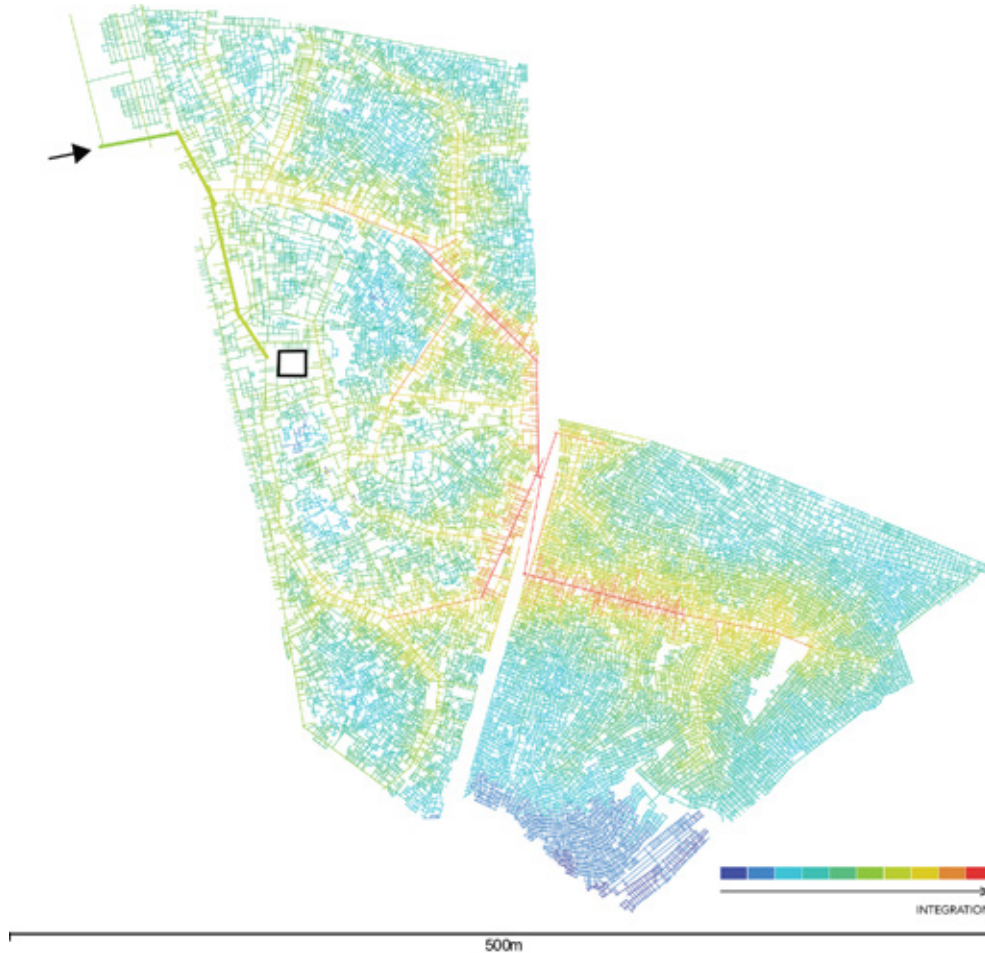

Figure 7 - Rasos cemetery axial map with integration HH measures

3.3 BURIAL DIRECTIONS

At the first sight burial fabric of Bernardines cemetery seems chaotic, obeying no regular rules, either geometric or symbolic. However, burial direction in the cemeteries since the earliest times of Christianity had been claimed to have symbolic and magic importance. "The orientation toward the east, toward Jerusalem, was retained for a long time in the burial of the dead" (Ariès, 1981 p. 14). Such orientation - head to the West and feet to the East - doesn't make part of the Bernardines cemetery burial pattern. Even if there is one prevailing direction in some of the burial, it doesn't mean a common rule for the whole cemetery. In the case of Bernardines cemetery perpendicular or parallel relation to the chapel is prevailing in those plots that lay closest to the shrine, and this configuration travels further away from the chapel as well, changing direction only in far West and East corners of the cemetery.

In Lithuania, a common notion suggests that burials should be oriented with feet to the nearest church, or with head to the North and the feet to the South (Dundulienė, 2005 p. 308). Such organisation (either church-wards, or Southwards) can be found dominant in small countryside cemeteries, but bigger cases - as Bernardines or Rasos - show a constant change of burial direction from one borough to another.
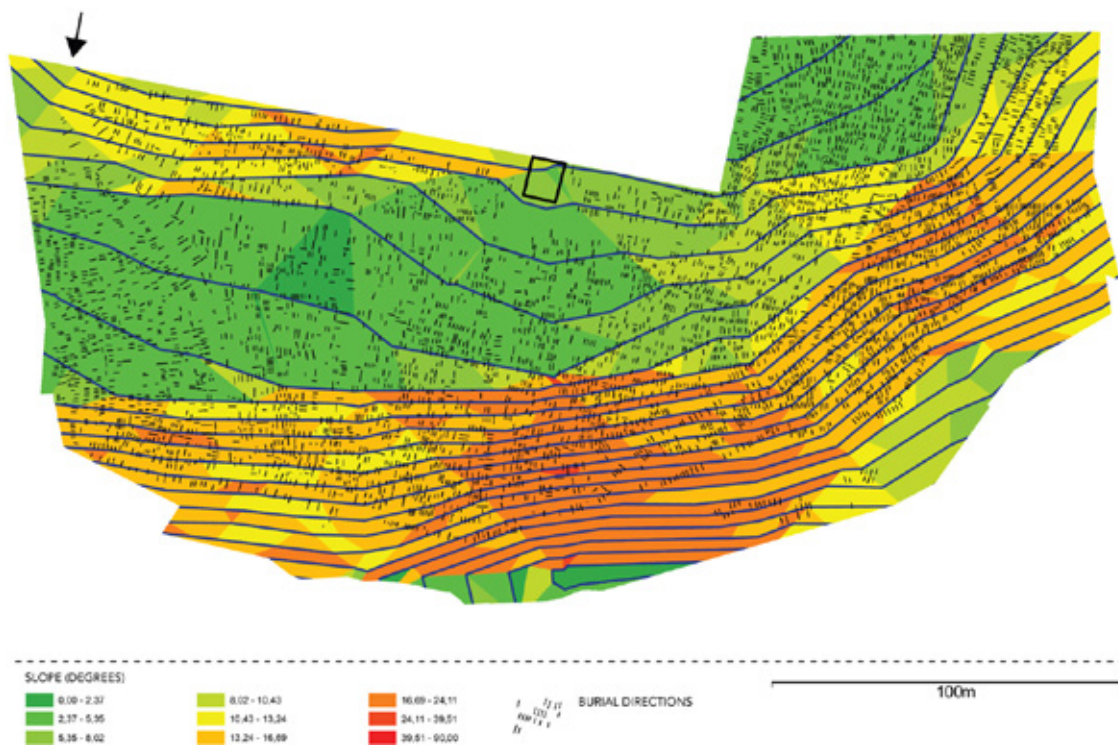
Figure 8 - Burial directions of Bernardines cemetery laid over terrain inclination map, processed by ArcGIS software.

Besides the relation to the chapel, burial directions showed dependence to the terrain change, however it is more visible in more dynamic topography of Rasos cemetery - burials obeyed the terrain and adjusted to it. Natural terrain of Bernardines cemetery apparently had not been changed, and the burials occupied those patches of land where burying was less challenging. Therefore the most inclined slopes were not as densely covered with burials as flatter ones. In Bernardines cemetery the burials are laid perpendicularly to terrain altitudes. Burials accompany perpendicularly only some of the main walking axis, especially on the pathway leading from the entrance to the chapel that continues Eastwards. Probably the pathways were defined previously to the filling of the cemeteries with the graves, and therefore the pathways were accompanied by main façades of the burials. However, it could have happened that the pathways were defined later than the burials took place, and the land was cleaned and filled with correctly oriented and organised graves. Mapping of burial evolution in Bernardines cemetery didn't show any particular staging of the cemetery burials, except the bifurcation at the entrance of the cemetery that appeared in the 1880's, and the pathway stretching from entrance Southwards, had been planted with burials only in the twentieth-century. Different morphological structure could have existed here before.

All in all, in such organically ordered networks, official pathways maintain their integration superiority in relation to other movement lines, and in the case of Bernardines cemetery those most integrated pathways have burials facing them perpendicularly. Integration values along the softly winding pathway are all above network average going from entrance Eastwards as follows. The highest integration of the pathway is concentrated close to the chapel.

Bernardines cemetery was extended in the Northeast direction only in 1861. Burial direction North-South had been maintained in the extension. The extension has significantly more individual graves than family graves (or family graves are not grouped and enclosed). It doesn't seem to be a result of the later development of the cemetery and different social conditions (less financial power to build bigger and better quality tombstones). It seems more plausible that the territory for its slight remoteness from the chapel was more used by the pauper.

Even with careful study of burial chronographic sprawl, it is difficult to say which burial direction was in the beginning of the cemetery. About 30 tombs survived from the first 20 years of the cemetery (1810-1830), they are mostly located in the burial vault structures located on the Western and Eastern side of the chapel. Some of them have dates previous to cemetery's foundation - these are the cases of reburials from other cemeteries, usually these are the graves of nuns. The core of the cemetery is laid in North-South direction, and at the first sight it is intuitively justified by their proximity with the chapel. However the chapel was only built 15 years after cemetery was founded.

Figure 9 - A photograph taken in 1866 by Vilhelm Zacharčik. Bernardines cemetery is viewed from Southwest (in Matulytė (ed.), 2001 p. 25)

The earliest photographs and engravings of the cemetery show it dotted with wooden crosses facing either North or South (a symmetrical nature of cross structure doesn't allow to understand if they are facing South or North, such understanding is only possible seeing cross relation to grave, but that is not possible in the images where cemetery is showed densely covered with trees).

Bernardines cemetery's burial directions homogeneously cover the territory either perpendicularly or parallel to the altitudes with very few orthogonal exceptions. Topography is constant, relatively flat, majority of the terrain is inclined around 0º-5,35º, and continues to be dense up until 10,43º.

The texture becomes less dense when inclination of terrain gets closer to 16.69º. In the slopes of 16.69º-24.11º inclination burials continue, but not as dense as in flatter plots. Getting closer to the river, almost reaching the end of slope and entering a valley, network vanishes, and the scarce burials are grouped in lonesome islands accessed through long uninterrupted 20-30 m pathway lines of the average measures of integration or below. The flatter the terrain, the more constant and regular burial pattern emerges.
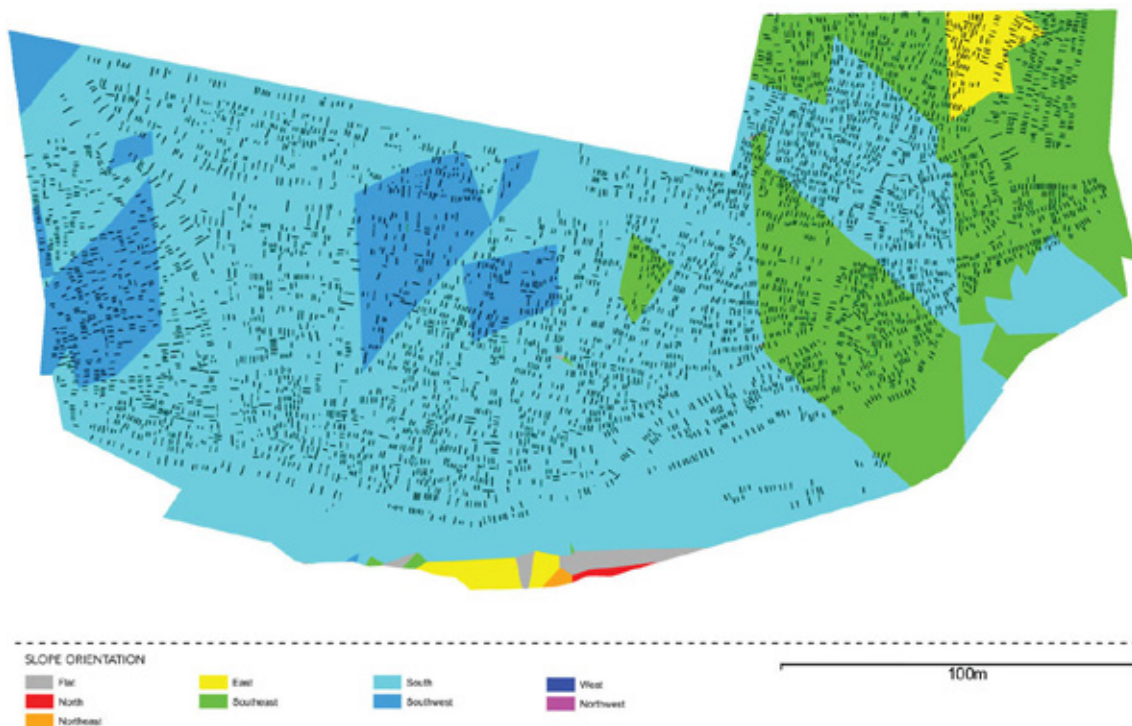
Figure 10 - Burial directions of Bernardines cemetery laid over terrain slope orientation map, processed by ArcGIS software.

Terrain is slightly inclined and facing South. Closer to the valley of river Vilnelė, terrain falls down - there is very few burials here. In those parts where terrain faces Southeast, burial direction turn softly towards East. On the Western side of the section terrain turns slightly West - Southwest orientation: here the prevailing burial direction is West-East. However Bernardines terrain is not as expressive as, for example, Rasos, and it is quite small. Lacking topographical variation, correlation between terrain orientation and burial direction seems not as strong, as burials' relation to the chapel - this looks like more plausible reason for cemetery's settlement genotype.

Probably it was chosen to plant the chapel on the highest spot of the cemetery, and burials were laid in relation to the chapel and the terrain. This burial direction doesn't match dogmatic Catholic principles, but corresponds to the common notion that Lithuanians have about burial directions. But this coincidence doesn't confirm it to be a rule, as other cemeteries in Vilnius show more organic configurations than Bernardines. Probably, Bernardines cemetery for its size and flat terrain was suggestive for keeping the same burial direction without extra effort - practicality took over mythology and enabled a reproduction of previous pagan burial practice. When terrain becomes more complicated, even though still making part of the cemetery's enclosure, burials become scarce and eventually vanish before getting close to the cemetery's wall.

4. CONCLUSIONS

Overlaying few sheets of different data, aiming at finding correlations between terrain, burial directions and integration measures proved to make sense and bring forward deeper insights to cemetery's morphological analysis. To sum up it is concluded that:

1. Chapel is situated on the highest point in the whole cemetery structure, surrounded by the graves set either perpendicularly or in parallel to the chapel. Organically symbolic paradigm of cemetery's settlement maintains chapel as a central figure, but its location is encountered along the pathways, and not geometrically imposed on cemetery's structure.

2. The dead of the highest social status are scattered through the oldest part of the cemetery. The extension has less nineteenth-century burials probably for lower quality tomb materials, that didn't prove to be resistant to the damages of time (probably these were wooden crosses), and wiped them off the cemetery and its history.

3. Entrance doesn't relate to the chapel symmetrically and directly, but the integration measures of the pathways are of the highest measures in the system (much above the average).

4. In terms of correlation between integration and burial directions: it has apparently more to do with the density of the grids, pathway length and straightness than with the changing burials directions.

5. In the case of Bernardines cemetery, burial direction obeys chapel's location, and further away from it follows the terrain, keeping a constant dialogue with changing altitudes. Therefore this is not common for other cemeteries in Vilnius.

ACKNOWLEDGEMENTS

REFERENCES

Ariès, Philippe. 1981. The Hour of Our Death. New York: Vintage Books.

Auzelle, Robert. 1965. Dernières Demeures: Conception, Composition, Réalization Du Cimetière Contemporain. Paris.

Bazaraitė, Eglė, Teresa Heitor, and Maria Manuel Oliveira. 2016. "Requiem for a Pagan Soul. Pagan Reminiscences in 19th Century Cemeteries in Lithuania." *Thanatos* 5 (2): 7–24.

Briedis, Laimonas. 2008. Vilnius: *City of Strangers.* Vilnius: Baltos lankos.

Dalton, Ruth Conroy, and Julienne Hanson. 2007. "Feeling Good and Feeling Safe in the Landscape: A 'syntactic' Approach." In Open Space - *People Space: Innovative Approaches to Research Excellence in Landscape and Health,* 205–23. Edinburgh.

Dundulienė, Pranė. 2005. *Senieji Lietuvių Šeimos Papročiai [Family Customs of Old Lithuanians]*. Vilnius: Mokslo ir enciklopedijų leidybos institutas.

Etlin, Richard E. 1987. The Architecture of Death: The Transformations of the Cemetery in Eighteenth-Century Paris. Cambridge: The MIT Press.

Girininkienė, Vida. 2004. *Vilniaus Kapinės [Cemeteries in Vilnius].* Vilnius: Atkula.

———. 2010. Vilniaus Bernardinų Kapinės 1810-2010 [Vilnius Bernardines Cemetery 1810-2010]. Edited by Vida Girininkienė. Vilnius: Versus Aureus.

Hillier, Bill, and Julienne Hanson. 1984. *The Social Logic of Space.* Cambridge: Cambridge University Press.

Kasperavičienė, Audronė. 1989. "Bernardinų Kapinės Vilniuje, Žvirgždyno Gatvėje. Istoriniai-Meniniai Tyrimai [Bernardines Cemetery in Žvirgždynas Street, in Vilnius. Historical-Artistic Study]." Vilnius: Paminklų restauravimo projektavimo institutas, F. 1019, Ap. 11, B. 7795-7796.

Mahmoud, Ayman Hassaan, and Reham H. Omar. 2014. "Planting Design for Urban Parks: Space Syntax as a Landscape Design Assessment Tool." *Frontiers of Architectural Research.*

Matulytė (ed.), Margarita. 2001. *Vilniaus Fotografija 1858-1915 [Vilnius Photography 1858-1915].* Vilnius: Lietuvos nacionalinis muziejus.

Oliveira, Maria Manuel Lobo Pinto de. 2007. "In Memoriam, Na Cidade." Dissertação de doutoramento, Arquitectura/ Cultura Arquitectónica, Universidade do Minho. http://repositorium.sdum.uminho.pt/handle/1822/6877.

Rugg, Julie. 2013. *Churchyard and Cemetery: Tradition and Modernity in Rural North Yorkshire.* Manchester and New York: Manchester University Press.

Turner, Alasdair. 2001. "Depthmap. Computer Application." London: University College London.

Varoudis, Tasos. 2012. "depthmapX Multi-Platform Spatial Network Analysis Software', Version 0.30 OpenSource."

Vėlius, Norbertas. 1996. Baltu Religijos Ir Mitologijos Saltiniai: Nuo Seniausiu Laiku Iki XV Amziaus Pabaigos, Vol. I [Sources of Baltic Religion and Mythology, Vol. I]. Edited by Norbertas Vėlius. Vilnius: Mokslo ir enciklopediju leidybos institutas.

———. 2003. Baltu Religijos Ir Mitologijos Saltiniai: XVII Amzius, Vol. III [Sources of Baltic Religion and Mythology: 17th Century, Vol. III]. Edited by Norbertas Vėlius. Vilnius: Mokslo ir enciklopediju leidybos institutas.

———. 2005. Baltu Religijos Ir Mitologijos Saltiniai: XVIII Amzius, Vol. IV [Sources of Baltic Religion and Mythology: 18th Century, Vol. IV]. Edited by Norbertas Vėlius. Vilnius: Mokslo ir enciklopediju leidybos institutas.

Zhai, Yujia, and Perver Baran. 2013. "Application of Space Syntax Theory in Study of Urban Parks and Walking." In *Proceedings of the Ninth International Space Syntax Symposium,* edited by Y. O. Kim, H. T. Park, and K. W. Seo, 032: 1-13.