The earliest water supply and sewage systems in Vilnius, Lithuania

R. Pukienė[1,2]

[1] *Vytautas Magnus University, Kaunas, Lithuania*
[2] *National Museum the Palace of Grand Dukes of Lithuania, Vilnius, Lithuania*

Due to the high groundwater level, a number of wooden underground objects had remained in the Vilnius Lower Castle territory from different periods. Dendrochronological investigation of ancient infrastructure elements helped to determine more accurately the building and maintenance history of this most central part of Vilnius.

Among the key needs of living in densely populated areas are water supply and sewage management. During archaeological investigation of the castle elements of wooden water supply system and sewers were found.

Two types of finds were discovered during archaeological excavations of the site that were related to the underground water-supply network. They were wooden water pipes and their remains, as well as the metal couplings used to join them. Wooden water pipes were made from pine logs, with the central part hollowed by a long auger. The diameter of the pipes ranged from 25 to 40 centimeters and their length measured 9 meters. The pipes were joined to one another using iron cylinder-shaped couplings with diameters of 11 to 17 centimeters and length of 10 to 13 centimeters.

The beginning of water pipeline network is dated back to 1501 by arguable historical sources in Vilnius. The earliest remaining wooden water pipes found in the Lower Castle were dendrochronologicaly dated to 1529. This first pipeline supplied with water the newly built grand duke's palace. In the 1540s–1550s major development of the water-supply system in the Vilnius Lower Castle occurred. Pipes were dated to 1545, 1551 and 1558. During the reign of grand duke Sigismund Augustus (1544-1572), water flowed into the most important buildings of the castle.

In 2002 and 2008 also parts of a wooden sewer were discovered north of the grand duke's palace. The sewer was meant for kitchen waste and was assembled in sections. Each section consisted of a flume made up of four sawn longitudinal boards resting upon cut out sections of log mudsills and covered by transversal boards. There are rafting holes in some of mudsills.

The covers of the sewer were made from oak and the rest parts – from pine timber. An 83 year-long oak tree-ring series was dated to 1530 against English oak chronology of the Baltic origin BALTIC1; however, some external rings were missing. After investigation of pine parts, tree-ring series with the duration of 248 years was made. The mudsills were preserved up to the bark edge. The constructed pine tree-ring series was dated against Vilnius pine chronology to 1539. Since the last ring is a bark-edge one, the dating shows the trees for the sewer were felled in the period from autumn of 1539 to spring of 1540.

Dendrochronological analysis of remnants of water supply and sewage systems has revealed the 16th c. was the time of rapid development of conveniences and sanitary in Vilnius.