

## Villanova Seepage Pits

Several seepage pits located on the southern side of Tolentine Hall, located at Villanova University in Villanova, Pennsylvania were discovered in July 2005. These seepage pits presented a unique opportunity to study the long-term impacts of infiltration. The history of these pits is still somewhat uncertain because of their age and a fire in Tolentine Hall in 1923. It is understood that the structures were built at the turn of the 20<sup>th</sup> century around the time Tolentine Hall, at the time called College Hall, was built. Originally, four pits existed in the area to collect and infiltrate stormwater off of Tolentine Hall, St. Thomas Monastery, and St. Thomas of Villanova Church which are located on the southwestern corner of the main campus.

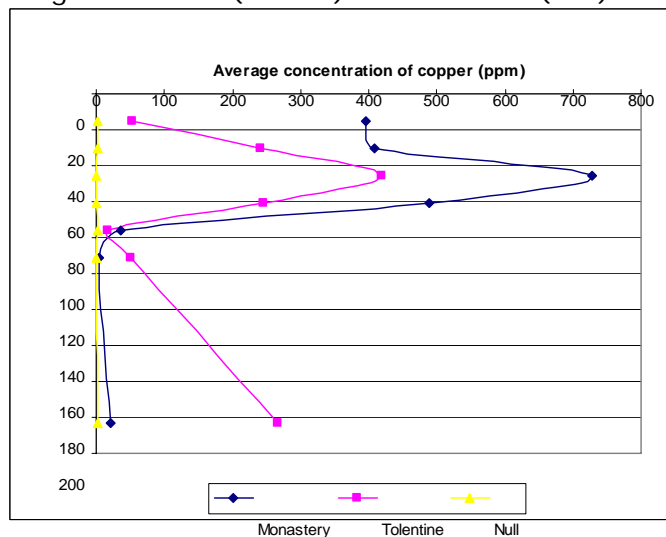


At the time of this research, two of the pits have been replaced by large box culverts and are no longer functioning as seepage pits. The pits were given names based on their location to certain buildings. The Tolentine pit is the red dot to the left and the Monastery pit is the red dot to the right. The goal of this study was to determine the functionality of the pits, the impact of infiltrating stormwater for 100 years, and what would be required to restore the pits. constructed out of bricks with a sand bottom.



Currently, the Tolentine pit is not in use. The total impervious area contributing to the Monastery seepage pit is 2617 m<sup>2</sup> (28170 ft<sup>2</sup>). Tolentine Hall has a roof size of 900 m<sup>2</sup> (9670 ft<sup>2</sup>) and St. Thomas Monastery has a roof size of 1720 m<sup>2</sup> (18500 ft<sup>2</sup>). The Monastery pit has a height of 4.1 m (13.5 ft) with a 1.8 m (6 ft) diameter resulting in a total volume of 10.8 m<sup>3</sup>

(381.5 ft<sup>3</sup>), which is to 10,800 L (2850 gallons).



Our analysis showed that although elevated copper concentrations were found in the soils beneath the pits, these levels were not above Pennsylvania standards for clean fill. The infiltration capacity of the Tolentine pit was quite high; however, the infiltration capacity of the Monastery pit had been compromised by the inadvertent addition of organic matter. A restoration design using earthquake drains was used to alleviate the Monastery pit infiltration capacity problems. Our study into the efficacy of this improvement technique was inconclusive.