”The Lateran Baptistery in Three Dimensions”

A pilot study in building archaeology of the Lateran baptistery in Rome
Lateran baptistery, Vatican State

Dnr 429-509-2010

Hanna Menander, Olof Brandt, Agostina Appetechia
and Håkan Thorén
“The Lateran Baptistery in Three Dimensions”
A pilot study in building archaeology of the Lateran baptistery in Rome
Lateran baptistery, Vatican State

Dnr 429-509-2010

Hanna Menander, Olof Brandt, Agostina Appetechia and Håkan Thorén
Contents

7 Introduction
9 The main building-phases of the Lateran baptistery
11 Earlier research on the Lateran Baptistery
13 The Lateran baptistery in three dimensions – theory and method
15 The aim of the project
15 Laser Scanner 3D technology applied to an Archaeological Site
   - Accomplishment of the work
15 Evaluating a real case
16 Technology and methodology
18 Data Post Processing
18 Results
18 Evaluation of a three-dimensional documentation and analysis
20 The results of the three-dimensional documentation
24 A Continuation of the project
24 “The Lateran Baptistery in Three Dimensions”
   A building archaeological method study 2011–2013
25 Project plan
26 Bibliographical References
27 Administrative data
Fig 1. Map over Rome where the baptistery is marked. GRAPHIC HÅKAN THORÉN.
"The Lateran Baptistery in Three Dimensions"
A pilot study in building archaeology of the Lateran baptistery in Rome

Introduction
In the autumn of 2008 a joint project was formulated between the Swedish Institute in Rome, the Pontifical Institute of Christian Archaeology in Rome (PIAC) and the National Heritage Board, UV, in Sweden, with the purpose of working with new questions and methods in building archeology. The project also aims to create an international cooperation and exchange of knowledge in this field between archaeologists at the National Heritage Board in Sweden and Vatican building archaeologists where the Swedish Institute serves as administrative coordinator and basis for the project. The international collaboration is of particular interest for the Swedish National Heritage Board who the last years have tried to develop the quality and methods of rescue building archaeological projects in Sweden (Menander 2007; Menander & Lindberg 2009, Menander 2009, Menander et al 2010). This project, called “The Lateran Baptistery in Three Dimensions”, began in spring 2010 and is loosely related to a research project about the Lateran baptistery carried forward by the PIAC in a formalized collaboration with the Vatican Museums, who are responsible for the monument (Brandt 1997, 1998, 2006, Brandt & Guidobaldi 2008).

The preliminary investigation presented in the following report has been realized thanks to Gihls Fond (Vitterhetsakademien), Margaret Biörstads fond and the Vatican museums. It is an initial pilot study with the purpose of examining and evaluating three-dimensional working methods for further investigations through a laser scanning of the Lateran baptistery, structured in yearly campaigns from 2010 until 2013.
Fig 2. Plan over the Lateran-area. FROM BRANDT & GUIDOBALDI 2008:191.
The Lateran Baptistery in Three Dimensions

The main building-phases of the Lateran baptistery¹
The Lateran baptistery stands west of Rome’s cathedral San Giovanni in Laterano in the south-east part of the ancient city (fig 1). It is an octagonal building circa 20 m high and 20 m wide, partially surrounded by chapels and other buildings added during the centuries (fig 2). In spite of many reconstructions, important parts of the Early Christian building were always visible, especially inside the building, like the central “baldacchino” with ancient columns and architraves, and several important mosaics. After the removal of the plaster of the outer walls in 1966, also the ancient brick walls are visible, showing that the octagonal building is late antique, although they also show many reconstructions and repairs (fig 3).

Although the baptistery is a late antique building, its appearance today goes back to a major reconstruction in the 17th century, especially under Pope Urban VIII (1623–1644) who made a new roof and central dome for the building and had its inner walls covered with paintings (fig 4).

Another important change was in the late 16th century, when Pope Sixtus V (1585–1590) demolished the 5th century chapel of the Holy Cross (Santa Croce) on the north-west side of the octagonal building and so created the modern entrance directly from the Piazza.

Before that, for many centuries the baptistery was surrounded by chapels and other buildings on all sides. The biggest of the surrounding buildings is the 7th century chapel of San Venanzio to the east, built in a rectangular hall partially built with the original baptistery and partially already before it, in the third century.

Fig 3. The northern outside parts of the baptistery. PHOTO THE PROJECT.

¹ This part is written by Olof Brandt.
Fig 4. The baptistery from inside, picture taken from south. PHOTO THE PROJECT.
Other surrounding structures belong to a major reconstruction during the central decades of the 5th century when buildings were added on four of the eight sides, creating a kind of cross-shaped plan. Among these buildings was the chapel of Santa Croce, but also the vestibule, a rectangular hall with apses on the short sides (south-east), which is still standing, and the small cross-shaped chapel of San Giovanni Evangelista (north-east), while the symmetric chapel of San Giovanni Battista (south-west) was replaced by a small oval chapel in 1780.

This 5th century reconstruction probably began with Pope Sixtus III (432–440) and was completed by Hilarus (461–466). In this reconstruction also the upper half of the octagonal baptistery was completely reconstructed with new, bigger windows, and perhaps raised to a new height. Re-used porfido columns and marble architraves were used both in the new vestibule and around the baptismal font at the centre of the building in a central baldacchino which since then has carried the weight of a small central dome, while the surrounding circular corridor is covered by a roof (fig 4).

The original phase of the baptistery had the same octagonal shape and is preserved in the lower half of the outer walls, where traces of broad doors beneath small arched windows can be seen on all visible sides. Nothing is known about the upper part of the original phase and its roof. The building technique of the original walls, together with the decorations of the building which was demolished for the construction of the baptistery, date the original phase to the late-Constantinian period, shortly before the middle of the 4th century. This also fits with the 6th century source Liber Pontificalis, which attributes its foundation to the Emperor Constantine (312–337).

Earlier research on the Lateran Baptistery

The fact that the Lateran baptistery is an ecclesiastical building still in use, explains why it is one of the few ancient Roman buildings which are still standing. However, earlier archaeological research on the baptistery has mostly touched only the foundations and preceding phases of the area, not the standing building itself.

The first excavations were made inside the baptistery in 1924 and in the vestibule in 1925–1926. These excavations revealed remains of a Roman third-century complex which had been demolished for the construction of the baptistery, and the foundations of the fourth-century baptistery itself. The observation that the octagonal building’s foundation was circular led to the conclusion that the first phase of the baptistery was of circular shape (Giovenale 1929).

Other parts of the same third-century complex were discovered outside and around the baptistery during new excavations 1962–1964 (Pelliccioni 1973).

Only after the last excavations, in 1966, the plaster which had covered the building for two centuries was removed, revealing the late antique brick walls and much earlier unknown information about the history of the building in the traces of many reconstructions and repairs. For a long time, however, these ancient walls were not studied in depth.

A new examination of the foundation walls 1993–1996 revealed that the circular foundation must belong to the same phase as the octagonal brick building (Brandt 1996–1997). The same study contained also the first observations of the stratigraphy of the standing walls.

2 This part is written by Olof Brandt.
An in-depth study of the wall stratigraphy was begun in 2005 and continued in 2006 and 2008. It has so far resulted in the production of a two-dimensional documentation with hand-made drawings of the outer walls with a summary indication of the stratigraphic analysis, which is gradually transformed in detailed AutoCad drawings where each brick is indicated, and with a separate layer for each stratigraphic unit. Preliminary results of this study were published in 2008 (Brandt & Guidobaldi 2008).
The Lateran baptistery in three dimensions – theory and method

For building archaeology digital technology and the possibility to work in three-dimensions gives a great opportunity to further develop methods of documentation and new types of analysis. By using laser scanners and digital measurements with a direct reflex total station we can create a “whole” structure. This means, for example, that we can study and compare the masonry and events in the masonry on all the façades of the building at the same time. But to make progress in the understanding of a building and enable the interpretations of the room and how it has been used in its historical context it requires further analysis. The three-dimensional way of working allows us to visualize the building’s spatiality so that we can try to make new interpretations of a building (Eriksdotter 2009:85ff). A three-dimensional approach makes it possible to have a deeper discussion and analysis than before of the space of the building, how it was used, and how this has changed over time.

Some theoretical work in this field has been made by Swedish archaeologist Gunhild Eriksdotter. In her Ph.D. thesis, “Bakom fasaderna” (2005), she formulated an analytical model of how to work with a building to visualize time, space and practice of the building:

• Time analysis is a stratigraphic documentation, analysis and interpretation of the masonry.

• The spatial analysis, based on the time analysis, means that the examined masonry is connected with spatial analysis of the room, i.e. how was the building reshaped and in what way did this affected the movement and the experience of the building?

• The practice analysis of the building means that we study the codes and markers that were put in the room to “dress” it with meaning. Were where these markers put and what was the underlying meaning of them? And how did the receiver apprehend the intentions of special markers in the building? This part of the analysis is based on the clear distinction made in modern theory discussion between the meaning given to a building by the person who determined its form, and that given to it by those who used it (Lukka & Searle 1993). The practice analysis is based on the spatial analysis, and requires a three-dimensional documentation of the building.
With this model as a starting point and analysis instrument the Lateran baptistery is in many ways an appropriate study object:

- The time analysis, i.e. the stratigraphical analysis of the walls is almost completed (Brandt work in progress).

- The building has been used with the same function (baptistery) for about 1700 years, but has been reshaped several times, which makes it particularly interesting because then we have the possibility to examine how the spatial movement varies and change in a long time perspective.

- The baptistery had different “building proprietors” who has manifested themselves through a variety of markers and symbols (fig 6 & 7) which make it particularly interesting because we can analyze and discuss the “messages” sent out by these markers. This also allows us to talk about the receiver of the “messages” and to do what Eriksdotter calls an empathic study of the room (2009:88ff).

- There is a great source material in the form of previous archaeological investigations, pictures and written sources that have recently been compiled (Brandt & Guidobaldi 2008).

In these circumstances, The Lateran baptistery is a good starting point for a research project with the aim to test and refine methods of three-dimensional documentation and analysis.

Fig 6. The hills with the star on top and the rovere tree were Pope Alessandro VII (1655–1667) coat of arms. He came from the Chigi family. The picture shows a part of the frieze near the roof.
PHOTO THE PROJECT.

Fig 7. The Pope Urban VIII (1623–1644) came from the Barberini-family who had bees on their coat of arms why also Urban VIII’s symbol became bees. Inside the baptistery there is a lot of bees symbolizing the Pope, on the ceiling, on the marble-floor etc. The bee on the picture is located on the base of the interior columns in the baptistery.
PHOTO THE PROJECT.
The aim of the project

The overall aim of the research project “The Lateran Baptistery in Three Dimensions” is to create an international collaboration in development and evaluation of virtual, three-dimensional methods and techniques for building archeology. The project aims to broaden the scope of interpretation and thus the possibility to perform qualitatively better and more thorough analysis of a building. The project also aims at increasing the knowledge of the baptistery’s complicated and complex building history. The results of this work will be presented at the Congress “Constantine and the fourth century” held in Rome in September 2013.

The aim of the present pilot study was to apply and test the three-dimensional documentation technique, i.e. laser scan, the Lateran baptistery and thus have the opportunity to evaluate the technology. Can the method be used to supplement masonry analysis? For example, can horizontal and vertical sections of the facades visualize different building stages? Furthermore, the pilot study was intended to create a three-dimensional image of part of the baptistery and in this way try to begin a spatial and practice analysis of the baptistery.

Laser Scanner 3D technology applied to an Archaeological Site

- Accomplishment of the work

**Evaluating a real case**

Within “The Lateran Baptistery in Three dimensions” project, the Pontifical Institute of Christian Archaeology in Rome, the Swedish Institute in Rome, the Vatican Museums and the Swedish National Heritage Board have planned and performed the 3D laser scanning at Lateran Baptistery in Rome with the FARO Photon 80 CAM 2 model in order to achieve a more effective archaeological interpretation through a schematic model of the architectural structure made with photographs of the surface of walls and overlapping stratigraphic surveys.

The purposes of this experiment in detail, can be summarized as follows:

- Assess the effectiveness of laser scanner as a measuring device for the measuring of structures already highlighted by previous excavations and/or still preserved.
- Define the method to extract information from the “basic” model, useful for archeological research (plan, sections and elevations).
- Establish working methods more effective in achieving a model of the monument with photographic wall surfaces to be used as a basis for reading stratigraphic or graphic documentation in support of an atlas of the types of walls.

The Pilot Project did not consider the entire monument, but only its southern portion, according to a procedure organized in steps aimed at the consolidation of the entire structure in high graphics. The choice of a precise part of the Baptistery was determined following a preliminary qualitative and quantitative analysis of historical architecture found in relation to priorities for action identified.

---

4 This part is written by Hanna Menander.
5 This part is written by Agostina Appetecchia.
Hence, the façades A-B-H were chosen for which provision was made for a campaign of full three-dimensional relief, indoor and outdoor, including also the corresponding part of the archaeological excavations below (see fig 5).

In future campaigns the encouraging results achieved by the methodology will be applied to the entire building and to the entire archaeological area, in order to integrate the three-dimensional model with the excavation and documentation of previous measurement campaigns (photo-plans, planimetric drawings, elevations and sections).

**Technology and methodology**

<table>
<thead>
<tr>
<th>Laser Scanner</th>
<th>FARO Photon 80 Cam 2 + Nikon D300 with 10.5mm Nikkor Fisheye lens.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acquisition time</strong></td>
<td>4 days.</td>
</tr>
<tr>
<td><strong>Acquisition procedure</strong></td>
<td>Panorama Scan VxH (320x360°) using the inbuilt inclination censor. Automatic acquisition of digital images.</td>
</tr>
<tr>
<td><strong>Number of scanpositions</strong></td>
<td>20 scan positions.</td>
</tr>
<tr>
<td><strong>Targets</strong></td>
<td>40 checkerboard targets was used to stitch the scans together.</td>
</tr>
<tr>
<td><strong>Post-Processing DATA</strong></td>
<td>Processing software: FARO Scene.</td>
</tr>
</tbody>
</table>

The laser scanner used during this campaign is a FARO Photon Cam2, a high-speed and high precision 3D laser scanner, based on the “Phase Shift” technology, combining different features which make it suitable for a wide field of applications (fig 8). The maximum instrument range is about 75 meters, with an accuracy of 2 mm at 25 meters, and covers a maximum of 360° horizontal and 320° vertical field-of-view. For each location, constant waves of varying length are projected. Upon contact with an object they are reflected back to the scanner. At the same time, a color camera acquires a digital image of the scanned scene, so that the cloud of points obtained consists of a data set, including space coordinates \((x, y, z)\) the value of reflectance and color data for each detected point. By means of special targets located ad hoc and visible (at least 3) in every single scanning, each of the point clouds was exactly located in order to reconstruct the whole building (fig 9).
The field operations were conducted from 22 to 26 March 2010 and approximately 400,000,000 points were measured. In order to record the whole wide area, 20 laser scanning operations were performed at 6 different locations of the site:

- Roof.
- Upper Terrace.
- Lower Terrace.
- Excavations.
- Baptistery inside.
- Baptistery outside (Side B and vestibule).

With different resolution value accordingly with the characteristic of the scene: high resolution was applied to the most significant structures like inside the baptistery and in the vestibule A. The scan project was divided in the following steps:

- Planning of the scan positions.
- Placing of targets in the scan scene, useful for the stitching of several scans.
- Panoramic scanning.
- Automatically capture of digital images.
- Detection of the targets and surveying their position using total station Leica Flexline TS R100 06.
Data Post Processing

The post processing phase was performed with FAROScene, the proprietary software provided by FARO with the laser scanner. FAROScene is a complete software environment with individual software modules, allowing both scanning intervention configuration and data recording, as well as point cloud management.

In the first data post processing phase, the 20 point clouds, partially overlapping, were exactly positioned in the same coordinate system so that they together represent the 3D model of the site. After that, not pertinent macroscopic peripheral portions of the cloud were manually removed and classified as “noise”. When all noise had been removed the photos obtained during the scanning was applied to the point cloud.

After noise removal polygon meshes were triangulated from the point cloud to obtain surfaces. Surfaces were created for different parts of the building were a detailed geometric model could be helpful in the tracking of three-dimensional contours of Stratigraphic Units. The surfaces are then cut into parts without losing the connection with images. For now, however, we have generated only a few sections and the building floor plan.

In a second step we will reconstruct, using different and specific softwares, the surfaces of all walls based on data of 3D scanning combined with digital photos that provide high-resolution detail and utilizing the digital images available on the plans.

Results

The aim of this pilot project was to examine three-dimensional documentation and analysis techniques to evaluate the working method for a future major project. Furthermore, the project intended to create an international collaboration project concerning building archaeology. The results of the pilot project are listed below.

Evaluation of a three-dimensional documentation and analysis

The practical field work

The Lateran baptistery has a long and complicated building history which also includes that part of the building which is inaccessible. Within the pilot project we laser-scanned part of the baptistery (side A, B and part of side H, see figure 5), from its foundation walls below ground to the attic. This was done to examine the possibilities of using the scanner in a variety of environments; outdoors, indoors, underground and in the attic. Thanks to archaeological excavations the foundation walls of the baptistery are accessible. In the excavation area, which is situated below the present ground level, the working conditions are problematic in many ways. Besides the remains of the baptistery there are ancient Roman remains like walls, floors, etc. The area below the ground therefore seems somewhat like a labyrinth, with narrow nooks, low ceiling and poor light conditions (fig 10). Based on this year’s experiences in this area we note that the scanner we used was too large and unwieldy. A major problem has also been that it had a top-mounted camera which is not suitable in confined environments with limited roof-space. For further work with the remains underground we therefore require a smaller scanner with built-in camera.

6 This part is written by Hanna Menander.
In order to work optimally in all parts the baptistery we need more flexible tripods, both for the scanner and for the total station. Furthermore, because of the inaccessibility of parts of the building, we can note that it requires a large number of laser scans in order to achieve maximum results. Also in this case it would be easier with a smaller and lighter scanner.

Another experience of the practical field-work is that we needed three people to carry out the fieldwork. For future work it is also important that there is continuity in who is doing the work, i.e. that the same three individuals will be carrying out the next field campaigns. Within the next campaigns it is also desirable that all the project participants have the opportunity to learn and to perform all parts of the technical work.

Post-processing the data

In order to do a full three-dimensional documentation and analysis of the baptistery it requires a well-functioning technology. In addition to a smaller and more manageable laser scanner it also requires good and stable software that can process the data. Each scan generates a very large number of points (see above technology and methodology) which means that the post processing of data takes a long time, requires large computing power and well-suitable software. It also requires good software to process the photographic material, i.e. a software which can straighten the photos which are a prerequisite for making photo mosaics. We also needed several different types of lenses to the camera to optimize the photo material.
When laser scanning we used markers, A4 paper with black and white squares, which was set up on walls and floors (see above technology and methodology). During the post-processing it has been shown that these markers have partially disrupted the texture of the scanning, why other types of markers should be used for further work.

**Collaboration**

The Lateran baptistery is in many ways an appropriate object to work with and test new methods of (see The Lateran baptistery in Three Dimensions - Theory and Method). One of the pilot project’s main aims was to provide a basis for international collaboration for building archaeologists. During the work it was proved that the close collaboration between PIAC, the Vatican Museums, the Swedish Institute in Rome and the National Heritage Board, UV has worked out very well and that this has been absolutely crucial for all parts of the project and that it should work out satisfactorily. PIAC has provided with scientific directions and expertise and project management. The Vatican Museums has been involved by lending equipment and in particular they gave us permission and facilitated the work with the baptistery. National Heritage Board, UV has contributed with technical expertise and has with project management pushed the project forward. The Swedish Institute in Rome has administered the project and served as both home and work place for the project participants. Thus, it is clear that a continued collaboration between these institutions with the same objects is a very good basis for further improvement with issues related to method development in building archaeology.

**The results of the three-dimensional documentation**

The following results have been achieved for the parts of the Lateran baptistery which have been laser-scanned.

The whole of façade A is available for analysis. The vestibule and the upper terrace cover and divide much of the masonry of side A which makes it the most inaccessible façade of the baptistery (fig 11). By laser scanning the façade, the entire wall can be studied simultaneously, but it also makes it possible to study and compare it with the adjacent façades B and H (fig 12). Furthermore we can, by applying the stratigraphical interpretation of a façade, for example the stratigraphy of side B, compare for example the scaffolding holes on side B with the scaffolding holes on side A.

The laser scanning also means that the entire façade of side B can be studied, i.e. from the foundation walls to the attic (fig 13). In addition, the scan makes it possible to do horizontal or vertical sections anywhere on the façade. This means that we can study the thickness/volume of the wall and see if it is leaning or if it is uneven and “bulges” (fig 14). A vertical section through part of side B shows that the wall is thinner in the upper part, where it narrows after a ledge just above the arch to the top antique window. Furthermore, the scan can document a peculiar phenomenon in the upper left section of the wall. This part of the wall seem at some time have started to bulge, or perhaps it bulged too much already from the beginning. In any case, at some time it was decided to plane the wall surface in an irregular triangle to create a straight wall surface. This was probably done when the building were plastered over.
Fig 11. Side A is the most inaccessible façade of the baptistery. Both the vestibule and the upper terrace cover and divide much of the masonry.

PHOTO THE PROJECT.

Fig 12. A mosaic of eight separate laser-scan positions. When we have laser-scanned side A the entire façade is available for analysis and also comparable with side B and H.

PICTURE AGOSTINA APPETECHIA & HÅKAN THORÉN.
Fig 13. The laser-scan allows us to study every part of side B, including the foundation. PICTURE HÅKAN THOREN.
The laser scanning gives us a virtual building, which means that we can complement but also control the previous graphic documentation. The virtual model gives us access to objects and constructions in the building that was not possible to examine previously. This means that we in the model for example can measure the interior columns and compare the height with the traces of alterations to the building exterior. Or we can for that matter make measurement of the roof dome or compare the size of the relieving arches at the attic. A virtual baptistery also means that we can work and explore the building whenever we want, i.e. without physically being there. In this specific case, it is very helpful because of the many different permissions necessary for access to the different parts of the building. Furthermore, the baptistery is frequented by many tourists, which occasionally prevent the practical work.
The laser scanning inside the baptistery makes it possible to “cut out” certain elements and create a visual image of what the baptistery looked like during different periods. By, for example, removing the columns, the vestibule and the roof dome we can create a three dimensional model, which gives an idea of what the room looked like before Pope Sixtus III major redevelopment in the fifth century. As part of the continued project more extensive and detailed scans means that we can make more accurate reconstructions of what the baptistery was like during different time periods. That means that we eventually could create virtual historical walks in the baptistery. These can in turn lead to further discussions on movement patterns and the practice of the building and how this changed over time. Within a possible continuation of the project, it is also important to study the baptistery in relation to the surrounding context, i.e. to illustrate how the baptistery related to the rest of the buildings in the Lateran area.

A continuation of the project

This project was intended to examine and evaluate the use of laser scanner as a documentation method and as a tool to broaden the interpretative framework and allow further analysis of the building. Based on those parts of the baptistery, which is laser-scanned, it is found that three-dimensional documentation has great development potential. The approach means, however, a new way of thinking, not just in practice but even in theory. It is therefore clear that we are doing “work in process”, i.e. new questions, perspectives and insights on the opportunities, but also the limitations of the method, are emerging as the work proceeds. It has therefore been of great importance, both for the practical field work but also for post-processing, that the project was started up with a pilot study. This first initial “pre-study” has brought many valuable experiences for future work and projects. A clear and essential experience is the need for continued efforts in the form of research projects to move forward with the work. In the current situation there is no possibility for work of this nature in the context of the rescue archaeological projects. But it is still essential to develop both the technical and theoretical methods for building archaeology. By testing new forms of analysis such as an empathic approach we can obtain new knowledge and understanding of the building and its historical context. In the future, the stratigraphic analyses of the masonry will hopefully be a starting point in the building archaeological examination and not the end as it sometimes is today. But to get there it will require new types of instruments and a new way of relating to a building. We therefore need to start to think, document and analyze in three dimensions (Eriksdotter 2009: 85ff). Thus it is desirable that the project is progressing with more campaigns. Below is a suggested plan to a continuing project.

“The Lateran Baptistery in Three Dimensions”

A building archaeological method study 2011–2013

The continuing research project will last from year 2011–2013 with field campaigns over the next two years. Every field campaign (two to three weeks/year) ends with a report, published in the Swedish National Heritage Board's report series. The project will lead to two “results”. One result will hopefully contribute to further knowledge about the history of the building and a one result that will relate to building archaeological method development. In September 2013, the project intends to present the results at

---

7 This part is written by Hanna Menander.
the congress “Constantine and the fourth century” in Rome. The project results will also lead to a scientific article which discusses methodology and method development in building archaeology. This article will be published in English in an appropriate forum. The methodological results may also be presented in further international conferences such as the EAA.

The project will be presented on the Swedish National Heritage Board, UV’s homepage for building archaeology with a link to the PIAC and the Swedish Institute in Rome. At the homepage we will communicate all parts of our project, i.e. technology, work process and results. For each field campaign, there will be a blog where we describe the progress of the work in words and pictures (for the pilot project’s blog see http://www.uvblogg.se/wordpress/?cat=6). In this way the project is open and accessible to input from building archaeologists and other interested groups.

The project will continue as an international collaboration between PIAC, Swedish Institute in Rome and the National Heritage Board, UV. The project is formulated as a research and development project and will seek external funding.

**Project plan**

<table>
<thead>
<tr>
<th>Year 2010</th>
<th>Year 2011</th>
<th>Year 2012</th>
<th>Year 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applications for</td>
<td>Field work, the founding walls of the</td>
<td>Field work, remaining parts of the</td>
<td>Work-shop, scientific article about</td>
</tr>
<tr>
<td>funding the projekt.</td>
<td>baptistery.</td>
<td>baptistery, i.e. in- and outside and all</td>
<td>building archaeology and method.</td>
</tr>
<tr>
<td>Post processing</td>
<td>Post processing data.</td>
<td>Post processing data.</td>
<td>Paper at the congress “Constantine and</td>
</tr>
<tr>
<td>data.</td>
<td></td>
<td></td>
<td>the fourth century”.</td>
</tr>
<tr>
<td>Report work.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Final report.</td>
</tr>
</tbody>
</table>
Bibliographical References


**Administrative data**

*Country:* Vatican State  
*Location:* Extraterritorial area of San Giovanni in Laterano, the Lateran Baptistery

*Coordinate:* Local  
*Height System:* Local

*National Heritage Board dnr:* 429-509-2010  
*Project number:* 11579  
*Intrasisprojekt:* –  
*Report Number:* 2010:18

*Responsible scientific Direction:* Olof Brandt (Dr. PIAC)  
*Project Coordinator:* Agostina Appetechia (PhD student PIAC), Hanna Menander (RAÄ, UV Öst)  
*Technology Manager:* Håkan Thorén (system developer, RAÄ, UV Teknik)  
*Administrative Coordinator:* Swedish Institute in Rome  
*Reference person:* Federico Guidobaldi, Prof. PIAC  
Barbro Santillo Frizell, Professor, Director of Swedish Institute in Rome  
Anders Kaliff, Prof. University of Uppsala, RAÄ

*Investigation time:* 22–26 March 2010

*Archive Documents:* –
"The Lateran Baptistery in three dimensions" is a research- and collaboration project between the Swedish Institute in Rome, the Pontifical Institute of Christian Archaeology in Rome and the National Heritage Board, UV, in Sweden. The aim of the project is to create an international collaboration in development and evaluation of virtual, three-dimensional methods and techniques for building archaeology. It also aims to broaden the scope of interpretation and thus the possibility to perform qualitatively better and more thorough analysis of a building. During the spring of 2010 a pilot study was done at the baptistery. The plan was to apply and test the three-dimensional documentation technique, i.e. laser scan, a part of The Lateran baptistery and thus have the opportunity to evaluate the technology. The results showed that three-dimensional documentation has great development potential and that we can reach new questions and knowledge by using this method. But it was also clear that it is a new way of thinking and that we are doing "work in process". An essential experience is therefore that we need continued efforts in the form of research projects to move forward with this type of work.