Chapter 25

Drawing, Geometry and Construction: The Dome of San Carlino Alle Quattro Fontane (1634–1675) by Francesco Borromini

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ABSTRACT

The link between the design drawing to an architectural work, sometimes goes through the definition of geometric paths which establish alignments, proportions, correspondences. The comparison of the geometric construction of survey data of an architecture and design data is very important for understanding the original design idea, highlighting not only the artist’s modus progettandi, but also matches, modifications or changes respect of precisely geometric paths and its building architecture. In these studies, the church of San Carlo alle Quattro Fontane in Rome, by Francesco Borromini, is an exemplar case. The project of the church, built between 1638 and 1675 and characterized by a coffered vault with an oval planimetric shape, is documented by a consistent corpus of Borromini drawings. This research, based on survey data, can allow to make new contributions to Borromini work and formulate new hypotheses regarding his construction practice.

INTRODUCTION

Understanding the connection between design drawings and the actual construction and analysing the correspondence between geometrical and survey alignments is neither simple nor straightforward. A series of factors, which are not easily readable, must be taken into consideration: on one hand, the graphic procedures and techniques employed, the representation methods, the geometrical construction on which design drawings are based and their timing sequence; on the other, the methods for capturing precise survey data, the choice of section plans that are congruent with design plans and the definition.
of architectural details. The case study of the *dome of San Carlino’s church* is a perfect example of this, both for the great variety and complexity of its design drawings and for the extraordinary quality of its architectural work.

The design of *San Carlino alle Quattro Fontane* by Francesco Borromini, was started in 1634 and continued, after he died in 1667, by his nephew Bernardo Borromini until 1675, the year in which the bell tower was completed. Most of the original drawings are part of a corpus of the architect’s entire work, which is preserved at the Albertina Academy in Vienna and available in digital format on the web (http://sammlungenonline.albertina.at).

The church, built in various phases between 1638 and 1675, features a mixtilinear layout with an elongated octagonal perimeter of the central nave, four curvilinear chapels on the orthogonal sides and four rectilinear walls on the oblique sides.

The dome rests on four support arches and four squinches and it constitutes the church’s main element, developed on a polycentric (oval) layout and characterized, at the intrados, by four levels of alternating cross-shaped and octagonal coffering.

During the late 1980’s, as the church was in a state of considerable decay, an intense restoration program was carried out. The program started in 1988 and continued until 1999, year of the Celebrations of Borromini’s work and it involved the clerestory (1988/89), the church’s façade (1990/93), the crypt (1994), the cloister and the Library (1996), the convent’s façades on Via del Quirinale and Via Quattro Fontane (1996/97), the interiors of the church (1997) and of the bell tower (1999). The studies on the historical documentation, on the “Relazione della Fabbrica” and on the construction phases, on the diagnostical analyses and the restoration, carried out by a team of scholars, technicians and restorers, coordinated by architect Paola Degni, are accurately described in Degni (2007).

In its present state, completely restored and free from the additions of the organ and the choir which dated back to the 1800’s, and brought back to its original colours, the church exemplifies Borromini’s authentic work.

From 2011 to 2013, two survey campaigns were carried out using traditional and direct survey methodologies, integrated by indirect, topographic, photogrammetric and laser scanning methodologies, obtaining a highly detailed 3d model; such surveys were aimed at studying San Carlino through the contribution of a multidisciplinary research team, made up of scholars in the fields of representation and survey, mathematics, history and restoration.

**BACKGROUND**

The scope of this study lies within the analysis of design drawings, whose background reference has been well defined by several texts, among which Docci (1987, 2009), Maestro (1992), Fraser and Henmi (1994), Mezzetti (2004), Morlacchi (2008), Arnheim (2009), and some magazines, specifically dedicated to the graphic analysis and the history of representation, as *Disegnare idee e immagini*, *Ikhnos* and *DisegnareCon*. This research, which has developed in recent years regards specific topics, graphical analysis of modern architectural designs, Canciani, (2003, 2009) architectural and archaeological survey methods, Canciani, et al. (2013), and Canciani, Spadafora (2014), wishes to focus on the analysis of the constructed object, through the detection and graphical analysis of the design and through the detailed study of all the drawings.