

PHOTOGRAMMETRY AND SURVEY PROCEDURES FOR THE ANALYSIS OF VENETIAN VILLAS: THE CASE STUDY OF VILLA ZENO BY ANDREA PALLADIO

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ABSTRACT

one of the most significant aspects of the architectural heritage of the Veneto region is the Venetian Villa. This project originates from the necessity of standardization which will regulate techniques and adjust procedures in order to analyse and catalogue their preservation. Different approaches are necessary for the comprehension of a historical building and the measured survey is essential for two particular reasons - the first being the knowledge of the building's composition, its geometry, its proportions; the second being the possibility for the spatial location and representation of datums (historical information, building materials, stratification of layers, quality of conservation ...). Measured survey is therefore contemporarily the representation of the *material text* of the villa and the most adequate support for the informations acquired through different investigations and various analytical techniques.

The primary objective is to establish a *vade-mecum* for a project planning of the operations to be repeated for all villas, a preliminary standard support for different successive specific examinations. The mean with which all information have been catalogued is through the CD-ROM (an instrument suitable for the integration of scholarly programs of investigation) where the technical report of the survey work can be found with all the topographical and the photogrammetrical datas, the program of digital photogrammetrical restitution (monoscopic and stereoscopic) using the orientation parameters (supplied by the CD-ROM) permitting the restitution of those elements that other scholars claim important in their research.

The Istituto Regionale Ville Venete, the public agency set up in order to facilitate the financing of the preservation of this very significant aspect of the architectural heritage of the Veneto region, in 1994 has commissioned a test study on villa Zeno located at Donegal di Cessalto (Treviso).

This villa built for Marco Zeno by Andrea Palladio (1508-1580) the most famous venetian architect, is a very peculiar case. The project is published in Palladio's *Quattro libri dell'Architettura* (Venice, 1570) but the villa has never been lived in and has experienced radical transformations in different periods; there is also the belief that the variance of its construction is due to the opposing ideas of the owner and the architect.

The villa needs a thorough restoration but the historical informations and the archival documentation are insufficient; there is then the necessity to undertake the process of cognition of a historical building from the *material text*; a point of view where measured survey plays a fundamental role.

The test had to face three different purposes:

1. to set up the technical operations for the acquisition of the essential metrical informations necessary to document the formal model of the villa - i.e. its geometry and proportions - integrating topographical survey and photogrammetry in order to obtain the most complete description of the building; to be followed by the exploration of the most suitable methods for a efficient representation of the distinctive character: from classical projections (horizontal and axonometrical), to computer solid modelling:

- . to document the decayed preservation of the building,
- . to analyse the geometrical configuration,
- . to study the distinctive stylistic elements,
- . to lay the foundations for subsequent analytical chronological examinations;

2. to draft a program of interaction with other investigations to define standardized procedures for a closer examination in occasion

of subsequent important works of restoration.

The first phase (spring 1995) has accomplished:

- . the topographical survey to set up the vertexes, the reference nets, the control points for the photogrammetrical models and verify the existing measured drawings,
- . the rectification of the south and north facades to make plainly visible the decayed conditions and to underline the characteristic architectural elements,
- . the geo-physical investigation using the Ground Penetrating System (G.P.R.) method with the aim of identifying possible underground structures and to determine their position,
- . the stratigraphical analysis aimed to examine the succession of modifications and their relationship in chronological terms.

The second phase (winter 1995-96) has accomplished:

- . the detailed survey of the entire building (the preexisting survey was not reliable) with special attention to those parts structurally more significant (vaults, disjointed walls, ...),
- . the enlargement of the area examined with G.P.R. and the ascertainment through excavation of the recorded reflection,
- . the investigation on more numerous sites with stratigraphical analysis. Several specimen have gone through chemical and physical tests.

As far as the architectural measured survey is concerned the drafting produced till now corresponds to:

- . plan of the first and second floor,
- . three longitudinal sections and one transversal,
- . rectified prints of the north and south facade.

The confrontation with the design produced by Palladio in his *Four books of the Architecture* and with the set of prints produced by Ottavio Bertotti Scamozzi at the end of the XVIIIth century gives way to a some considerations that can be summerized as follows:

- . Palladio's illustration reproduces correctly the typology of the building but the proportions do not correspond,

- . Bertotti Scamozzi's prints are clearly a product of a measured survey; there are differences on minor details,
- . there is then a confrontation possible with today's measured drawings as shown in the illustration included,
- . the big question to be raised then is why and when the transformations occurred (the thermal window on the south facade has been closed, the vaulted hall at the ground floor has been radically changed to create a higher room at the first floor, ...).

A manual has been written out and the technical procedures for a measured survey of a villa have been compiled. The priority, in logical and temporal terms, of measured drawings is stressed because of its irreplaceable function permitting the spatial location and representation of datums (historical information, quality of materials, stratification of layers, conservation state ...).

Moreover we have suggested a further operation to implement the existing catalogue with a photogrammetrical campaign (facades, courtyards, arcades, decorated halls, ...) extended to the most significant villas. For those which will undergo a program of restoration a topographical campaign is absolutely necessary to support adequately the surveying.

The quality and the quantity of informations that have been gathered, the necessity to record and to transmit not only the datas but also the drawings has advised us to have recourse to a CD-ROM.

The content is:

- . the technical report of the survey work, the various phases, the

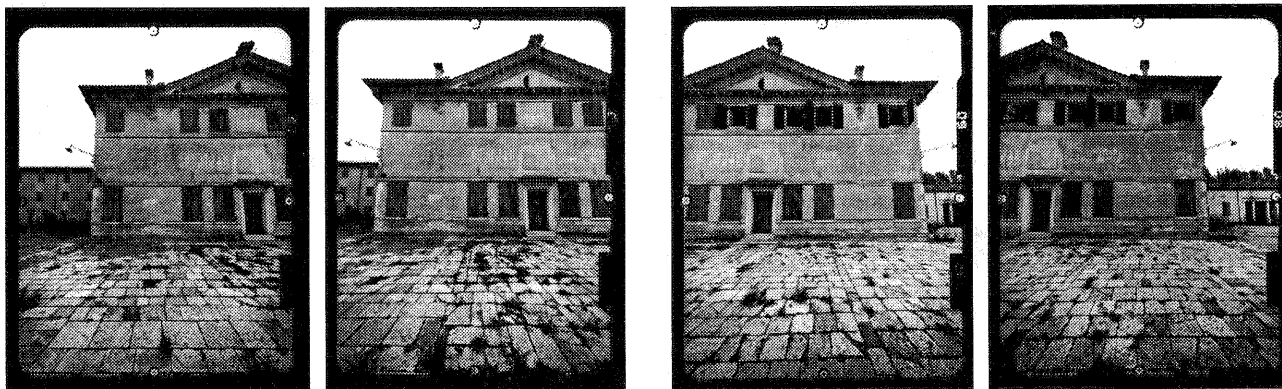
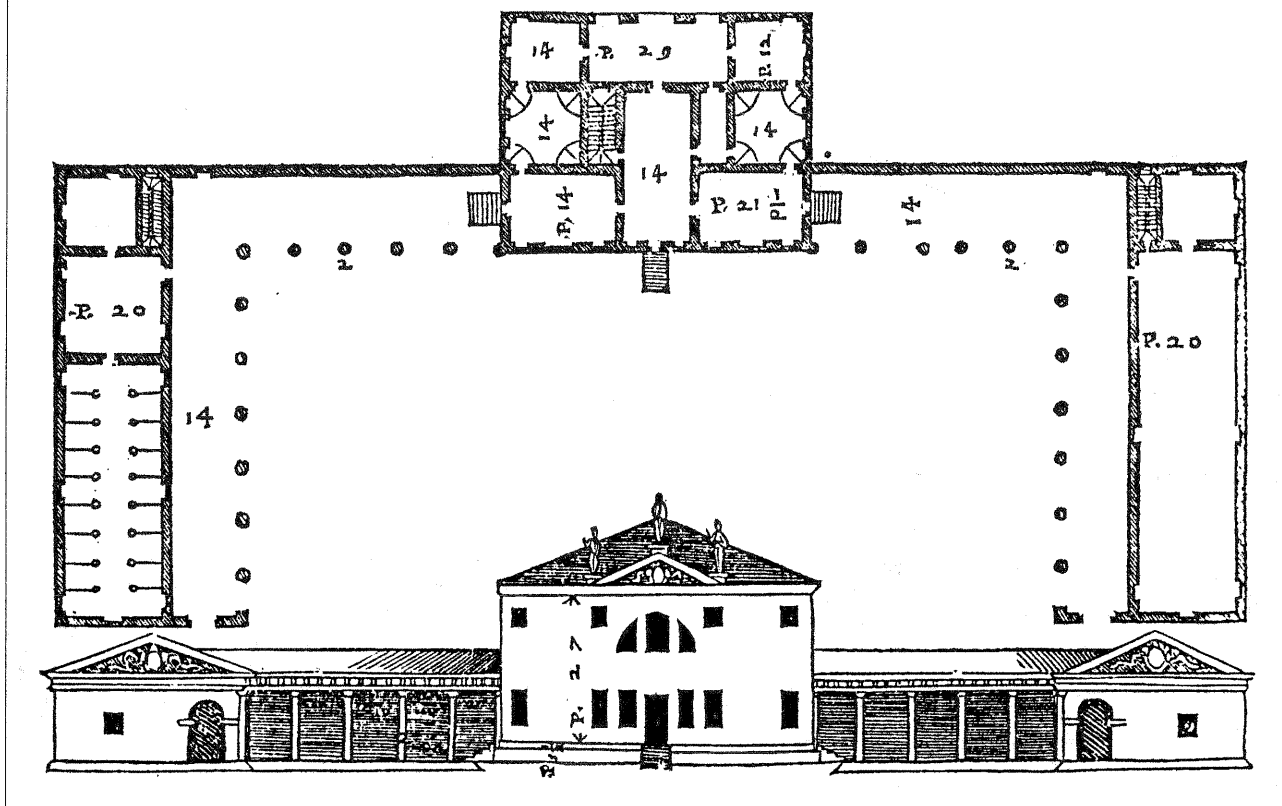
- different operations, the instruments used,
- . the topographic data: the network, the photogrammetric control points surveyed with multiple forward resection, the marked stations that establish the vertices of plano-altimetric network, field notes and sketches,
- . the photogrammetric data relative to front elevations: catalogued photographs, camera calibration certificate, orientation parameters,
- . numerical drawings of various floor plans (ground and first floor), significant sections (with integration of photogrammetry and measured survey), roof structure, structural details and ornamentation,
- . the program of digital photogrammetrical restitution (monoscopic and stereoscopic) using the orientation parameters (previously calculated and supplied by the CD-ROM) permitting the restitution of the parts that other scholars claim important in their research.

This aspect offered by digital photogrammetry is particularly important to us: this experiment has attempted to underline the relationship between the representation of measured drawings and other investigations pertinent the studio of the architecture of a Venetian villa. Together with the representation of the survey work, with the architectural *form* of the building, there will be the possibility to introduce new information, to develop closer a deeper architectural knowledge of the historical heritage.

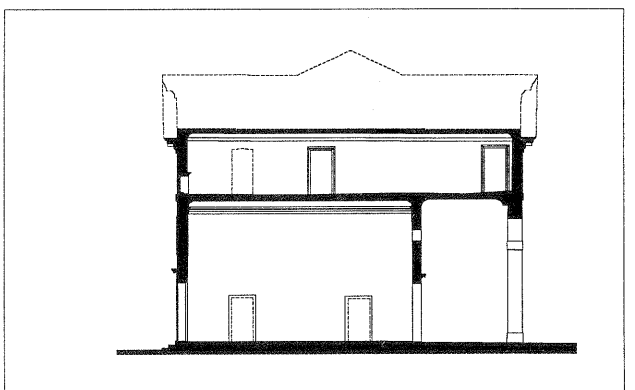
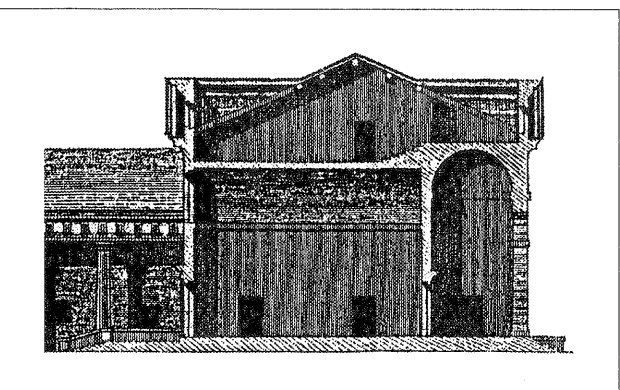
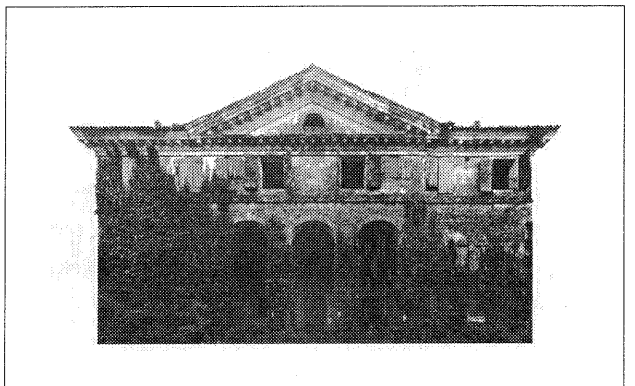
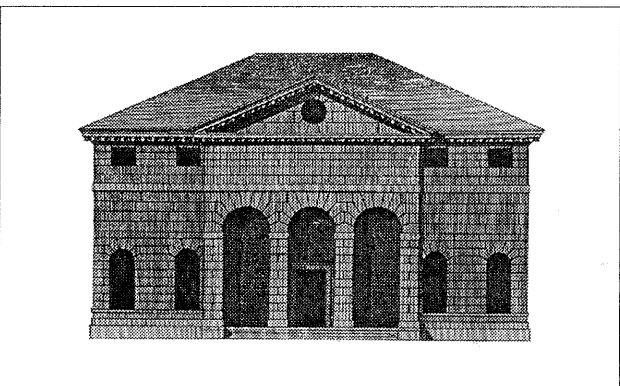
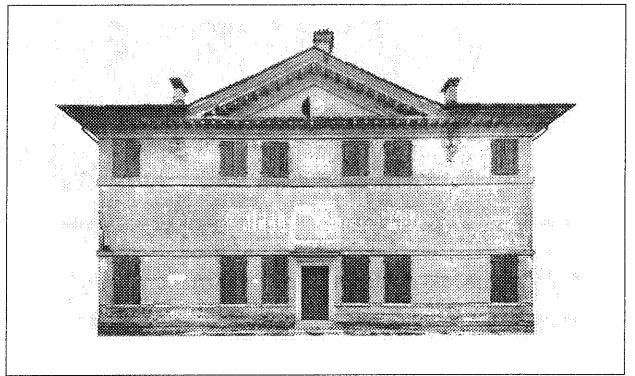
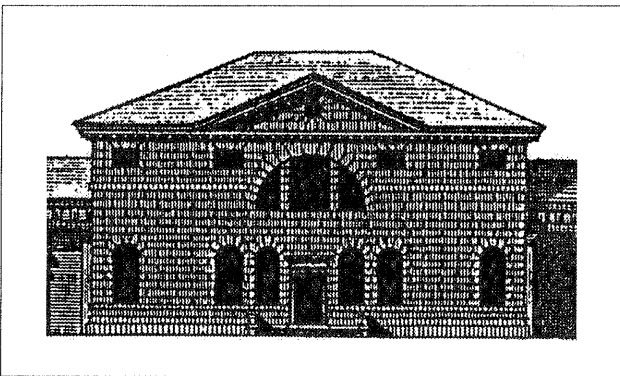
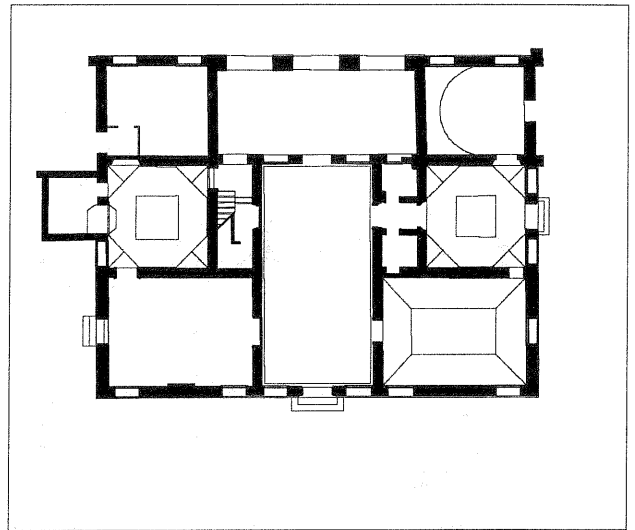
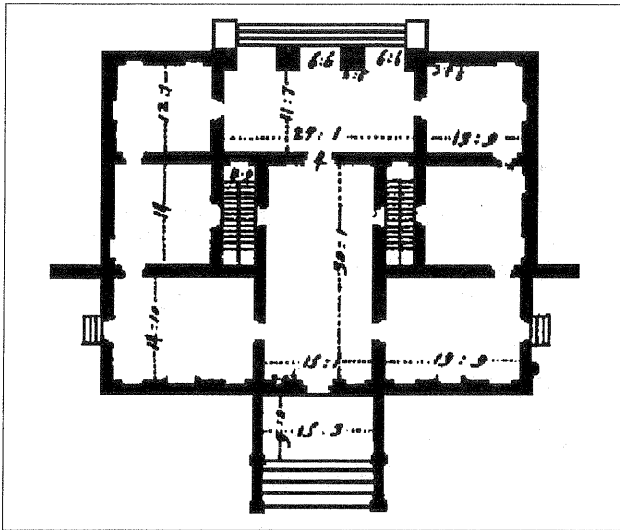


A view of villa Zeno.

IL MAGNIFICO Signor Marco Zeno ha fabricato secondo la inuentione, che segue in Cefalto luogo propinquo alla Motta, Castello del Triuigiano. Sopra vn basamento, il quale circonda tutta la fabrica, è il pauimento delle stanze: lequali tutte sono fatte in uolto: l'altezza de i uolti delle maggiori è secondo il modo secondo delle altezze de' uolti. Le quadre hanno le lunette ne gli angoli, al diritto delle finestre: i camerini appresso la loggia, hanno i uolti à fascia, e cosi ancho la sala: il volto della loggia è alto quanto quello della sala, e superano tutti due l'altezza delle stanze. Ha questa fabrica Giardini, Cortile, Colombara, e tutto quello, che fa bisogno all'uso di Villa.

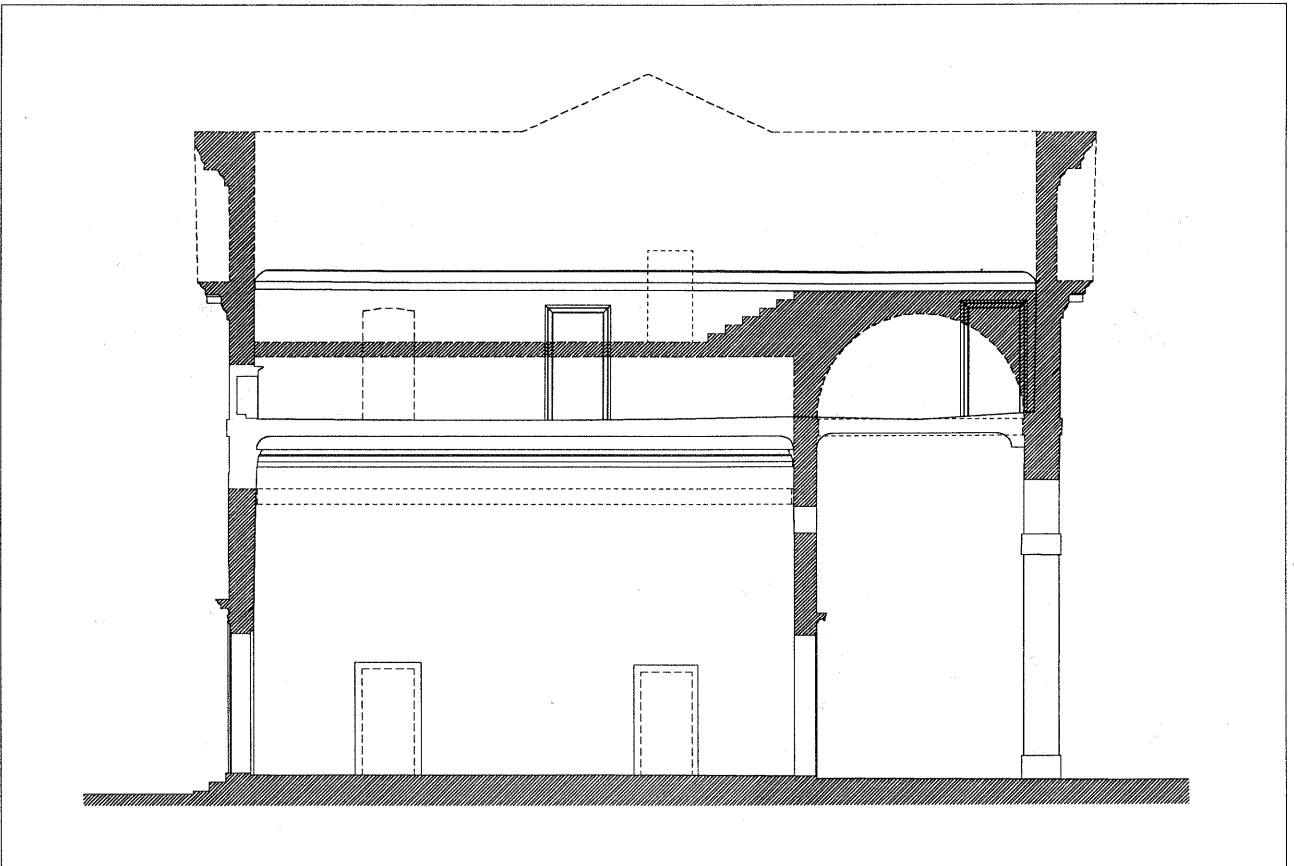
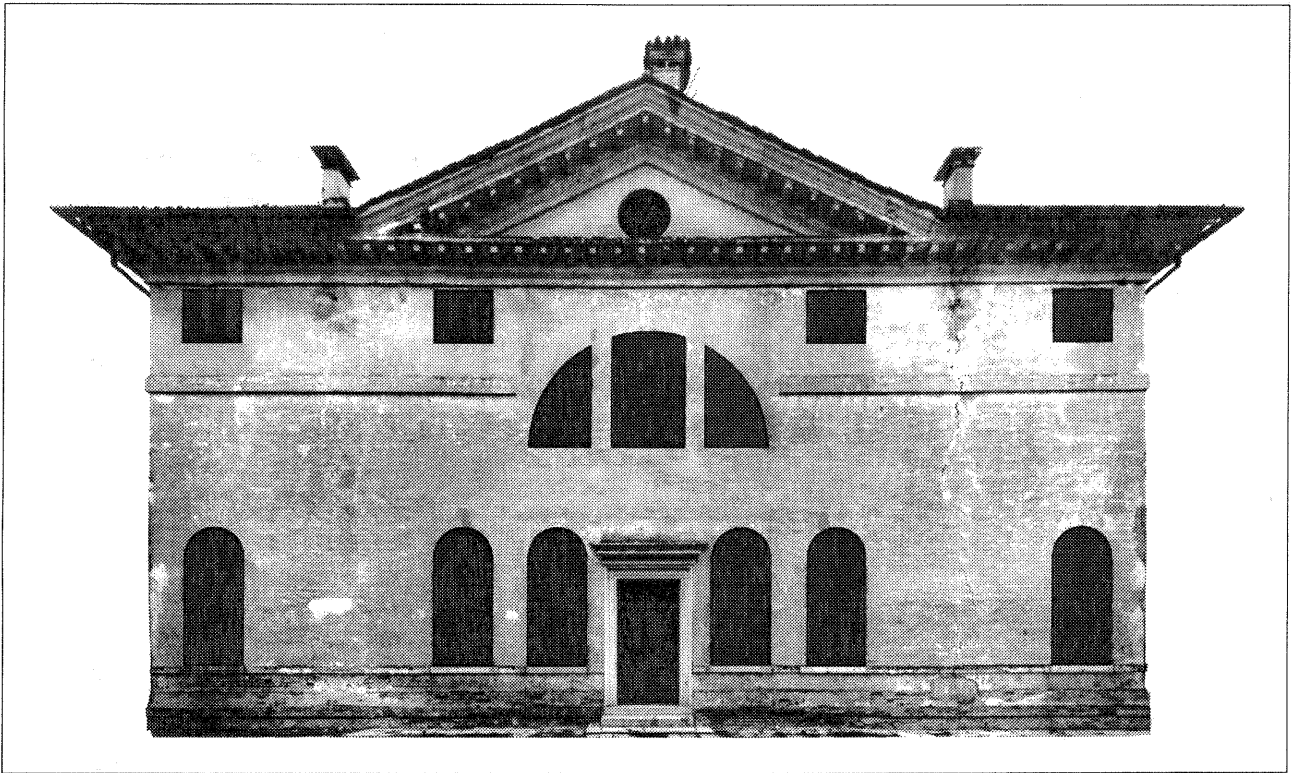


Top: a reproduction of Marco Zeno's villa in the "Quattro libri di Architettura" by Andrea Palladio (Venezia 1570).
 Bottom: the two overlapping pairs of the south front (camera Wild P31, 45 mm lens).



Left: the series of drawings for villa Zenobia (ground floor plan, south and north façades and longitudinal section) printed by Ottavio Bertotti Scamozzi in his book "Le fabbriche e i disegni di Andrea Palladio" (Vicenza, circa 1780).

Right: a comparison with today's measured drawings (ground floor plan, digital rectification of the south and north façades and longitudinal section).



Top: reconstruction of the south façade following the survey by Ottavio Bertotti Scamozzi.

Bottom: longitudinal section showing the superimposition of the survey by Ottavio Bertotti Scamozzi.