

CREATION OF A INFORMATION SYSTEM RELATING TO THE ARCHIVES OF “ARCHITECTURAL SITES”

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ABSTRACT

The work is the result of collaboration between the *Politecnico di Milano* and the *Direzione Regionale per i Beni Culturali e Paesaggistici della Lombardia*. The common goal was to develop a information system that would provide a means to arrange, catalogue and implement the documentation in the paper archives regarding the restrictions on the Department's "Architectural Sites", approximately three hundred files. A information system was thus created which, combined with maps, databases, texts and images, could be constantly implemented and updated with the material relating to new restrictions and authorizations. Furthermore, as planned this instrument provides the opportunity to interface the data inserted from other agencies for the management of the entire territory. In addition to the identification of the location, the arranging, the filing and the implementation of the data, the constitution of an instrument that provided the opportunity to make the documentary material available and more easily accessible on the part of the Department's personnel as well as any external users was a necessary condition. The information system in question is composed of a database within which the geographical elements are integrated with those described in the table, text and image form. The project refers to the georeferentiation (on the Regional Technical Map, scale 1:10,000) of Sites subject to restrictions by the Direzione Regionale, the constitution of a comprehensive Database containing data and information relating to the Sites in question and the conversion and filing in digital format of the paper documentation. The Esri ArcMap 8.3 program was used for the georeferentiation of the Sites, connected to a Database developed with Microsoft's Access 2003. The paper documentation was attached by realizing html pages that may be called up by the GIS as well as to the correlated Database, for easy and immediate consultation

1. OBJECTIVES AND PREPARATION OF THE PROJECT

The work illustrated herein refers to the collaboration carried out between the Laboratorio di Diagnostica per la Conservazione e il Riuso del Costruito of the Dipartimento di Progettazione dell'Architettura of the Politecnico di Milano and the Direzione Regionale per i Beni Culturali e Paesaggistici della Lombardia for the constitution of a information system relating to the "Architectural Sites Archive" constituted by the institution of the agency (at the end of 2000), for a total of approximately three hundred files. The objective is to realize a geographic information system that, integrating the existing paper archives, will arrange and catalogue the Regional Department's documents, thus permitting the mapping of the location of the various Sites in question. The availability of new information systems that make it possible to associate databases, text and images to the maps made it possible to find suitable solutions to consolidate this system. Consequently, a information system was created which, in addition to the catalogued documentation, could be implemented and constantly updated with the material relating to any new restrictions and authorizations issued by the Direzione Regionale. Furthermore, this map database provides the opportunity to interface the data included in other similar systems (such as: Regional Computer System, Lombardy Region Environmental Sites Computer System, etc.). In addition to the arranging, the filing and the implementation of the data, the constitution of an instrument that provided the opportunity to make the documentary material available and more easily accessible was a necessary condition. The information system, therefore, needed to be set up in such a way as to be easily consultable by the Department's personnel as well as by any "external users", thus bypassing any problems

linked to identifying and finding the paper documentation in the existing archive as well as those problems linked to usage and consumption of the material. For the creation of the information system, thought was first of all given to which computer instruments should be used to meet the goals set. As commonly known, computer technology permits the organization of efficient, extremely flexible databases with marked utilization potential; many forms of interrogation are possible, suitable for various types of users, by means of immediate and easy access procedures. The database relating to the information system in question is composed of a database within which the geographical elements are integrated with those described in table, text and image form. In brief, the project referred to the georeferentiation **of the Sites** subject to regulation on the part of the Direzione Regionale (Restriction Decrees, Authorizations, etc.), the **constitution of a comprehensive Database** containing data and information, agreed upon with the Direzione, relating to the Sites in question, and the **conversion and filing in digital format of the paper documentation**. The Esri ArcMap 8.3 program was considered suitable for the needs of the project to georeferentiate the Sites, connected to a Database developed with Microsoft's Access 2003. The paper documentation was attached by realizing html pages that may be called up by the GIS created in ArcMap as well as to the correlated Database in Access, for easy and immediate consultation.

2. CONVERSION AND FILING OF THE PAPER MATERIAL IN DIGITAL FORMAT

The first phase of the work consisted in the conversion in digital format of the paper material relating to the various Sites subject to documentation by the Direzione Regionale (starting from the

beginning of 2001) in order to be filed on computer and utilized by the necessary programs. Based on understandings with the Direzione, it was decided to file only the documentation relating to the Restricted Area and Authorization files, which was catalogued utilizing the documentation act, the attached land registry blueprints and or more significant images of the various Sites. By using a scanner, the documents pertaining to approximately three hundred Sites divided by the eleven Lombardia provinces and by the various Municipalities were acquired in image format. Thereafter, the material was elaborated for filing purposes: in order to “occupy” as little space as possible, the various documents were re-sized, maintaining standard uniform centimeter dimensions (primarily for the photographic material, originally in various formats) and a low resolution (72 dpi), which in any case permits good legibility whether on the screen or on paper if printed. The documentation was then filed by realizing html pages, viewable therefore with any Internet browser. A page was created for each Site filed, and the pages were organized with an index that allows the user to call up the entire city territory with the localization of the site, the enlargement of the portion of the interested territory in order to facilitate identification (both blueprints were created using ArcMap 8.3 during the constitution of the GIS), the documentary file (Restriction Decree, Authorization, etc.), the land registry blueprint and one or more images of the Site in question. These html pages can be called up for viewing and consultation by the Database as well as by the GIS project

3. GEOREFERENTIATION OF ARCHITECTURAL SITES AND CONSTITUTION OF THE GIS

The precise georeferentiation of the architectural sites should be carried out by a direct inspection, if at all possible with the help of GPS instruments for a correct calculation of the geographic coordinates. To speed up the time needed to constitute the archive, it was agreed with the Direzione Regionale to use a geographical localization of the various Sites by means of comparing the Regional Technical Map, scale 1:10,000, with the land registry maps attached to the various files.

With respect to the future implementation of the archive by the Department's personnel, network consultation of the land registry documentation was advised, made possible by the agreement with the Direzione and the Land Registry Office. Moreover, consultation of entire sheets of the land registry maps, often more recent and therefore more updated with respect to the land registry maps possessed by the Direzione, offers a correct calculation of the coordinates of the Site being researched, which may, in future, be precisely georeferentiated on the base map. Through the use of ArcMap 8.3 the geographic localization of the architectural sites heretofore filed was carried out. The GIS project was structured by utilizing 11 data frames relating to the eleven provinces of Lombardy. In each frame four layers were organized relating to the following:

- **Base map** relating to the provincial territory in question, constituted by the mosaics of the sheets of the Regional Technical Map flights 1991 and 1994, scale 1:10,000.
- **City boundaries** of the provincial territory in question, through the digitalization of **polygonal elements**.
- **Sites** subject to regulation by the Direzione (Restriction Decrees, Authorizations, etc.), identified as **point elements**. The decision to utilize point symbols rather than polygonal geometries was dictated by the difficulty in correctly reproducing the boundaries of the land registry sheets subject to the decree on a CTS map, scale 1:10,000. In certain cases this was due to the exiguity of the area in

consideration (for example, in dealing with portions of edifices), while in others it was due to the consistent diversity of the design of the territory due to urban expansion, to new street layouts, etc., with respect to the period in which the land registry map was made. The point symbol was placed at the center of the edifice in question; should it refer to a complex that contains more than one building, it was placed in one of the edifices.

- **Restricted areas** (areas subject to indirect restrictions) by means of the digitalization of **point elements**. An effort was made to respect the effective area indicated in the attached land registry map as much as possible, deferring in this case too the exact boundaries to its visualization.

The geographic elements (point symbols and polygonal geometries realized to construct the various layers) and the map have been projected using the Gauss-Boaga as reference system, based, as the UTM system, on the Gauss projection. This system refers to the international ellipsoid oriented on Monte Mario and utilizes the compensation system of the domestic support networks “ROME 40”. These geometries, moreover, are integrated thanks to an **individual identification code**, with descriptive data in table form:

- each polygon related to the various city boundaries was associated with an individual identification code in a numerical form, which coincides with the ISTAT code, which relates it to an attached table that contains the information which was considered necessary and which relates to the various city territories (Provincial Code, Province, Name of the City);
- each point element constituting the layer of the Sites subject to regulations of the Direzione Regionale was assigned an individual identification code, utilizing the five numbers of the ISTAT code assigned to the individual cities, with the addition of two numbers relating to the object (for example: the ISTAT Code for the Municipality of Casatenovo is 97016, the Sites relating to said territory have been registered as 9701601, 9701602, 9701603, etc.); this code relates each point symbol to the table in the Database in Access, directly connected to the GIS, containing the information fields relating to the various Sites (see “Constitution of the Database)
- each polygonal geometric relating to the restricted area was associated with an individual identification code with the same method utilized for the codes assigned to the point elements of the Sites (five numbers of the ISTAT code followed by 01, 02, etc.); should the restricted area and the Site be part of a single document file (Decree, Authorization, etc.), the individual code is coincidental, inasmuch as it must connect with a single field of the Database both for the Restricted Area and for the Site.

The system can thus be implemented and updated, so that it can contain future documentary provisions. (Fig. 1).

4. CONSTITUTION OF THE DATABASE

As indicated above, the GIS project is correlated to a database realized with the Access program, a quick and easy-to-use instrument, given the difficulties in effectuating “interrogations” by means of the GIS on the part of users who do not have sufficient training or the right approach with respect to this program. The Access software, instead, enables the creation of frames and data access pages that facilitate the user in the research and data viewing operations. The direct correlation between the two programs, moreover, permits the elaboration and implementation of the Database in Access, simultaneously updating the project in ArcMap. The various fields utilized for

the constitution of the Database are as follows:

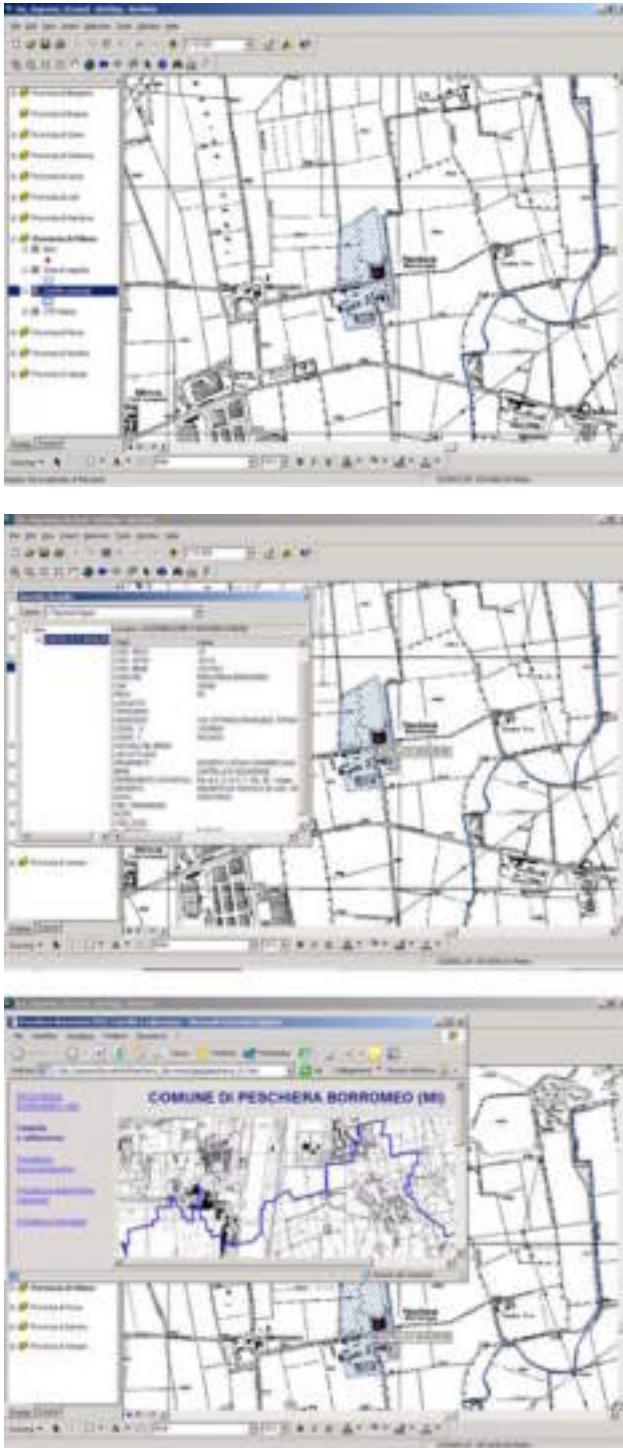


Figure 1. Georeferentiation of the Sites by means of the GIS (Geographic Information System). On the basic map (Regional Technical Map, scale 1:10.000), the following have been digitalized in their exact geographic setting: the city boundaries, the location of the Sites, identified utilizing a point symbol, and the restricted areas, identified through the use of polygonal geometries that define the area. Consultation of the Database by means of the GIS. Within the GIS it is possible to consult the various voices relating to the Site in question, memorized in the external Database. In addition, said correlation enables a real time updating between the two systems (adding data, implementation of new Sites, etc.).

- **Regional Code:** numerical field containing the Lombardy Regional Code;
- **Provincial Code:** numerical field containing the Provincial Code;
- **City Code:** numerical field containing the City Code;
- **Site Code:** numerical field containing the individual identification Code of the Site consisting of the five numbers of the ISTAT code followed by a progressive number;
- **City:** text code containing the name of the city to which the Site in question belongs;
- **Postal Code:** numerical field containing the numbers of the Postal Code relating to the City to which the Site in question belongs;
- **Province:** text field containing the initials of the Province to which the Site in question belongs;
- **Geographical location:** text field containing the name of the township or hamlet of the municipality to which the Site in question belongs;
- **Place name:** text field containing the name of the place name of the geographical location to which the Site in question belongs;
- **Address:** text field containing the name of the street/square followed by the number of the Site in question;
- **X Coordinate:** numerical field containing the East coordinate of the Site in question, calculated as a coordinate of the point element utilized to identify the Site, or as coordinate of the center of gravity of the polygonal element utilized to set the boundary of the Restricted Area;
- **Y Coordinate:** numerical field containing the North coordinate of the Site in question, calculated as a coordinate of the point element utilized to identify the Site, or as coordinate of the center of gravity of the polygonal element utilized to set the boundary of the Restricted Area;
- **Nature of the Site:** text field containing the indications for identifying the Nature of the Site in question, divided, according to type parameters indicated by the Ministry for Fine Arts and Cultural Activities in: Building, Unit, Architectural element, Edifice, Garden or park; Terrain;
- **Current Use:** text field containing the indications for identifying the current use of the Site in question, divided, according to the indications of the Ministry in: *Unused, Commercial, Residential, Tertiary directional, Logisticproduction, Cultural, Artist workroom, Sports, Pleasurerecreation, Tourism-lodgings, Refreshments, Public services, Military, Place of worship, Technological equipment, Other*;
- **Name of Site:** text field containing the name of the Site, as indicated in the original tables provided by the Direzione;
- **Property:** text field containing the name/s of the owners or the name of the agency/company that owns the Site in question;
- **Land registry:** text field containing the indications for identifying the sheets and respective registry numbers of the Site in question;
- **Decree:** text field containing the indications for identifying the type of provision implemented by the Direzione on the Site in question: Restraining Decree (Leg. Decree 490/99 Art. 2), Restraining Decree (Leg. Decree 490/99 Art. 49) Authorization to Alienate (Presidential Decree 283/2000), Authorization to Exchange (Presidential Decree 283/2000), etc.;
- **Date:** numerical field containing the date the Direzione provisions for the Site in question were issued;

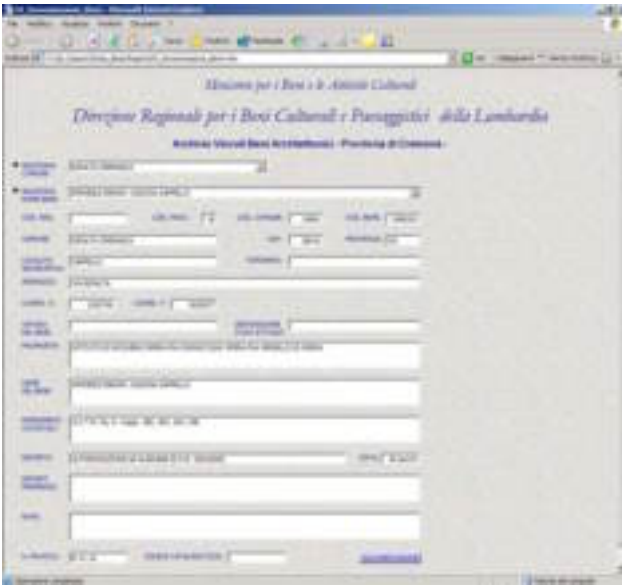


Figure 2. Database of the architectural Sites archives: consultation frame. Consultation takes place by means of the html pages, publishable in local network: the research keys have been organized according to an order that starts with the Province, then the City and, last, the indication of the name of the Site or the relevant address. Once the Site has been identified, in addition to the information obtained from the database, through the use of the "Documentation" key it will be possible to view the relative attachments (documents, land registry blueprints, images), filed in the html pages.

- **Previous decrees:** text field, should there be more than one provision issued by the Direzione, containing the indications relating to the provisions issued previously with respect to that indicated in the "Decree" field, is more recent in time;
- **Comments:** text field containing any explanatory notes;
- **File number:** text field containing the filing code of the paper documents;
- **ICCD catalogue no:** text field containing the filing code assigned to any ICCD file compiled for the Site in question, needed for the shelving and correlation with the ICCD file archives;
- **Documentation:** key to be utilized to call up the attached documentation relating to the Site in question, filed by means of the constitution of html pages (Fig. 2).

5. IMPLEMENTATION OF THE ARCHITECTURAL SITES ARCHIVE

The updating of the archive will take place by means of the implementation of the Database and the GIS and the constitution of new html pages. First of all, an individual identification code must be assigned to each Site to be included in the archive, in compliance with the parameters assigned (ISTAT Code followed by a progressive number). Said code will be used to identify the Site, thus allowing it to be correctly included in the Database and in the GIS, as well as the correlation between the geometric data (point and polygonal

elements) and the table data in the Database. For the implementation of the Database, it will be sufficient to add a new record for each new Site to be catalogued to the tables in Access relating to the various provinces, filling in the relative fields, marking the assigned identification code in the specific field. The pages and consultation screens will thus be automatically updated, as will the research menus. For the implementation of the GIS, the corresponding geometries will need to be digitalized in the various layers:

polygonal elements for the city boundaries and for the restricted areas, point symbols for the. By adding the assigned identification code to the linked tables, the various fields with the complied data will be automatically updated in the Database, since the GIS is correlated to the Database in Access. Once the paper material has been converted and elaborated into a digital format, the pages in html can be constituted according to the model previously adopted that can thus be attached to the Database and to GIS. In addition to the implementation with new procedures issued following the criteria for cataloguing and arranging followed for the constitution of the information system Archives of Architectural Sites, new material and documents may also be included following suitable, case-specific methods: for example, new fields may be added to the Database to receive additional data or new material may be added to that already existing (more images or a more comprehensive documentation for each Site implementing the html pages relating to the various objects catalogued); furthermore, databases relating to other archives may be called up (such as the ICCD Catalogue frames) through the addition of fields of connecting keys, that should be determined as the case may be in relation to the programs and cataloguing methods used from time to time (Fig. 3-4).

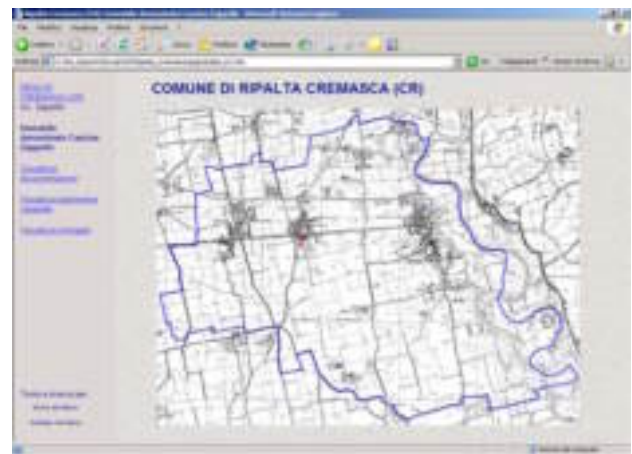


Figure 3. Html page that can be called up from the database for consulting the documentation attached to the Sites. The initial screen shows an overview of the entire city territory with the localization of the Site in question (georeferentiated by means of the use of a GIS program). When the various voices in the index on the left of the screen are selected, the frame on the right shows the various attachments (documents, land registry blueprints, images). The "Name of the Site" and "Address of the Site" keys facilitate returning to the consulting frames in the Database according to the relevant research criteria.



Figure 4. View of the attached documentation. Viewable are an enlargement of the portion of the city area surrounding the Site in question, which can be called up by clicking on the image of the City in the initial frame, and the paper file documents (Restraining Decrees, Authorizations, land registry blueprints and images), accessible through the voices in the Index.