Facilitating the Exchange and Reusability of Information in the City of Venice

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Abstract

This project focuses on implementing 'City Knowledge' principles for *Urbanistica* and *Edilizia Privata* of Venice by extracting reusable information from private building permits. Pellestrina was used as a sample to model and demonstrate a theoretical system. We gathered information from archived permits, and digitized it via Microsoft Access and MapInfo. Scenarios were modeled using collected data, demonstrating the system's benefits. We conclude with an analysis of benefits, and give recommendations on implementing and improving the proposed system.

1 Executive Summary

This project worked with the *Urbanistica* and *Edilizia Privata* departments of Venice extracting reusable information from private building permits. The goal of the project was to develop a system that would allow *Urbanistica* access to information in the building permits to keep their knowledge of the city current and assist in their planning.

Before beginning our project we conducted background research. We first examined the principles of City Knowledge. The main focus of this concept is the retention and reuse of information collected by various government agencies. The ultimate goal is a single integrated system where datasets are each managed and updated by their respective agency. Our project falls under the scope of this concept, working with two agencies to extract reusable information from an administrative process.

We examined several similar situations from projects around the world. In particular we looked at a Smart Permit system in San Carlos, California, Vertical Information Management framework by the US Department of Energy, and a digitization project in the Netherlands. We found that each system addressed the problems of storing the information in such a way that would allow for reuse. Typically some kind of digital format was used, with the exact specifications varying according to the nature of the data.

Once we had a solid understanding of the issues in projects similar to ours, we focused on assessing the local context of our project. *Urbanistica* is Venice's urban planning department, and in charge of creating zoning regulations via PRGs and strategic plans for the development of the municipality. *Edilizia Privata* is the private buildings department in Venice, they process permit applications for construction on privately owned buildings; these permit applications contain all the relevant data about the proposed building. Our project is focused on making that information available to *Urbanistica*.

In our search, we also discovered the *Infrasruttura Territoriale di Base* (ITB) project. The ITB is concerned with updating the base layers of the Venetian region, providing a standardized map for the area with all important topographical information. The project also aims to keep the maps updated via updating the map layers every few

years. We believe that the ITB project is a step towards improved information accuracy and reusability.

Before starting work on our project, we planned out our methodology. The project methodology consisted of four major steps: examining the structure and flow of information, identifying the reusable data, extracting the reusable data and creating a model for a building permit system, and demonstrating reusability via a prototype.

We began the first step by collecting the permits available from the *Sportello Unico* site, and translating them through Systran, a translation program. Then we discussed the forms with an Italian speaker who worked with such them. We determined that the two major forms were the *Domanda di Permesso di Costrure* (Permission to Construct) and the *Denuncia Ininzio Attivita'Edilizia* (D.I.A.).

We then had to identify which sections of these forms contained useful data. We analyzed the forms within our team and came up with several potential fields. By discussing the forms with our sponsor, we determined the information he wanted to get out of the forms, and what he thought would be useful for his department. We also decided that Pellestrina, Burano, and San Erasmo were areas that would have a good representation of construction. After determining the information we were looking for, we went to gain access to the actual permits. Once we were able to go through the archives, we then settled on Pellestrina as our sample location, and looked over several permits from the area. We collected the data by taking pictures of the plans, and recording important calculations.

Our third step involved putting the raw data into useable digital formats. We put most of the information into a database and made an accompanying form, except the footprint, floor plans, roof lines, and sewer system, which were put into GIS layers. We then devised the procedures that could be implemented to automate the information collection step. We determined that the best time to intercept the data would be when it was first submitted, so that *Urbanistica* will have time to analyze the impacts of the construction and raise any concern before construction begins. Also accepting the permit digitally would both eliminate the need to format the data, and allow multiple copies to be efficiently distributed.

The final phase of the project was to demonstrate the system's ability to analyze urban impacts. We focused on specific examples to demonstrate this capacity. First, we focused on providing an overall picture of the construction on the island. By using the construction start and end dates we were able to highlight buildings that were currently undergoing construction, and all buildings constructed since the last PRG.

From this general assessment, we focused on the specific impacts of construction. These impacts were calculable from the urbanistic data forms linked to each building. For our example in this section we focused on the impact of sewage use. By being able to access data before construction began, a building's impact on sewage can be predicted beforehand. If necessary, greater sewage capacity can be developed to deal with the additional load.

We also focused on demonstrating the combined impacts of developments. For a primary example, we used the traffic on Pellestrina. We noted that traffic capacity on Pellestrina is limited by two factors, the main road along the length of the island, and the vehicles carried by ferries on and off the island. By estimating the number of vehicles the each building is likely to have, and comparing it to current traffic patterns, future patterns can be predicted. The foresight of future patterns can create the impetus to develop a plan to deal with the traffic situation before it becomes an overwhelming problem.

From these examples, we conclude that the major benefits of our system are the ability to measure impacts before building plans are approved, and the capability to factor in the future effects of current construction when making planning decisions. The first benefit comes from *Urbanistica's* access to important urbanistic data early in the application process. The second stems from the fact that the system is updated as each permit comes in, rather than in discreet intervals of several years at a time. Finally, the report ends with recommendations for the effective and successful implementation of such a system. These recommendations entail the following:

- Collect information directly from applications
- Accept applications in digital formats
- Integrate system with ITB project
- Expand system to collect and distribute data over additional agencies

2 Introduction

Many city governments have a department whose task is to plan the development of the city, assuring its growth is steady and sustainable. However, such a department is usually separate from the departments that approve major changes to the city. Before actual construction may begin, these departments require changes to the city to be approved. Information about the changes is presented in the form of a permit application. The large number of applications processed in cities contains critical information about the cities' future. For example, the Inspectional Services Department of Boston processes approximately 19,000 permits a year.[1] Nevertheless, most of this information is lost once the permit is approved and subsequently filed away.

Some cities have recognized this lack of information reuse and have attempted to apply techniques to capture this information. These techniques are based on knowledge management principles, which originated from the businesses sector to improve efficiency by allowing employees to find the information they need, rather than recreating it. Often companies that use such a strategy find "There are a lot of materials that are just sitting there and not being used." Using simple knowledge management techniques, organizations can quickly make better use of information they have already collected.[2] Governments have also begun to adopt similar methods, typically referred to as e-government. Such processes seek to enhance the accessibility and reusability of information in order to save time and improve future decisions.

In Venice, there are two main departments involved in the building permit approval process, *Urbanistica* (Planning) and *Edilizia Privata* (Private Buildings). The *Urbanistica* department is in charge of strategic city planning while the *Edilizia Privata* department is in charge of approving the final permit. Both departments are directly involved in the building permit process. These two departments need to share paperwork with each other, but the information contained in such documents is often incomplete. This situation slows down the process; more time and money need to be invested to

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[1] Sommers, William. Management Study and Analysis with Recommendations, (Boston, 2003), 55
[2] Rupal Parekh, "**Revisiting the `KM' buzz.**" ***Business Insurance***, March 1, 2005 p20

obtain information that could otherwise be easily obtained from current and past permit applications.

Many studies have been conducted aimed at finding methods to retrieve and apply existing information. E-government initiatives have been implemented in many areas around the world. These initiatives seek to unify applications into a single process, ultimately better informing the public about government processes. In Beijing, an attempt to unify processes by using e-government principles was established, and as a result "eighteen counties and districts in Beijing now provide a 'One-Stop Office (*Yizhan Shi Bangong*),' which enables almost all government agencies to share critical data." [3]. Within Italy, e-government techniques have been attempted, aiming to centralize the processing of permit applications. This scheme is referred to as the *Sportello Unico*, or 'one window', where citizens only need to turn in their forms at a single window and the government will take care of all the individual steps.

In Venice, the *Infrasruttura Territoriale di Base* (ITB) project has assisted city planning efforts by creating an updated GIS layer of the Venetian islands[4]. This project enables a standard for storing information that can be reused by government agencies. However, to benefit from this project, it is necessary that the government collect data and store it in a manner that allows reuse. Once the departments are able to create reusable information, the lessons learned can be applied to future instances, allowing for better and faster decisions. Furthermore, a system that can sustain itself can be automatically kept up-to-date with minimal effort. The techniques of e-government and city knowledge can be applied to help these intra-governmental issues. Implementation of these fields could help increase the cost-effectiveness and overall capabilities of both departments.

Our goal is to allow *Urbanistica* to monitor the effects of its plans by facilitating the reusability of information in *Edilizia Privata*'s permit process. We hope to improve the reusability of information, which will also allow these departments to share information more efficiently. By analyzing the permit, we plan to use our knowledge of

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3 Lianjie Ma, Jongpil Chung and Stuart Thorson, *E-government in China: Bringing economic development through administrative reform*

4 **Dott. Paolo Barbieri and Ing. Massimo Rumor,** *Il progetto per l'Infrastruttura Territoriale di Base del Comune di Venezia*, http://www.comune.venezia.it/urbanistica/itb/ArtMondoGis.asp.

current technology to create informative digital building permits as well as a means of exchanging these new documents in a secure manner.

3 Background

This section will cover the basic background knowledge about the project. It is divided into four sections, which cover relevant information useful in the implementation of this project. The first section discusses the major issues that this project hopes to address, while the second section focuses on the issues emphasizing a local scope. Next, the current attempts to solve similar situations worldwide are analyzed. This section is concluded by a discussion of the issues in Venice to be addressed.

3.1 What is City Knowledge?

The departments of a city, involved in urban planning, take on a large role in a city's future. These departments allow the change of not only the buildings, but the character of the city. With such a crucial role in the future of the city, one would think cities would use all the available information they could get their hands on to make effective decisions. For the most part, this situation is untrue. Many cities have an array of specialized departments that are involved in the building permit process, yet these departments often lack communication between each other.

Improving information reuse in departments is the basic principle of City Knowledge. The City Knowledge approach is the "gradual, but systematic compilation of all the disparate datasets and maps accumulated by a wide variety of government and non-government organizations." [5] This retention and reuse of information will eventually improve the ability to communicate between departments, yielding a better idea of the current state of the city, and allowing better planning for its future. Each department would understand what is happening to the surrounding city elements, rather than just the domain of their department. Each department would save time and money by not retracing over another department's footsteps.

City departments need as much information about their city as possible, especially the urban planning departments. Using available technology, information can be easily stored, transferred, and applied through maps, datasets, and the internet. The technology

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[5] Dr. Fabio Carrera, *City Knowledge* (2004), 13

itself is relatively inexpensive, but the work to implement it can be expensive and time consuming. The initial money invested would be minute compared to the long term return of the valuable information.

Governments all over the world have realized this problem in both their urban planning departments and other government departments. They have confronted their problems with large investments in forms of GIS maps, datasets, and forms of e-government and e-business. Cities, such as Boston, have recently invested three million dollars in information databases to store and track building permits in one department. Although they have not designed a system to share the information with other departments, it is a step in the right direction. Beijing on the other hand has set up an amazing information management system.

Beijing has developed a network of databases that share and exploit the city's resources. The city has formed a network that interlinks different government departments and citizens. These databases have been "Used for enterprises, population, taxation, statistics, vehicles, and city administration. Based on the platform and network, 142 city departments have set up their own websites and 58 of the examinations and approval items can be completed via the internet."[6] Many of Beijing's districts share almost all their information from their governments. With improved communication between departments, Beijing has also enabled companies to pay their taxes through the internet, "Beijing Local Taxation Bureau started to offer online taxation functions in 2001. Through this online service, 40% of all the enterprises paid their taxes online."[7] Beijing's system is a perfect example of how the application of City Knowledge and technology can be such a valuable asset to a city. This system has taken a few years to create and possibly millions of dollars, but it enables the city to be more efficient.

Almost all city governments could use a system similar to Beijing's, but that would require a large reconstruction effort from each department. The city of Boston has

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[6] Yingxun Zhang, Ping Lu and Qinying Jia, "2002 Difang Xinxihua Huigu: Beijing, Tianjin and Shanghai (The report of local government informatization: Beijing, Tianjin and Shanghai in 2002)," *Jisuanji Shijie (Computer World)* (2003, January): 1–5.

[7] Xiaolin Xu and Lanrong Yang, *Dianzi Zhengwu Daolun (An introduction to e-government)*, (Wuhan Chubanshe, Wuhan: 2002), pg#.

made a simple step towards better City Knowledge. The city of Venice has also realized the need for improved reusability of information for a better realization of the future of their city.

3.2 Recent Efforts

Governments have been trying to utilize technology in their departments for the past decade. Applying information technology to government processes takes time; research has to be done to come up with a system, and then the government has to weigh the costs and benefits of the system. This process can repeat itself for a few years before implementing a new system.

One city that underwent this process is the City of San Carlos in Silicon Valley. The Smart Permit Project, led by the city of San Carlos, began in 1993. "Smart Permit is a unique public/private project sponsored by Joint Venture: Silicon Valley. Smart Permit is aimed at improving the quality and efficiency of the building and development process in Silicon Valley. The project involves Permit Streamlining (streamlining the permit process in each city), improving Permit Processing Software used by local government agencies, Internet-enabling the Permit process and a variety of related processes and initiatives."[8] After years of development the Smart Permit software finally debuted in May, 1999. The initial software release had a few key features but evolved over the next few years. Currently the software has many features that make the permit process easier for the departments and allows applicants to obtain the status of their application online. One recent innovation enables an applicant to apply and pay for a permit online and allows building inspectors to write up and print out inspection results in the field. The smart permit project took seven years before it was implemented mainly due to increased software capabilities. Though the initial investment may seem costly, integrating information technology in governments is well worth it.

Another project to create information reusability was lead by the US Department of Energy. The reason for the creation of this project was that "Decision makers usually

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[8] Jack Aiello, *Smart Permit in San Carlos*, http://www.cityofsancarlos.org/is/display/1,1124,deptid-24_isid-232,00.html

require information beyond what is stored. Yet, the collected data are a valuable resource. These data are particularly important for scientific experimental results where the samples are expensive to collect and analyze, as in environmental remediation and restoration. One sample from a storage tank containing nuclear waste can cost over $1,000,000."[9] Thus, the Department of Energy has good reasons to find a way to maximize information reusability. However, in order to reuse information, underlying data need to be accessed, but such information only appears within the context of the report, and is often time consuming to track down.

To deal with this problem the report suggests the use of a Vertical Information Management (VIM) framework. The VIM model requires the information to have three components: the high level request, the data that were actually collected, and the method of derivation. The data are then stored in a database, where search queries can be executed to retrieve the data. The VIM system allows for more than just a simple electronic record of the report, but also provides a method to reuse data. Since the data from the report is broken down into components, searches for just low level data can be made, allowing it to be reused for future reports without requiring either recollecting the data, or difficult searching. Furthermore, the system allows the researcher to create a more explicitly detailed record of the data collected and used, lending further credibility to the results produced.

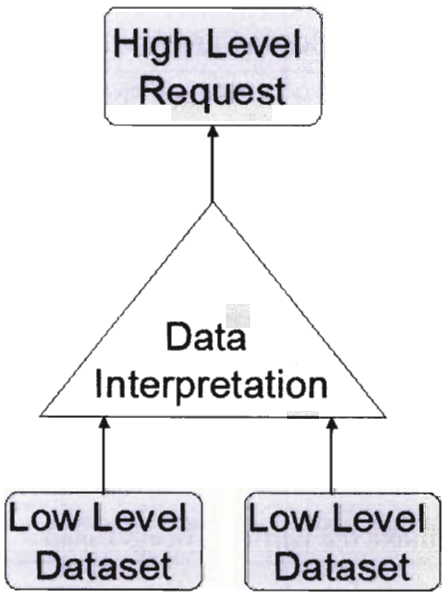

Figure 1: VIM Data Model

The VIM project follows City Knowledge principles as the agency's collected information is able to be reused, instead of having to be recollected. "Most high-level requests are satisfied by the efforts of an information expert who collects data, identifies

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[9] Gregory A. Washburn, Lois M. L. Delcambre, and Mark A. Whiting, *Reuse of High Level Information Requests: Leveraging the Investment*, Eighth International Conference on Scientific and Statistical Database Systems, 1996. Proceedings. (1996): 186, http://ieeexplore.ieee.org/.

assumptions, performs summarization steps, etc. The electronic record of the process is often just the final result...The VIM framework allows the information expert to explicitly identify the relevant metadata"[10] Along with the collected data, future researchers also have access to the methods of data interpretation. This access allows both data and methodologies to be reused in future studies.

Another example of a government department using information technology to improve their efficiency is the Department of Building Inspections (DBI) in San Francisco, CA. The DBI had an internal network already in place but certain information associated with building permits was not easily accessible. James Albert, the DBI's MSI director, describes the information needed to process permit applications as "spread out in various places on various types of media, such as computer files, microfiche, and paper documents."[11] To solve this problem the DBI tested the HP Model 200T optical jukebox along with an imaging and on-line archiving application. This machine and software allowed the DBI to easily digitize the information they needed, making it immediately accessible to the rest of the department. Following the success of the initial tests, the jukebox was installed on their network in October 1994. Since the DBI added the jukebox, the time to process and approve building permits has decreased from six months to as little as one month.

Besides improving efficiency using information technology, new systems using IT can also save money for the applicant and departments involved in the permit process. In 2004, a study was conducted in the Netherlands to see how technology could improve the building permit process. The study identified major inefficiencies in the way information was passed between applicants and the departments. The study found that a lot of the paperwork in an application, such as architectural diagrams, were created on computers and had to be printed out upon submission. A table showing the varying degrees of digital data contained in applications, before they are printed, and within the governmental departments can be seen in Figure 2: Degree of Digitization.

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[10] Ibid. 194.

[11] Structuring Strong Document Access, Managing Office Technology, October 1995

Degree of Digitization (%)	Low	Medium	High
Professional applicants	18%	23%	59%
Municipalities	76%	18%	6%

Figure 2: Degree of Digitization[12]

	Expected annual savings	Maximum costs per application	Contribution applicant per application
Biggest municipalities	€ 33,382	€ 263	€ 24
Average	€ 10,926	€ 83	€ 31

Figure 3: Savings Analysis[13]

The table shows that most information and documents created by professional applicants are highly digital, while most documents within the government departments themselves have very low digital information. Since the applicants had to submit everything in paper, the department accepting this paperwork had to take the box full of papers and scan them into their database. This step is obviously an unnecessary expense on the applicant and department since most of the data were in a digital format to begin with. The survey also discovered how much the unnecessary printing was costing the department. Adopting the digital permit system would save the biggest municipalities 33,382 euro every year with an average saving of 10,926 euros per year, see Figure 3: Savings Analysis. The municipalities were not very enthusiastic about the digital system until they saw the possible savings. Governments were not only increasing the efficiency of their work, but they were saving money.

In each of the cases above, technology improved the way government departments handle information. Using technology to store and exchange information enhances the flexibility of how that information is accessed, stored, and exchanged. Such flexibility allows the information to be reused more frequently, cutting down on redundancy and reducing the time and money spent completing tasks. Our project is focused on bring this type of flexibility to the building permit departments in Venice.

3.3 The Situation in Venice

In Venice's government there are two departments handling building permits for privately owned buildings: *Urbanistica* (Planning) and the *Edilizia Privata* (Private

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[12] Marcel Hoogwout and Robbin te Velde, *Digital building permit application: a feasibility study for a shared services solution in The Netherlands* (2004), 4

[13] Ibid, 5

buildings) departments. These departments work separately, communicating information only as it is required.

Urbanistica manages the growth and development of Venice and the islands. Their job entails creating plans structuring the urban environment through PRGs, zoning proposals and forecasts on urban development. The PRGs enable *Urbanistica* to regulate the evolution of the city. To perform their job, *Urbanistica* needs various types of information about the current state of the city. Typically when *Urbanistica* creates a plan, first information has to be gathered, and then the actual planning process can begin. The results of such plans are not obvious to *Urbanistica* as they continue their planning process for a different region, once one is complete. They only learn the impact of the plan once they need to gather information to update or renew their plans for the region. The *Edilizia Privata* enforces the zoning regulations when they permit new construction and building modifications.

The *Edilizia Privata* is responsible for approval of construction and modification for all private buildings. They receive and process both commercial and residential permits. They approve all the permits and use the zoning regulations set by *Urbanistica*. When applications are submitted, an attachment consisting of a localized picture of the PRG is required, to verify that the proposed work falls under the acceptable limits of the PRG. As these permits are processed, their location is tracked by a system called *Global Edil*. This system tracks the location of the permit through the approval process along with an identification number and a brief description. The *Global Edil* originated as a system exclusively for the *Edilizia Privata*, but our sponsor, Giorgio Pilla, has gained access to it.

Beyond the PRG and the *Global Edil* system, there is minimal communication between the departments. They each do their separate jobs independently, without taking into consideration, what the other department does with the permit approval process. When a permit is approved, all associated documents are sent into storage where they reside until someone needs them. The only way to access these documents is to physically go to where they are stored and give them the appropriate file number. In most cases the information in past permits is unused because the people working on a current permit approval are not aware of past information that could be useful. They also do not

want to spend the time looking through past documents for ones that they think could be useful. Thus, implementing a system that increases the reusability of information and allows easy access to past information could be very beneficial to the two departments.

Improving the communication between these two departments would also make them more effective as a whole. They would each utilize the other department's resources and expertise to make better decisions and to speed up the overall permit process. The city of Venice has attempted to improve communication between the departments by making small administrative changes. The two departments have exchanged employees to create a bridge between them. Our Sponsor, Giorgio Pilla, moved from the *Edilizia Privata* department to help connect the two departments. Pilla brought with him the *Global Edil* system and knowledge of the *Edilizia Privata.* The bridge has helped the departments understand one another, but does not utilize available technology.

The Venetian Government has funded a project known as the *Infrasruttura Territoriale di Base* (ITB), which literally means base territorial infrastructure, and refers to the work they are doing. The project's goal is to create a standardized digital base map of the city. To create the base maps, the project was broken into "two major components: orthophotographic maps and a database containing a selection of elements represented by the appropriate vector primitives."[14] The maps were used to represent all visual information, while the database contained additional information about each feature. It was decided that this database should only contain the necessary geophysical data to determine the physical layout, such as the buildings, their heights, streets, intersections, etc. All other data were to be kept in separate databases, used and

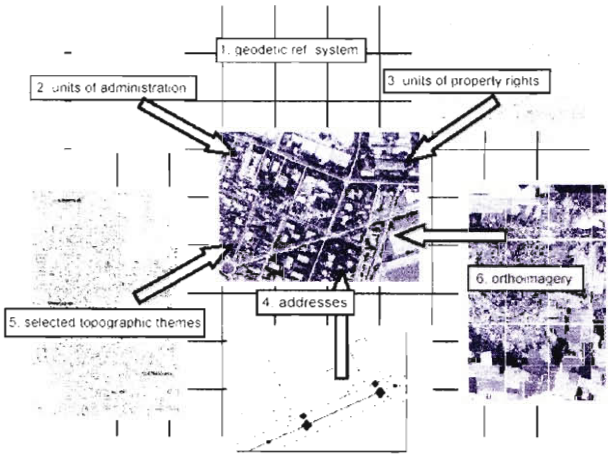

Figure 4: ITB Layers

[14] Massimo Rumor, Paolo Barbieri, Marco Bresciani, and Stefano Mazzariol The Design and the Implementation of the Spatial Data Infrastructure of the City of Venice, 4

maintained by organizations that required it. The ITB project should be completed by August 2005.

However, the ITB project is not intended to be a one shot deal, but instead regularly updated and maintained rather than replaced. The orthophotographic pictures will have to be updated by taking new pictures every three to five years. As for the data structures, the ITB believes that a system should be put in place to monitor the changes to the structure of the city. It is possible to monitor these changes because all changes must go through an administrative process, where the information about the change can be captured. "Continuous information on these administrative events allow the changes to be detected and most, if not all, data necessary for the updating to be obtained."[15] However, to guarantee the accuracy the ITB recommends that the database be checked against the orthophotographic maps when they are updated.

3.4 The Problem to be Addressed

Although much progress has been made with the implementation of e-government initiatives, it is generally a government-to-citizen process. While government process can often be accomplished within a few related agencies, oftentimes many other agencies need access to the information produced. Even with e-government processes, the information is often not adequately stored for future reusability. If such information were available, it could be useful not only for the department in charge of it, but also for other departments.

Venice has a similar scenario with the *Edilizia Privata*. The information encapsulated within the permit contains a large amount of information that could be useful for making later decisions about approving permits. However, although the *Edilizia Privata* has taken some initiative to streamline its processes with the creation of a shorter permit form called the D.I.A., it does not keep the information it acquires through the process in a way that allows reuse. A set of methods and standards need to be developed to create reusable information.

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[15] Ibid, 6

This knowledge could then be applied in a myriad of applications. The *Edilizia Privata* could use such information to enhance its decision making process. Currently, *Urbanistica* does not have access to past permit information. In order to see how their plans affected Venice, they have to rely on data collected during past PRG report cycles, which are every few years. The large gap of time between each PRG report increases the work *Urbanistica* has to do when they analyze past reports and develop a new plan. The increased work in turn increases the time before a new plan can be put into action. The large gap of time between PRG reports also hurts *Urbanistica's* ability to analyze trends and act quickly to stop construction that could be detrimental to Venice.

Additionally, *Urbanistica* could use the information stored within the permits. The ability to retain information on the changes and analyze them to make appropriate decisions would help both departments by allowing them to efficiently share critical information with one another. This improved communication would save time and money for both departments.

In order to create information reusability, both the content and structure of the data must be considered. Simply having the information available is not sufficient; if there is no common structure to the data, it will be impossible to efficiently extract the needed information. Thus, a standard for reusable information must be established between the two departments. Once such issues are properly in order, then the data can be used to manage permit applications, while providing critical data to city planners.

4 Methodology

The overall goal of the project is to allow *Urbanistica* to monitor the effects of its plans by facilitating the reusability of information in *Edilizia Privata*'s permit process.

In order to meet the stated goal of the project, the methodology was broken down into four major objectives which were:

1. To examine the structure and flow of information
2. To identify the information that could be reused by the departments
3. To extract information from administrative documents and create a model for a new building permit system
4. To demonstrate how the system allows the reusability of data with a prototype

The project's conceptual scope covers the reusable knowledge within the permit process. Although there may exist additional information requirements for *Urbanistica*, the scope of the project is limited to what information can be obtained from the *Edilizia Privata* department. The project also aims to create a case study using permits in areas with active construction and modifications, such as Pellestrina. Finally, it is our intention that the project's proposals not be retroactive, and only applicable to future permits.

The remainder of this chapter will be split into four sections:

Section 4.1 explains how we examined the permit and the flow of information between *Urbanistica* and *Edilizia Privata*

Section 4.2 explains how we determined what reusable information was in the permits and how we extracted the information

Section 4.3 describes our plan to use the collected data to create a new system for managing the information from the permits

Section 4.4 describes our plan, demonstrating how the system facilitates the reusability of information in permits through a prototype with varied examples

4.1 Examining the Structure and Flow of the System

In this step, we searched for information about the current building permits and information contained in permit forms. Then we translated the applications and began to review them.

4.1.1 Obtaining Blank Permit Application Forms

As we began to learn more about the building permit process in Venice, we found an informative website constructed by the *Sportello Unico* (http://suer.comune.venezia.it/). Their website contained a list of twenty-one downloadable forms. These forms included all the applications needed to obtain a building permit. We downloaded these forms and began to evaluate them.

4.1.2 Translating Application Forms

The first step in determining the important information in the permits was to translate them into English. We used software, Systran, to give us a rough translation of all the forms that we downloaded from the *Sportello Unico* (See Section 8.3.1 for a Systran processed permit form.) The software translation was confusing and contained many errors due to the literal translation of the grammar.

To gain a better grasp of the permit forms, we discussed them with a native Italian speaker, Alberto Gallo. He is employed by Forma Urbis, affiliated with the WPI Venice Project Center, and his work involves these permit forms. He directed us to concentrate on two forms, the *Domanda di Permesso di Costrure* (Permission to Construct) and the *Denuncia Ininzio Attivita' Edilizia* (D.I.A.) forms. He told us that these were the two main types of forms submitted. The *Domanda di Permesso di Costrure* is a general form for all types of work, while the *Denuncia Ininzio Attivita'Edilizia* is a shortened version where the architect has more responsibility. Mr. Gallo gave us the *Prontuario dell'attività Edilizia* which is a form that indicates the necessary attachments for various kinds of construction. We discussed both forms in detail, and Mr. Gallo helped us to create a better translation for each form.

4.2 Extracting Reusable Information from Permits

In this step we focused on finding information in the permit that could be reused by *Urbanistica*. We discussed with our sponsor the department's needs, determined an area of study, and obtained completed building permits.

4.2.1 Analyzing the Available Information in Application Forms

Once we better understood the translation, we were able to discern what was being asked in each section. We discovered that most of the documentation detailing the construction was contained in the required attachments, while the main form asked for identification information.

We selected specific fields that we believed would be useful for *Urbanistica*. The fields we thought were important involved maps of the local area, surrounding buildings, infrastructure, building plans, intended construction, and a copy of the PRG for the local area. The PRG is a map of the zoning regulations for the city.

4.2.2 Determining *Urbanistica's* Information Requirements

We met with our sponsor, Giorgio Pilla from *Urbanistica*, and discussed our selections for reusable information. Our group and he analyzed parts of the permit that would satisfy the needs of *Urbanistica*. Our sponsor directed us to specific parts of the permit that he felt would contain the most reusable information.

We provided him a printout of each of the two forms "Domanda di Permesso di Costrure" and "D.I.A." with the highlighted fields that we thought were important. With Dr. Fabio Carrera acting as our translator, Mr. Pilla gave his opinions on each of the fields. Mr. Pilla mentioned that they did not need the copy of the PRG as *Urbanistica* was the agency that provided it. Furthermore some of our selections were only required for historical buildings. The information that concerned him most was the building's usage, volume, dimensions, and its relative location to lot boundaries and other buildings.

Mr. Pilla suggested that the best section to check would be the brief written report detailing the plans of construction. He stated that these reports usually contained most of the technical information required by *Urbanistica*.

4.2.3 Establishing the Area of Study

During the discussion with our sponsor, we decided upon a location for our sample permits. The best samples are from areas that have had a wide range of construction over the past few years. Mr. Pilla suggested that Burano, San Erasmo, and Pellestrina were good candidates. He avoided the city of Venice, because, as a historical city, new building construction is very rare. We determined that doing a study of the past five years would be most appropriate, since it is the standard life of a PRG from *Urbanistica*.

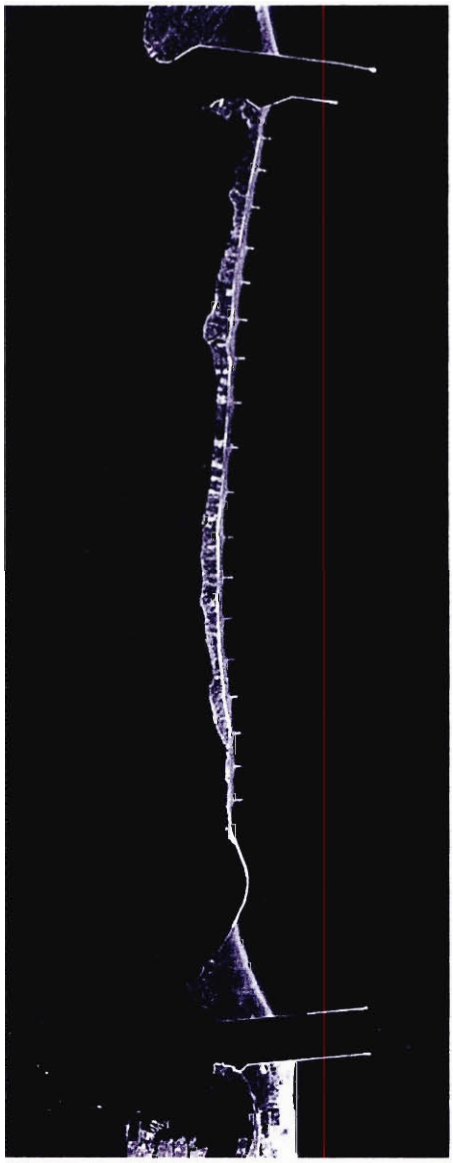

Figure 5: Pellestrina

4.2.4 Obtaining Completed Building Permits

To work with the permits, we needed to locate them within the *Edilizia Privata* archives. The permits are catalogued according to two unique identification numbers, which are based on the date received, and type of permit. Finding the permits in the archives would be difficult without first determining the ID numbers. Through Dr. Carrera, we contacted Sandro Distefano, computer technician of the *Edilizia Privata*, and asked him to run a search to determine the ID numbers of the permits from the areas Mr. Pilla had suggested.

However, the search ran into some problems, and we ended up obtaining an Excel spreadsheet with a listing of over 1,500 permits. The spreadsheet indicated the permits' number, location, and a brief description of the work done. The first two steps to narrowing down the list were to search for the location, and then to look at the brief description. The brief descriptions were translated into English and then were analyzed. We selected permits if they fell under three categories: Restructure/division, change of use, and new construction. These categories were used because they were most likely to

have an urban impact when the construction was completed. The list was narrowed down to approximately 150 candidates from the areas that we had decided on earlier: Burano, San Erasmo, and Pellestrina. Additionally, we found that Malamocco and Murano also had a significant number of permits that seemed promising. However, as we discussed with our sponsor, we decided to stay within the original areas. The list was narrowed down even further to 35 permits. Our final selection contained various types of work, with a fair number of new constructions included.

A further snag arose from the bureaucratic structure in the government, which delayed us from gaining access to the permits. The person in charge of records was concerned about giving us access to the permit archives due to privacy issues. Once we were able to set up a meeting with her through Dr. Fabio Carrera and Giorgio Pilla, we were able to sort out the situation in relatively short order. We then were finally able to access the permits stored in the archive, as seen in Figure 6: Permit Archive for Past 10 Years.

Figure 6: Permit Archive for Past 10 Years

Due to time constraints, we decided to focus solely on Pellestrina for data collection. It had some large developments, and the island's urbanistic concerns, such as traffic, are readily apparent. We handed the archive's workers the ID numbers of the selected permits, and they provided us the colossal permits. As seen in Figure 7: A Typical Completed Permit, the permits contained more than one hundred papers enclosing maps, diagrams, notes, and technical data. When we opened the permits, we found it was quite different then the blank forms

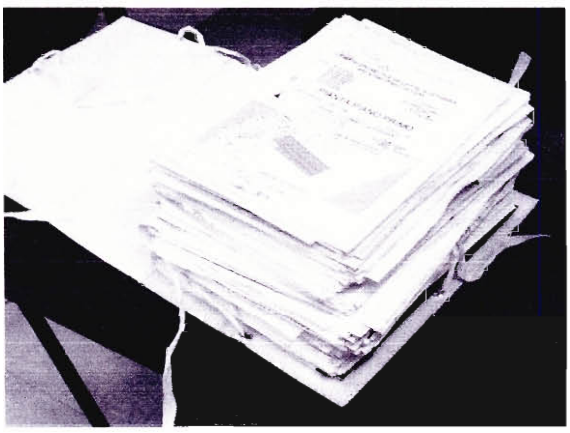

Figure 7: A Typical Completed Permit

would have implied. We worked on locating the parts of the permits that contained useful data, and catalogued them for later steps in our methodology.

4.3 Categorizing and Analyzing Data

In this section, we analyzed the data collected from the permits and developed a method to categorize the data. First we needed to transform the data into a digital format, then we could decide how to best categorize the data. After setting up the data structures, we analyzed our work and made recommendations so that the process could be automated and sustainable.

4.3.1 Digitizing Permits

We found the permits were stored as hardcopies in large folders. In order to manipulate the data contained in the permits, we needed to put them into a digital format. We went through the permits and located the information we wanted to collect. As we sorted through the stacks of papers, we found that the blank forms we analyzed earlier were rarely, if ever, included. However, all the necessary attachments were present and sorted in chronological order by date processed. Most of the important data were contained in the planning diagrams and blueprints. The ISTAT form and the fee calculation sheet also contained some data such as surface area and volume. A sample of an ISTAT form can be seen in Appendix 8.6.

After identifying the information, we then set about digitizing it. First we took photographs of the important pieces of data. Taking pictures allowed us to go through the permits quickly while retaining the information to work with later. We then needed to translate the information from pictures into GIS layers and a database. By overlaying the picture onto the GIS map (Geo coding), we traced the lot of the building, the building footprint, floor plans, roof lines, and sewage systems into separate GIS layers based on the pictures. The side views, volumes, and ID numbers were put into an Access database. The photos were referenced by filename in the database so as to save space and reduce loading times.

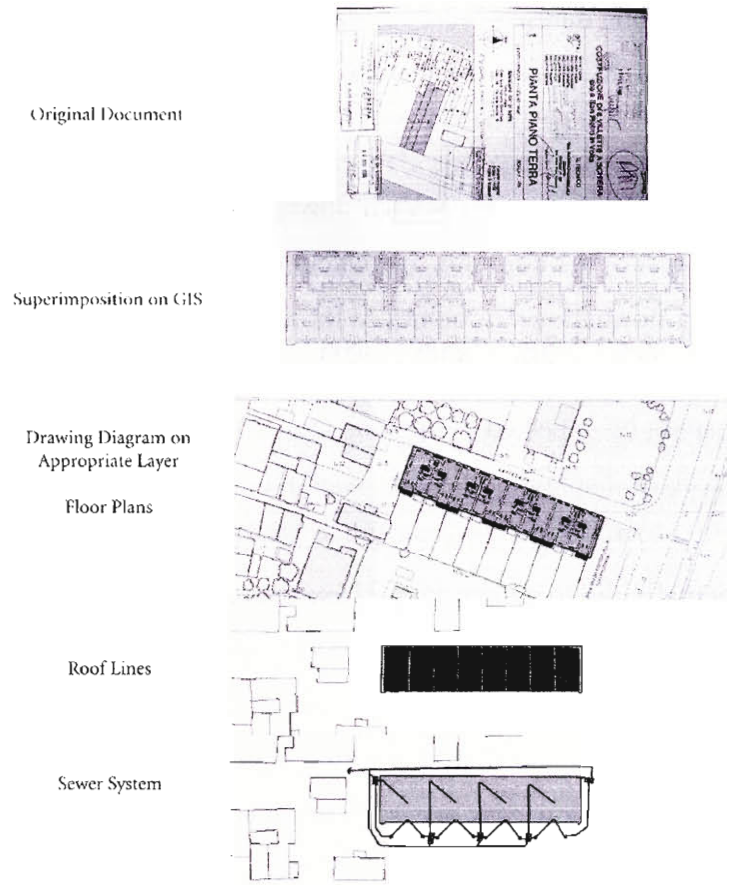

Figure 8: Process to Convert Diagrams to GIS Layers

4.3.2 Organizing Information

The next step in the process was to determine how we were going to use the information. Knowing the use of the information allowed us to put it into an appropriate format. The main distinction we made was whether the data were for a specific building or if it could have a more general usage. The data specific to a building included floor plans, fences, roof lines, and side views. We felt that these data would be useful for analyzing the specific building they applied to, but less useful for a large group of buildings. The general use data consisted of the building footprint, location, surface area and volume. The general use data have more relevance for a set of buildings because they

can show the combined impact and urbanistic load of group of buildings. The other remaining datasets were identification numbers, and although they were not directly applied, they were used to link the database and GIS map together.

4.3.3 Developing Procedures for Implementation

With the data in their new format we were able to easily show many important aspects of the building, and calculate the effect of its development. However, attaining the information was achieved through additional manual labor. Our procedures are not considered as standard methods for the *Urbanistica* department, and the manual labor cannot be expected to be done regularly. Although a program could automate most of the work of displaying the data, each record would still need to be digitized by hand.

We analyzed a few areas where we thought our system would differ from what we actually did to gather data. These areas were: gathering permit information, storing the data, access and sharing of the data, and interactivity. Gathering permit information dealt with what format to accept permits in, what type of information should be included, and using digital information. Storing data dealt with how the data could be stored in such a way as to allow easy access to the needed information, and maintaining an up-to-date map of the city. While analyzing accessibility and distribution, we considered how to give appropriate notice, when a permit was updated or a new one was received, and to be able to pull up pertinent information from these updates. Finally, interactivity dealt with being able to automate the creation of thematic maps, and allowing multiple users to view and work with the information.

The actual results of the process appear as section 6.2 Future Recommendations. We chose to do this because, although the specific ideas we developed are the results of this section, we cannot implement them ourselves and thus, the procedures were put into our recommendations.

4.4 Creating Prototypes to Demonstrate Reusability

In this step, we used the data we collected and organized to create useful visuals for *Urbanistica*. We researched some basic urban problems such as traffic and sewage, determining how to calculate them and applied them to our data. We then created several example displays to demonstrate how the data we collected could be transformed into

useful statistics. We emphasized two aspects: checking the specific plans for a single development, and calculating the overall effect of several concurrent developments.

4.4.1 Integrating GIS with the Database

Integrating the database into GIS allowed us to apply the urbanistic information contained in the database to a map. With the database, single buildings could be viewed in detail, but it lacked the ability to show the surroundings of the building. By integrating the two programs, we are able to visually show how the permits have affected the built environment. The integration of the two programs also allowed for trends in an area to be highlighted via the creation of thematic maps.

4.4.2 Identifying Urban Impacts

We identified urban impacts which could be interpreted from the information in the permits. These impacts were: population, traffic, infrastructure use, sewage output, and utility use. We based these calculations on research from urban planners in the United States. We then applied these general formulas to Venice, after taking into account appropriate modifications based on the situation. For instance, the expected number of cars per family is generally lower in Italy than the United States; instead the Italian family is likely to have more bikes that are used on a daily basis.

4.4.3 Displaying Results and Demonstrating Information Reusability

Our final step in this project was displaying the data by showing trends to make urban impacts apparent. We applied the formulas derived from the previous section to the building data that we gathered. We then displayed the data via thematic maps to show the impacts. We divided the types of impacts into two categories, those a single development visibly impacts, and impacts that only become apparent when measured as a combined impact. We focused on sewage as an individual building impact, and traffic as impacted by combined developments. Furthermore, we also wanted to demonstrate the ability of the system to expand and take new factors into account. Towards this end we created a scenario to analyze the ability of houses to produce energy using photo-voltaic technology. The example shows the combined impact of houses to produce energy in an environmentally friendly method. We believe this shows a forwards looking impact, as

environmental concerns are ever increasing, and the data to calculate solar energy output can be easily included in a permit.

5 Results and Analysis

The following section catalogues the results we produced while working on our project. In order to produce viable results for our project, intermediate steps of interpretation and analysis were required. Since the two steps were intertwined, they were combined into a single section for this report. The first subsection focuses on what we learned from our initial research. The next focuses on our study of the permits, first the blank forms then the completed permits. Thirdly, our database and GIS layer structure created to store the permit data is examined. The penultimate section focuses on the methods we used to calculate the urbanistic impact of buildings. Finally, we conclude with a discussion of our methods of displaying these impacts.

5.1 Background Research

The first step of our project was to gain the necessary background information to complete our project. Much of the background work we did prior to our arrival in Venice was centered on theories and ideas such as data management and city knowledge. In order to continue with our project we needed to learn about the specific situation in Venice. The two major topics we learned about were *Urbanistica's* situation, and the ITB. The information we learned in our research went into writing the sections of the background chapter dealing with the specifics of our project (Sections 3.3 and 3.4)

As we were learning about the general situation, we began delving into the *Edilizia Privata* permits through the *Sportello Unico* site (http://suer.commune.venezia.it) in order to prepare ourselves for looking through completed permits. Since we found that the information of interest would be in the attachments, we were unable to get a feel for the permit structure based on the forms. However, the forms did help us to determine what types of information we could expect when we looked through completed forms.

5.2 Permit Information

In order to produce reports about the impacts of construction, we first had to acquire data about the buildings. Towards this end we reviewed the application forms, and completed forms stored in the archives. When dealing with the application forms, our main goal was to determine what information was necessary for calculating urban

impacts, versus information present. Working with the completed permits, involved producing results in the form of data regarding specific buildings.

5.2.1 Blank Application Forms

Working with the application forms allowed us to anticipate the information available in the completed permits. The available information assisted us by both enabling us to determine the feasibility of displaying particular trends, and allowing us to discuss the potential information with our sponsor. After discussing the permit forms with our sponsor, we obtained a cleared understanding of *Urbanistica's* information requirements. An annotated permit can be found in Appendix 8.4, showing our initial guesses and our sponsor's comments. We determined, based on the available data in the permit and *Urbanistica's* concerns, that we could track six major trends: population, traffic, sewage, ground permeability, energy usage, and public services (e.g. garbage collection, police, schools, etc.).

5.2.2 Completed Permits

We found that the permits contained just about all information associated with the construction of the building, from the required attachments, to memos, calculations, and notes between departments. However, not all of this information was useful; some was outdated due to redesigns, while some was not relevant to our project. We found that the majority of the useful information was in diagrams and pictures, because it was necessary to represent spatial dimensions. The data we collected as pictures were: the location of the building in the lot and on the island, the floor

Figure 9: Diagrams from Permit

plans of each level, the roof lines, the side view from each direction, and the sewer system. For other data we simply used a field of the appropriate type to represent it. These included: date beginning work, date ending work, surface area, residential volume, non-residential volume, and total volume. For an in-depth view of each permit section, see Appendix 8.5.

There were several areas in the form that seemed as if they could be useful not only for the purpose that they were intended, but to provide *Urbanistica* data as well. The calculations on the cost to apply for the permit were based on the surface area and volumes of the house. The volume and surface area could be useful to *Urbanistica,* but currently the forms focus heavily on the financial side, with only minimal data on the volumes. If the dataset was expanded to include more detail on the volumes, then the same form could be used by both *Edilizia Privata* and *Urbanistica* to extract the information they require. Furthermore, we also noted that most of the drawings were done via computer software, most likely a CAD program. Accepting such drawings in digital format, such as a CD, would benefit by reducing the amount of paper generated, allowing easier access to data.

5.3 Database and GIS Layers

Once we collected the raw data from the permits, we needed to process it in order to develop a useable format. As described in our methodology section, we divided the data between a database structure and GIS layers. The following subsections each discuss the data structures created within their respective programs.

5.3.1 Database

The database was created to store information about the building, focusing specifically on data important for urban impact calculations. This information includes the volume, surface area, address, side views, and construction dates. Additionally, we included fields that were not normally collected, but would assist in urbanistic calculations in the future. These fields were AC type, heating type, rain collection, and energy load. Although these fields are not currently included in permits, they are useful considerations for energy saving and efficiency. Considering the growing world

population, energy crisis, and climate change, such figures will undoubtedly become of increasing concern.

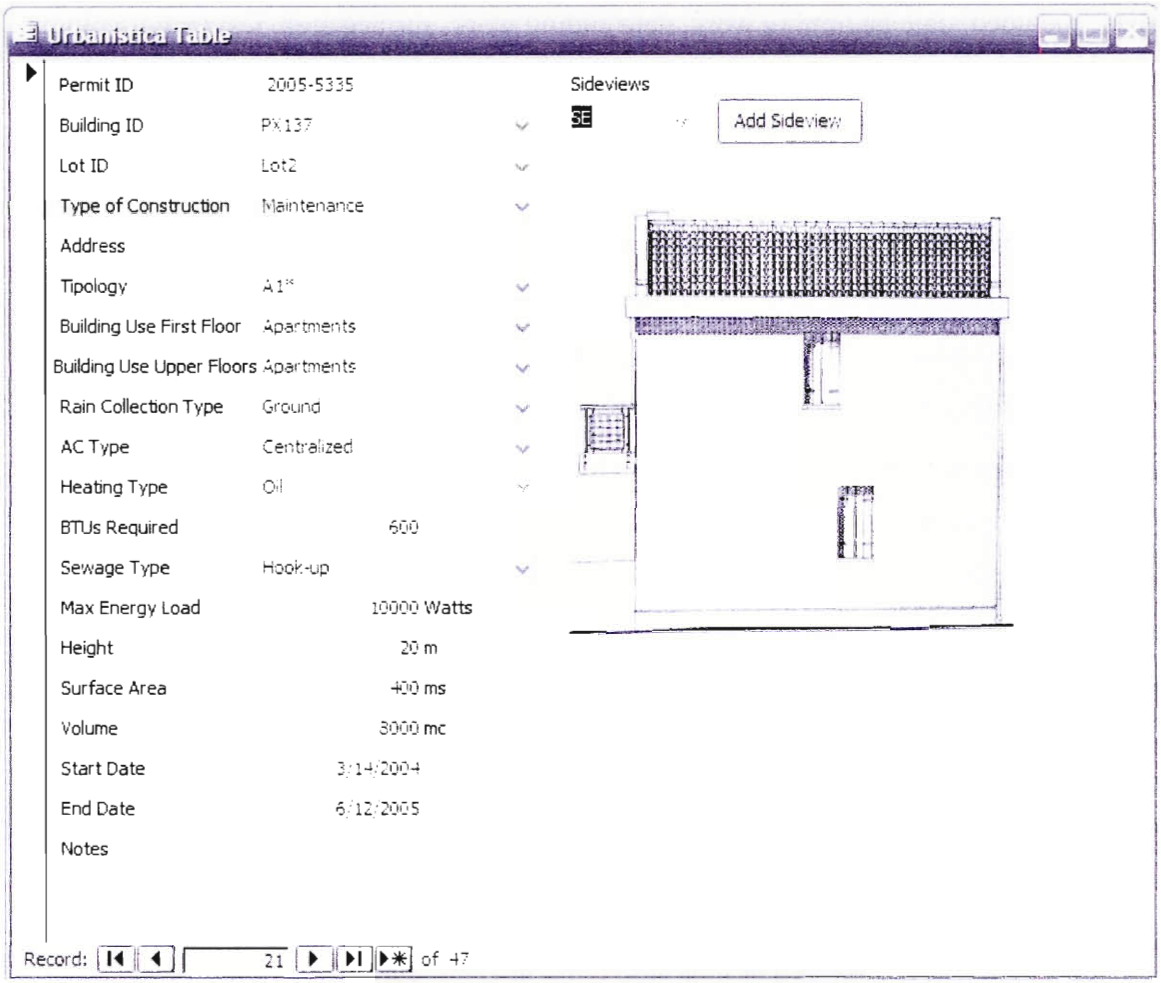

Figure 10: Database Form

The database also contains several tables generated by MapInfo which included the unique identification numbers for the MapInfo objects. The Building_ID field, from the buildings table, used a selectable list for the building ID field in the form. Since the IDs matched up, the form could be linked to MapInfo. The link between the two allows the information contained in it to be displayed graphically. Multiple buildings can be viewed simultaneously, showing the distribution in an area.

The actual tables that were the basis for the urban impacts were separate from the main form, reducing clutter. Figure 11: Database Relationship Diagram shows the relationships between the data among the original table, and other tables used in urban

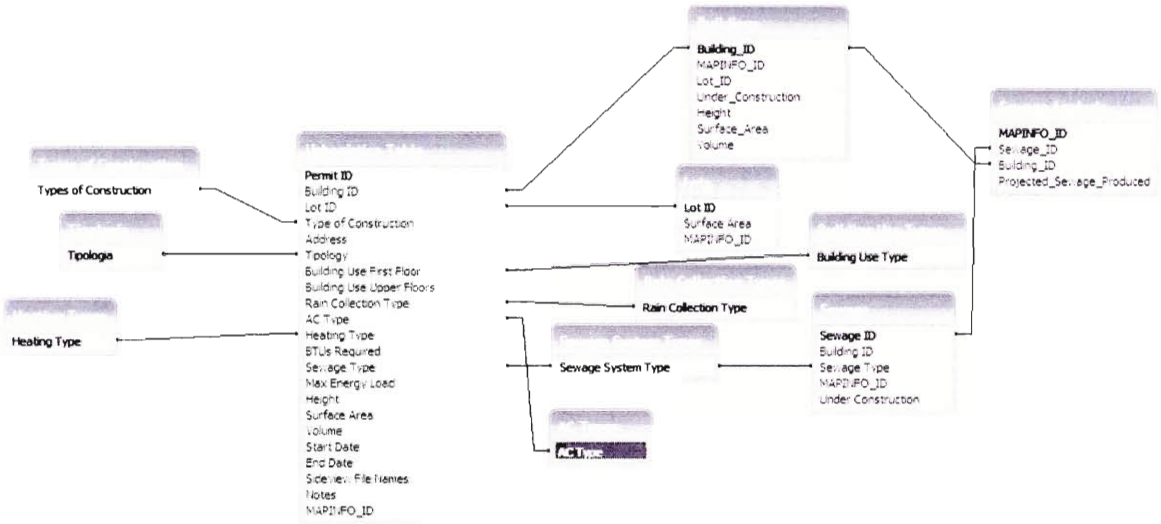

Figure 11: Database Relationship Diagram

impact calculations. These relational tables allowed us to use specific tables for each impact while being able to show these impacts in MapInfo.

5.3.2 GIS Layers

The GIS Layers we created using MapInfo; each type of data was stored in a separate layer. First, we put the building footprint into the pre-existing building layer. We then created several new layers to put in diagrams of the lot, sewer, roof, and floor plans. We had to create separate layers for each floor of the building, due to the limitations of MapInfo. We included extra layers up to the fourth floor, although the buildings we did only went as high as the second floor.

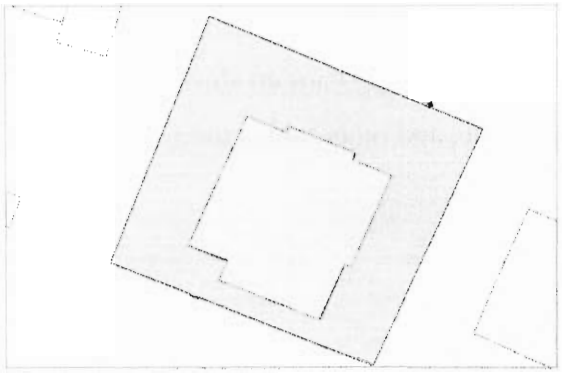

Figure 12: Building Footprint and Lot Layers

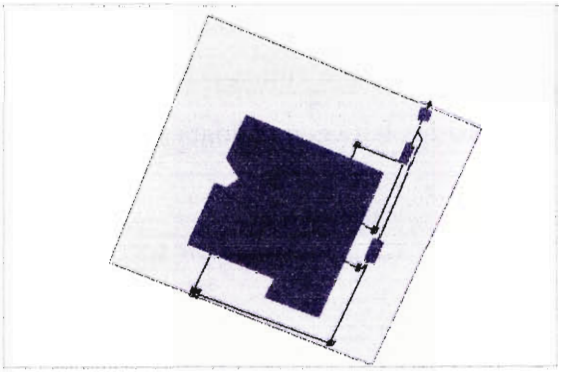

Figure 14: Sewage Layer

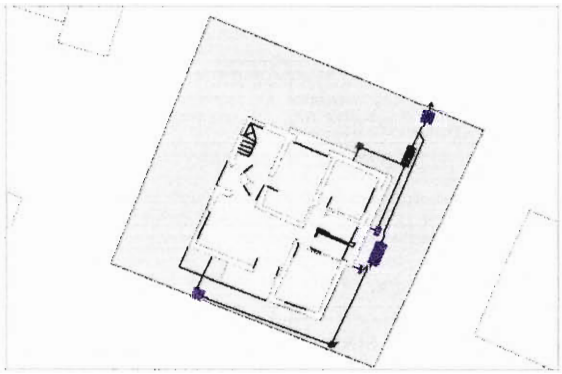

Figure 13: Floor Plan Layer

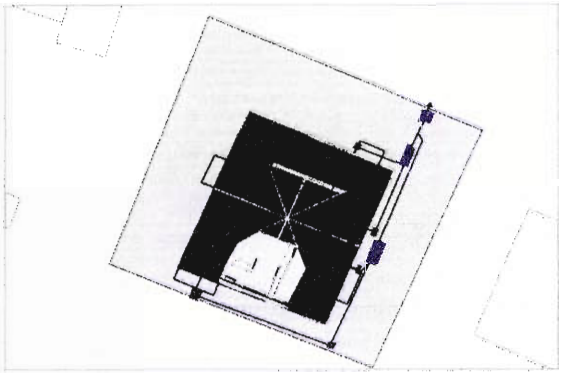

Figure 15: Roof Layer

5.4 Urban Impact Calculations

In order to calculate different kinds of urban impacts, we had to obtain some statistical data. There were many different statistics online for the impacts of traffic, water, energy, and sewage depending on country and date the statistics were taken. The statistics we used were found on the OECD website (http://www.oecd.org). The OECD, Organization for Economic Co-operation and Development, not only contains economic statistics but also environmental data. The site contained comparisons between the thirty countries belonging to the OECD such as Italy. Along with information about the individual countries, the OECD broke down the statistics to use per capita. For example, the average amount of water usage per person, per year is around 800 cubic meters. A person produces about 500kg of municipal waste per year. On average there are .6 vehicles per person in Italy,

Figure 16: OECD

and each person uses an equivalent of 3.0 tons of oil per person, per year.[16] These statistical values are later used in our specific impacts section to help create thematic maps. Using statistics relative to an individual person made it easy to calculate the urban impacts that will be discussed in the next section.

5.5 Displaying Results

Displaying the combined information from our Access database and GIS layers in a single application or web interface shows the real potential of the system. At this stage the system is in the conceptual phase. We currently have an Access form, as seen in Figure 10: Database Form, that links to the database and allows for all information to be entered into it, including side view diagrams of buildings from the North, East, South, West, North East, South East, South West and North West. We included all eight directions, but only expect four to be used at a time, either the four cardinal directions, or the intermediaries. This form is an early prototype of how an application could interface with the database to view and enter information about a certain construction project. An *Urbanistica* website, as seen in Figure 18: Construction Browser, is also an early concept for a web interface to access, view, and enter information into the database and GIS layers. The web site does not contain any functionality that it displays, it is simply meant as an example of how a professional developer could use our database and GIS layers to design an interface that would integrate them into a single system.

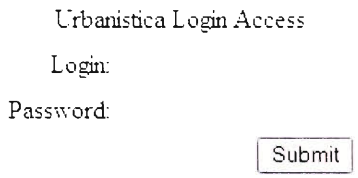

Figure 17: Login Access

[16] Organization for Economic Co-operation and Development, http://www.oecd.org.

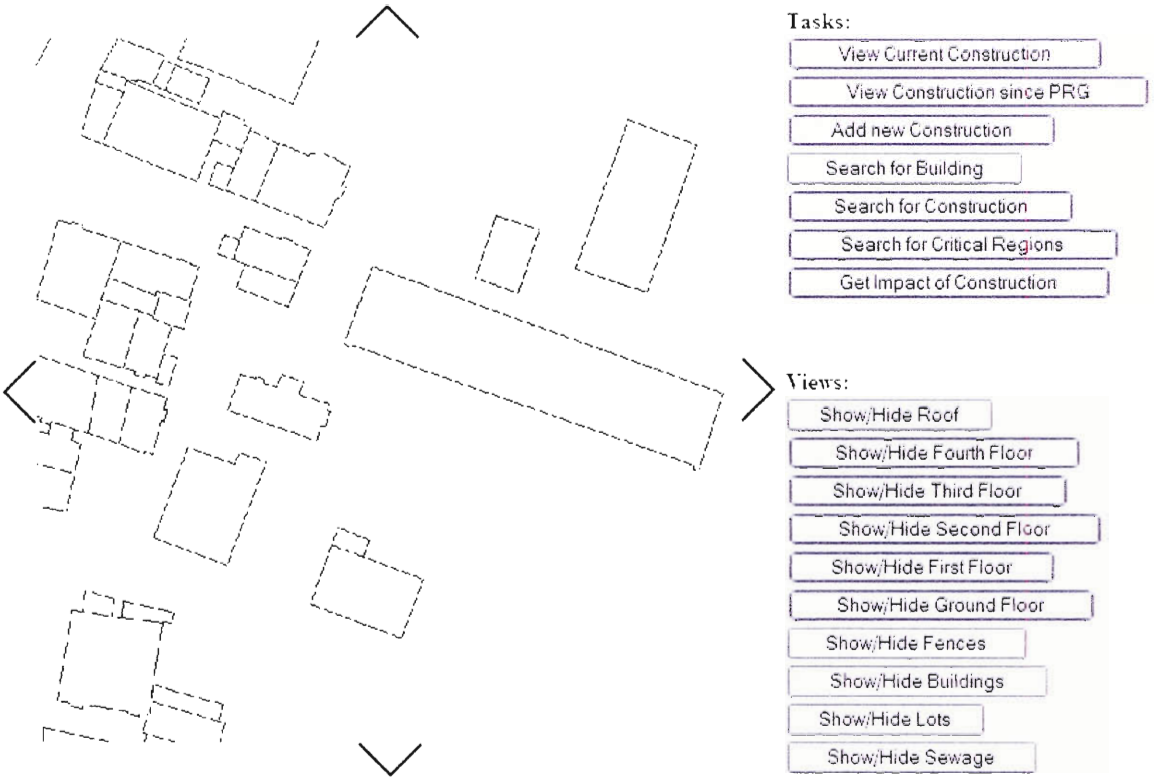

Figure 18: Construction Browser

5.5.1 General Picture

If implemented, the web interface would allow the user to view all buildings that currently exist in Venice and any buildings that are currently under construction. This information is displayed visually using GIS Layers containing the outlines of buildings, roofs, floor diagrams, etc. The user has the option to view/hide any layer and display certain groups of buildings in different colors, such as displaying all buildings under construction in a certain color, as seen in Figure 19: Current Construction Map. This allows the user to get a better visual representation of the buildings and makes it easier to differentiate between them.

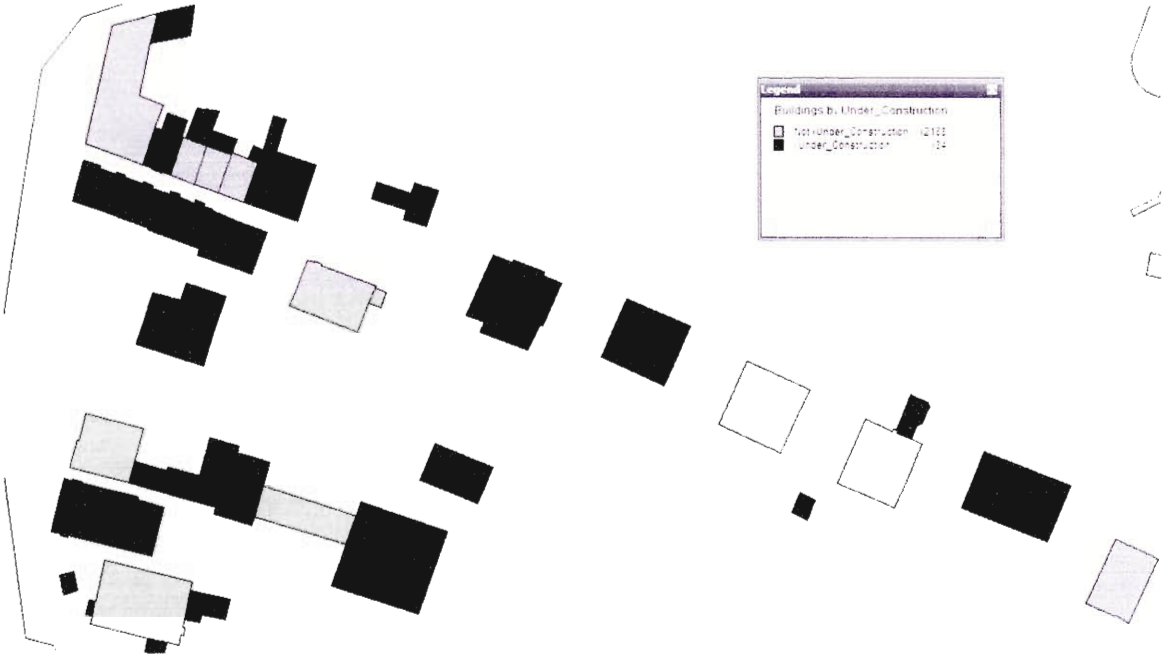

Figure 19: Current Construction Map

5.5.2 Specific Impacts

If implemented, the web interface would also allow the user to view the impacts that a building has on its environment. We used the list of impacts, as described in Section 5.4, to show how new construction could be checked to prevent negative urban impacts, such as pushing a sewage facility over its capacity as seen in Figure 20: Preventing Urban Impacts. If our system is implemented, these urban impacts can be seen before new construction is approved and will allow for corrective action to be taken.

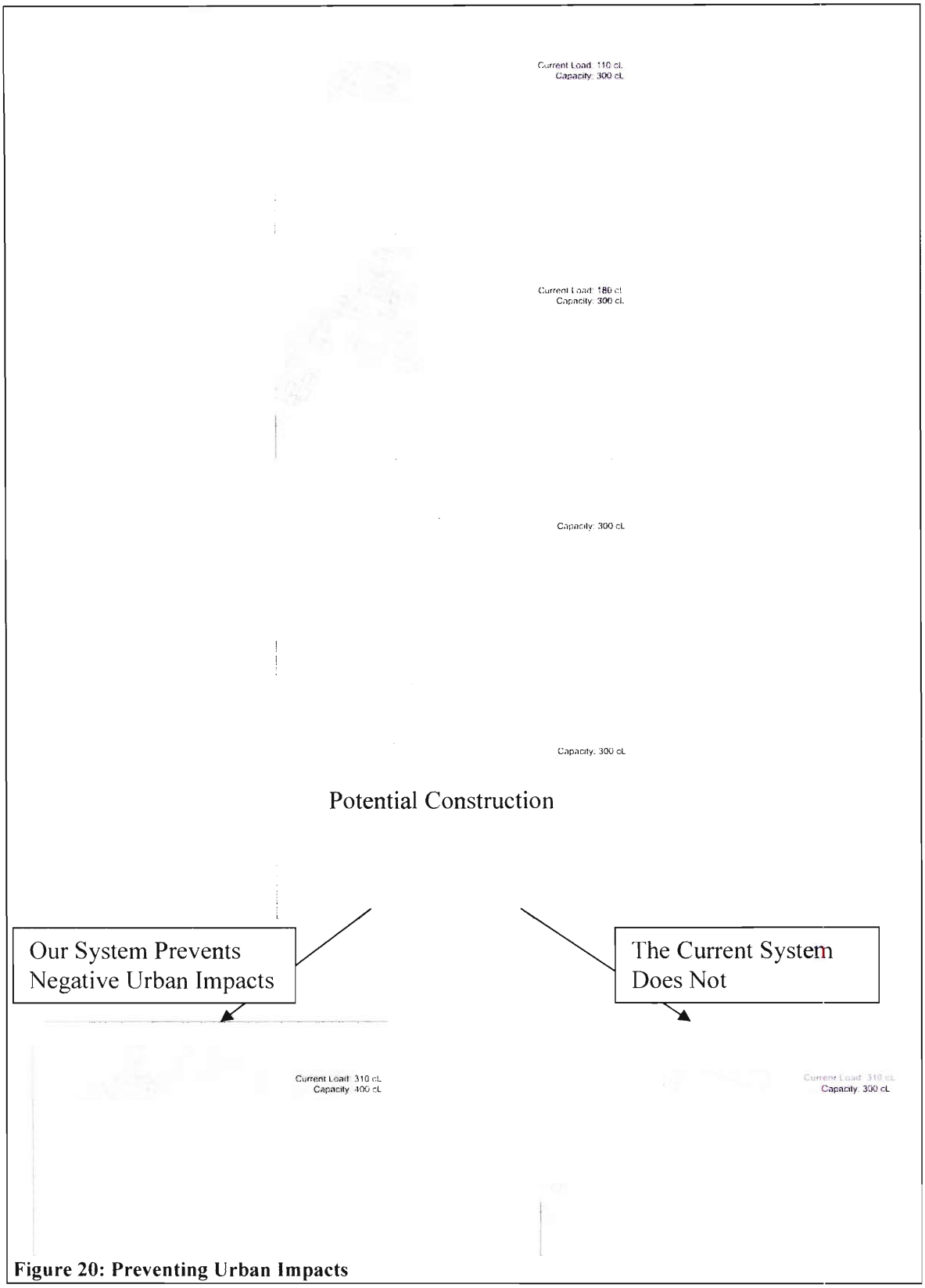

Figure 20: Preventing Urban Impacts

5.5.3 Combined Impacts

Several types of impacts are harder to trace to a single source, but rather are a cumulative result of many small changes. For instance, traffic in Pellestrina is a

significant concern because of its unique position. There is only one major road on the island, and the only way on and off the island is by ferry. Although each development may only add a bit of traffic on the roads, and on and off the island, the combined impact can be significant. A 2003 WPI project measured the traffic on Pellestrina at the intersections and the ferries on and off the island. We used this as a base measurement for the capacity of the ferries and roads. By approximating the number of vehicles on the island, we calculated the peak traffic and average traffic. This helped show what areas have a problem and best determine the number of ferry runs to make. Being able to view this data in advance allows for preemptive decisions to be made, before traffic becomes a major issue. It may be necessary to implement vehicle restrictions, or provide public transportation incentives.

5.5.4 Future Impacts

The large amount of information submitted with the construction of a new building enables our system to go even further than just urban impacts. With only a small amount of additional data, our system could calculate the potential solar energy from a building's rooftop. In our system, the roof is already apart of GIS, therefore the surface area of each section of the roof can be easily obtained. The additional information needed to effectively calculate the potential energy output would be the orientation and inclination of each section of the roof. The potential solar energy could be used by *Urbanistica* or any other concerned departments.

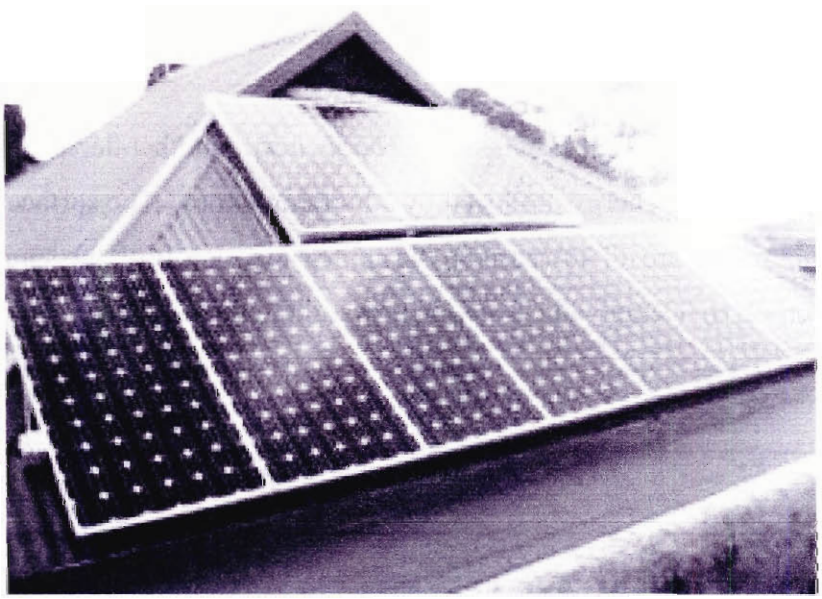

Figure 21: Solar Power

Having the potential solar energy of a whole group of buildings would be similar to a recently proposed project in the United Kingdom. With the developing concern about climate change, the University of Oxford has proposed a project to reduce residential energy usage by 60% by the year 2050. In order to reach their goal, they would need 30% of homes with at least $20m^2$ of Photovoltaic cells with an efficiency of 15%. The orientation also has a factor on the solar energy produced. As the University proposes, "Around a quarter of the homes will have the main roof facing between south east and south west, which retains output within 95% of maximum. West or east facing roofs still achieve 80% of peak output." [17]

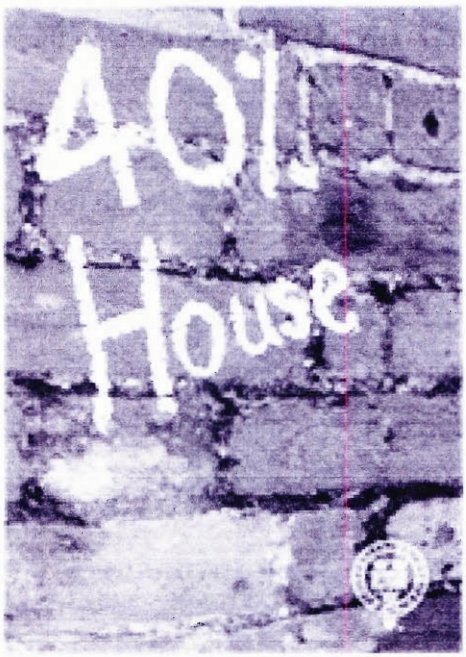

Figure 22: 40% House Book Cover

Using similar statistics, *Urbanistica* or another department could calculate the approximate energy produced by a building's roof. The surface area, orientation and inclination are all key parts in the approximation. With the supplied information in the permit, they could take a step in preventing climate change with the island of Pellestrina.

[17] Brenda Boardman and others, *40% House* (Oxford: University of Oxford, 2005), 68.

6 Conclusions

Our project goal was to demonstrate the effectiveness of creating a system to capture data during the development process. We believe that the system we propose will help planners by allowing them to determine potential urbanistic impacts before a building is approved, and assess the combined impacts of developments in an area. Although our system allows for such benefits, greater effect can be achieved by going further than we have been able to accomplish.

6.1 Analysis of Benefits and Effectiveness

Implementing a system that can intercept data about buildings as they are proposed creates many benefits. Firstly, this system will ensure that *Urbanistica* is always using the latest and most accurate map of the city. The system will allow informed decisions without having to spend extra effort to first manually verify the map's accuracy. Furthermore, it will allow decisions to be made in advance, before the building construction even starts. Since urban planners can predict the potential effects of a development, they can raise their concerns about it during the application process. This preemptive decision-making can deter issues before they become major problems.

The system also provides benefits by allowing planners to see the whole picture, and not just information about the building in question. The system is able to provide them with a complete picture of the status quo, including the existing buildings, ones under construction, and other proposed buildings. This access to information will allow planners to consider the combine impacts of the developments in a region, and act accordingly.

6.2 Future Recommendations

Much of the manual work done in this project can be automated by establishing appropriate guidelines. Creating an automated system will significantly increase the efficiency of the system, as less effort will be put into getting the pieces to fit together, and instead time can be spent analyzing the effect of these developments. To facilitate the automation and integration process, we have two areas in which we have recommendations. The first is centered on integration into permit process and

sustainability, while the second is concerned with expanding the system beyond its current scope.

6.2.1 Integration and Sustainability

To have the system work most effectively, information should be intercepted as it is coming in, rather than after it is approved. We gathered information about the buildings from permits in the archives. However, this situation is not ideal, as it does not allow information to be collected in any organized or timely manner. The ideal time to collect the information about a building is as it is coming in, since this will keep *Urbanistica* up to date, and allow for time to analyze the situation and make appropriate decisions. A crucial step in achieving the system will be strong communication between the two agencies. A set of standards for communication needs to be developed, along with a system to notify *Urbanistica* of new permits received. These notifications could integrate into part of the *Global Edil* program.

Furthermore, as mentioned previously in this report, accepting the permits in digital format will be crucial for simultaneous work to be done. By devising an appropriate set of standards for the digital formats accepted, much of the work we have done converting the permits to digital form can be passed onto the applicant. Currently we foresee accepting permits as text files, in a format such as .doc, with diagrams submitted in .dwg or .dxf formats. A list of suggested submission requirements can be found in Appendix 8.3.2. The possibility of a web interface to input the data would be a further consideration, and once appropriate verification measures are implemented, could entirely supplant a written permit.

6.2.2 Expansion of System

The system can be integrated into the base maps of the region and used as an update tool for them. As mentioned in the background, the ITB project will create updated GIS base layers. These layers should be used, as they will be the most recent, and also include a layer for volumes. The ITB plans to sustain their layers by relying on periodic updating every few years. Our system is designed to track the changes to the buildings of Venice through permits, and thus can be used as an even more effective method of updating the buildings layer, as it will be continuously updated, rather than

only updated once every few years. Using this system as an update method for the common base layers will allow other agencies to also benefit from the collected data by keeping their records up to date.

Although this system may be effective in allowing *Urbanistica* to track the progress of their plans, there are still further improvements that could be made. One obvious gap is that this system will only collect information about private buildings, this leaves out public works projects, and industrial construction. Expanding the system to include information from the departments that deal with these types of development would provide a more complete picture of the situation. Also, this system can benefit more than just *Urbanistica*. Other departments, such as the environmental department could benefit from such information as well. This system currently exists as a link between the *Urbanistica* and *Edilizia Privata* departments, but could potentially be expanded to a more general link, conveying information between many departments.

Recommendations:

- Collect information directly from applications
- Accept applications in digital formats
- Integrate system with ITB project
- Expand system to collect and distribute data over additional agencies

7 Bibliography

Aiello, Jack. *Smart Permit in San Carlos.* http://www.cityofsancarlos.org/is/display/1,1124,deptid-24_isid-232,00.html.

Barbieri, Dott. Paolo, and Ing. Massimo Rumor, *Il progetto per l'Infrastruttura Territoriale di Base del Comune di Venezia*, http://www.comune.venezia.it/urbanistica/itb/ArtMondoGis.asp.

Boardman, Brenda, Sarah Darby, Gavin Killip, Mark Hinnells, Christian N. Jardine, Jane Palmer and Graham. *40% House.* Oxford: University of Oxford, 2005.

Carrera, Fabio. "City Knowledge." PhD diss., Massachusetts Institute of Technology, 2004.

Chung, Jongpil, Lianjie Ma, and Stuart Thorson, E-government in China: Bringing economic development through administrative reform. Beijing: 2002

Delcambre, Lois M. L., Gregory A. Washburn, and Mark A. Whiting, "Reuse of High Level Information Requests: Leveraging the Investment," *Eighth International Conference on Scientific and Statistical Database Systems*, 1996, 186, http://ieeexplore.ieee.org/.

Hoogwout, Marcel, and Robbin te Velde, Digital building permit application: a feasibility study for a shared services solution in The Netherlands. Netherlands: 2004.

Jia, Qinying, Ping Lu, and Yingxun Zhang, "2002 Difang Xinxihua Huigu: Beijing, Tianjin and Shanghai (The report of local government informatization: Beijing, Tianjin and Shanghai in 2002)," *Jisuanji Shijie (Computer World)*, January 2003, 1–5.

Managing Office Technology, "Structuring Strong Document Access," October, 1995.

Organization for Economic Co-operation and Development. http://www.oecd.org.

Parekh, Rupal. "Revisiting the `KM' buzz." *Business Insurance*, March 1, 2005, 20.

Rumor, Massimo Paolo Barbieri, Marco Bresciani, and Stefano Mazzariol. *The Design and the Implementation of the Spatial Data Infrastructure of the City of Venice.*

Sommers, William. Management Study and Analysis with Recommendation. Boston: 2003.

Xu, Xiaolin, and Lanrong Yang. Dianzi Zhengwu Daolun (An introduction to e-government). Wuhan: 2002

8 Appendices

8.1 Annotated Bibliography

American Planning Association, http://www.planning.org/.

Seemed like a pretty good source. It has some good information on E-Government and Urban Planning. The articles did seem pretty interesting but I am not sure how applicable some of the articles are to our project.

Bosselman, Fred and Duane A. Feurer, Charles L. Siemon, *The permit explosion : coordination of the proliferation.* Washington, D.C., Urban Land Institute, 1976

This book is rather short (~80 pages) but it is a report that says it focuses on, "strengthening regional agencies, coordinating permit procedures, reducing the number of levels of government involved in permitting, and establishing specialized appellate review of permit decisions." It's rather old but contains a lot of good ideas on restructuring the building permit process.

Brough, Michael B. *A Unified Development Ordinance*. Washington, D.C.: Planners Press, 1985.

Most of the information is way over my head. The purpose of this book is to provide local governments with a basis of land-use ordinances. This book contains a list of terms and definitions concerning types of buildings with technical definitions specifically to zoning. These terms may come in handy if we need them.

The Building Permit Process
http://www.greenwichct.org/PublicWorks/pwBIBuildPermProc.pdf

This document shows the different stages that a building permit application goes through in Connecticut. This document is fairly detailed and shows how a building permit moves in a digital system. This document will be useful in giving us an example of a step by step building permit process.

The City of Boston: Boston Redevelopment Authority,
http://www.cityofboston.gov/bra/DevProjects.asp?action=ViewStatus&StatusID=5.

This website gives an example of a permit tracking system in the City of Boston. Could be used as an example for the tracking system in Venice.

City of San Carlos Smart Permit Project
http://www.cityofsancarlos.org/is/display/1,1124,deptid-24_isid-180,00.html

This site contains information regarding the smart permit project in Silicon Valley California. The smart permit project was an effort to digitize the permit process and harness the power of the internet to allow greater access to information within the department and to the public. This source is useful because it relates to enabling the reuse of building permit information using technology. The source is good but unfortunately a lot of the documents that give detailed information about their implementation process are no longer accessible.

The City of Venice
http://babelfish.altavista.com/babelfish/trurl_pagecontent?lp=it_en&trurl=http%3a%2f%2fwww.egov.comune.venezia.it%2fSUER%2findex.jsp.

Site contains a list of forms appearing to be applications for building permits. There are quite a few forms for both citizens and planners to send to the S.U.E.R. These forms will probably be used later in our project when we know exactly which form to analyze.

The City of Venice: S.U.E.R.
http://www.comune.venezia.it/direzioni/sportunico/suer/home.asp?R=nf.

This website contains the application forms attaining a building permit. One of the files is for residential purposes and the other is for commercial purposes. This application will later be analyzed and possibly changed to supply better communication and reusability between the two departments.

Delft, The Neatherlands, "Managing inter-organizational workflows in eGovernment services." ACM International Conference Proceeding Series, no. 6 (2004): 500-505

This source talks about how government departments are organized top-down, but that the processes they perform are often multi-level and cross-departmental. This paper suggests that governments need to think in terms of a process rather than as separate departments to improve their efficiency. This examines a case study in India for passport application to prove its point.

Greunz, Markus, Joachim Haes, and Bernd Schopp, "Integrating e-Government Infrastructures through Secure XML Document Containers." IEEE Annual 2000 International Conference, no.43 (2001): 58-76.

This document is a proposal for a system that uses java and XML to create a secure flow of information between departments in an e-government. In the proposal they used the building application process as their prime example of how this type of technology can be applied effectively in an e-government and e-business situations. This article is a good example of a proposal for new technology for an e-government and touches on our topic of digitizing the building permit process.

International Conference of Building Officials, *Uniform Building Code,* Vol. 2, *Structural Engineering Design Provisoins.*Whttier, CA: 1994.

This book contains all the details and specifications on building codes for the United States. Although informative on building specifications, this book has no real use for our project. I thought that the international Conference of Building Officials would be a good lead for building permits.

Juergensmeyer, Julian C., and Thomas E. Roberts, *Land Use Planning and Control Law.* St. Paul: West Group, 1998.

This book goes in depth in the Laws pertaining to Urban Planning and land use. Extremely in depth on the topic of zoning. This book also touches upon Aesthetic Regulation and Historic Preservation, but mostly laws pertaining to these topics.

Shah, Ravi "One-Stop-Shop: Making Governments Faster and Friendlier," IQ Service report, no. 1 (2001): 78.

This article is about how the city of Carrollton, Texas, launched a "One-Stop-Shop" for building permit processing by combining different departments into one department. This article would be useful if the government was willing to make drastic chances to their building permit approval process and share information. This article will not be so useful to us since we are not planning on changing the structure of their departments.

"Structuring Strong Document Access," Managing Office Technology. October 1995

This article is a bit out dated to be applied to our project, but it does have some relevance considering how much they improved their efficiency using technology. This article is about how the city of San Francisco improved the time it takes to approve a building permit from six months to one month by using a new machine to digitize building permits.

Traunmuller, R., and M. Wimmer, "Trends in electronic government: managing distributed knowledge." Database and Expert Systems Applications, no. 11 (2000): 340-345.

The challenge for e-Government is to find a successful way of re-engineering and distributing the administration's knowledge. In this article theoretical and practical insight is provided into various perspectives influencing knowledge management for e-Government. These perspectives need to be integrated in a comprehensive approach to develop e-Government strategies and systems.

Zannes, E., "Knowledge management in industry and government: the conflict between security and knowledge sharing." IEEE Annual 2000 International Carnahan Conference, no. 34 (2000): 160-169.

This concentrates on the differences between applying knowledge management techniques in businesses versus governments. The paper states that benefits can be achieved through using such systems, allowing for greater efficiency and productivity. However it emphasizes that governments require additional security for information because of the possible sensitive nature of it.

8.2 Database

Permit ID	Text	Unique ID of the current permit
Building ID	Text	Unique ID of the building being refered to
Lot ID	Text	Unique ID of the Lot where construction is happening
Type of Construction	Text	Modification, New Construction, Restoration, etc.
Address	Text	Current or estimated street address of the building
Tipology	Text	Tipology of the building
Building Use First Floor	Text	How the first floor will be used, Residential vs Commercial
Building Use Upper Floors	Text	How the upper floors will be used, Residential vs Commercial
Rain Collection Type	Text	The Method for handling rain
AC Type	Text	Type of Air Conditioning Installed
Heating Type	Text	Type of Heating Installed
BTUs Required	Number	Estimated BTUs of energy required to run AC/Heat
Sewage Type	Text	The method for handling waste
Max Energy Load	Number	The max number of Watts the building is expected to use
Height	Number	total height of the building in meters
Surface Area	Number	surface area of the building in sq meters
Volume	Number	Total volume of the building in cu meters
Start Date	Date/Time	Permit Approved date
End Date	Date/Time	Construction Completed Date
Sideview File Names	Text	Filenames of sideview drawings, using format "N:<file name>E:<file name>S:<file name>W:<file name>NE:<file name>SE:<file name>SW:<file name>NW:<file name>"
Notes	Memo	Additional notes about this building or construction
MAPINFO_ID	AutoNumber	

8.3 Forms

8.3.1 Raw Systran Translated Building Permit Form

to compile itself edited by the petitioner

	COMMON OF VENICE DIRECTION CENTERS THEM ONLY SHOP **SHOP ONLY BUILDING RESIDENTIAL (S.U.E.R.)**	It marks from I brand € 11,00

QUESTION OF PERMISSION TO CONSTRUCT

according to of art. the 3, codicil 1, letters d) and) f), of art. the 10 and art. the 22, codicil 3, of of D.P.R. 380/01
(Unified Body of Laws of Building the legislative and prescribed dispositions in matter)
like modified from D.lgs 301/02

In Varying — in I renew art. 15 D.P.R. 380/2001

In Sanatoria art. 36 D.P.R. 380/2001 (*) — In Sanatoria art. 37 D.P.R. 380/2001 (*)

(*) single Esaminabile on not bound buildings according to of the artt. 10, 11, 12 and 13 of the D.Lgs. 22 January 2004, n. 42 (already L. 1089/39) and on not bound areas according to of the artt. 134 and 142 of the D.Lgs. 22 January 2004, n. 42 (already L. 1497/39).

CLASSIFIED To the OFFICE

General protocol:		Notes:

Responsible procedure		Outcome ☐
Responsible preliminary investigation		POSITIVE NEGATIVE ☐

TO COMMON OF VENICE THE DIRECTION IT CENTERS THEM ONLY SHOP

SHOP ONLY BUILDING RESIDENTIAL (S.U.E.R.)

TO COMPILE IN THE EVENT OF PHYSICAL PERSON

(substitutive declaration of notoriety according to of the DPR n. 445/00 - to enclose photocopy document of identity of declaring)

/The undersigned/to (in the event the petitioners was more of one to enclose the relative data you in sheet to part)			
Last name and name _____			
Been born/to to _____		Prov. __	__/__/____
Cod. treasurer			
Resident in _____		Prov. __	C.A.P. _____
Via _____			n. ____
Tel. ____/_____	Fax ____/_____	email _____	

IN QUALITA' OF	
(To specify) _____	Owner or holder of other real right or straight compatible staff with the participation to realize, according to of art. the 11 of D.P.R. 380/01.

Of the SITUATED PIECE OF REAL ESTATE IN			
Common _____			Prov. __
Via _____		n. ____	Slowly _____
Section _____	Sheet __	Mappale _____	Subordinate _____

TO IN THE EVENT COMPILE OF LEGAL ENTITIES (COMPANIES/AGENCIES/SOCIETY/ETC)

(substitutive declaration of notoriety according to of the DPR n. 445/00 - to enclose photocopy document of identity of the legal representative)

Denomination and corporate name _____			
With center in _____		Prov. __	C.A.P. _____
Via _____			n. ____
Tel. ____/_____	Fax ____/_____	email _____	
Cod. treasurer			

p. I.V.A												

Legal representative: last name and name ______		
Been born/to to ______	Prov. __	The __/__/__

Cod. treasurer																				

Resident in ______	Prov. __	C.A.P. ______
Via ______		n. ____
Tel. ___/______	Fax ___/______	email ______

IN QUALITA' OF	
(To specify) ______	Owner or holder of other real right or straight compatible staff with the participation to realize, according to of art. the 11 of D.P.R. 380/01.

Of the SITUATED PIECE OF REAL ESTATE IN			
Common ______			Prov. __
Via ______		n. ____	Slowly ______
Section ______	Sheet __	Mappale ______	Subordinate ______

aware of the previewed penal endorsements in case of declarations mendaci, formation or use of actions it is made, according to of art. the 76 of DPR 445/00

IT INTRODUCES

in compliance with the enforced legislation in matter urban planning and building, question of **PERMISSION TO CONSTRUCT** for the execution of works, RELATIVE TO BUILDINGS WITH EXCLUSIVELY RESIDENTIAL DESTINATION, re-entering in the following tipologia of participation:

	Art. 3,1 letter d) of D.P.R. 380 and succ.mod and int. Building participations of restructure, the participations revolts to transform the building organisms by means of with systematic of works that can carry to a building organism in all or partially various from the previous one. Such participations comprise the restoration or the substitution of some constituent elements of the building, the elimination, the modification and the insertion of new elements and systems. In the within of the participations of building restructure those consisting in the demolition and reconstruction with the same volumetria and preesistente shape are ricompresi also of that one, made the sun necessary innovations for the adaptation to the antiseismic norm blank;
	Art. 3,1 letter and) of D.P.R. 380/01 and succ.mod and int. Participations of new construction.

	Art. 3,1 letter e.1) of D.P.R. 380/01 and succ.mod and int. Construction of manufatti building outside earth or buries to you, that is the widening of those existing outside of the existing, firm shape remaining, for the pertinenziali participations, previewed how much exactly e.6)
	Art. 3,1 letter e.2) of D.P.R. 380/01 and succ.mod and int. Participations of primary and secondary urbanization realize to you from various subjects from the common one.
	Art. 3,1 letter e.3) of D.P.R. 380/01 and succ.mod and int. the realization of infrastructures and systems, also for publics services, that it involves the transformation in permanent inedificato ground way;
	Art. 3,1 letter e.5) of D.P.R. 380/01 and succ.mod and int. the□stallation of manufatti light, also prefabbrica you, and of structures of whichever kind, which roulottes, campers, houses you furnish, boats, that they are uses like rooms, job atmospheres you, or as I placed to you, similar warehouses and, and that are not directed to satisfy requirements merely temporary;
	Art. 3,1 letter e.6) of D.P.R. 380/01 and succ.mod and int. the pertinenziali participations that the technical norms of the urbanistici instruments, in relation to the zonizzazione and the pregio they and landscaped of the areas acclimatizes, characterize like participations of new construction, that is that they involve the realization of a advanced volume to 20% of the volume of the main building
	Art. 3,1 letter f) of D.P.R. 380/01 participations of restructure urban planning, those revolts to replace the existing woven urbanistico-building with other various one, by means of with systematic of building participations, also with the modification of the design of the lotteries, of isolate to you and of the street net
	Participations subject to you from D.P.R. 380/01 and succ. mod. and int. to D.I.A for which it is faculty of the having owner or tito to demand it to the place of the D.I.A the permission to construct.

IT DECLARES MOREOVER

	that the cited works over front regard piece of real estate realized/modified to the vigenza of L. number 1150 of the 17.08.1942, and more not modified _____

	that the cited works over regard piece of real estate realized/modified in compliance with: License/building Concession/Authorization n. _____ rilasciata the __/__/____ to the Denunciation of Beginning Activity prot. _____ introduced in date __/__/____ to the Building Condono (law 47/85 and/or of law 724/94) n _____ rilasciato the __/__/____ Allowed To construct n _____ rilasciato the __/__/____
	that the cited works over regard piece of real estate interested from introduced question of condono building in date __/__/____, prot. _____ not still rilasciato, for which it has been poured the oblation, produced the documentation prescribed from the law the 47/85 and 724/94 and not sussistono exclusions of which to art.32 and the 33 of law 47/85 (area subordinate to ties); therefore on the question of condono the assent has been become serious Hush
	that the cited works over regard piece of real estate interested from introduced question of condono building in date __/__/____, prot. _____ not still rilasciato, but does not modify, neither regards the object of the question of condono.

That:

The PLANNER Of the PARTICIPATION Is		
Last name and name _____		
Enrolled to the College/Order of/of _____	Of the province of __	Number _____
Been born/to _____ to		The __/__/____
Cod. treasurer/p. vat		
With study in _____	Via _____	n ___
Tel. ____/_____	Fax ____/_____	email _____

The DIRECTOR OF the JOBS Is (to communicate itself however before the beginning work)		
Last name and name _____		
Enrolled to the College/Order of/of _____	Of the province of __	Number _____
Been born/to _____ to		The __/__/____
Cod. treasurer/p. vat		
With study in _____	Via _____	n ___
Tel. ____/_____	Fax ____/_____	email _____
The ENTERPRISE EXECUTRIX OF the WORKS Is *(to communicate itself however before the beginning work)*		
Denomination of the Company _____		

With center in _____	Prov. __	C.A.P. _____
Via _____		n. ____
Tel. ____/_____	Fax ____/_____	email _____
Cod. treasurer		
p. I.V.A		
Legal representative: last name and name _____		
Been born/to to _____	Prov. __	The __/__/____

Cod. treasurer			
Resident in _____	Prov. __	C.A.P. _____	
Via _____		n. ____	
Tel. ____/_____	Fax ____/_____	email _____	
IN CHARGE OF THE EMERGENCY ACCORDING TO OF THE D.LEGS. 494/1996 E' **(to communicate itself however before the beginning work)**			
Last name and name _____			
Enrolled to the College/Order of/of _____	Of the province of __	Number _____	
Been born/to to _____		The __/__/____	
Cod. treasurer/p. vat			
With study in _____	Via _____		n ____
Tel. ____/_____	Fax ____/_____	email _____	

It declares moreover of being acquaintance of the obligation of which to article 45, codicil 1, of D. Lgs. Number 152/1999 and successive modifications, relative to the drainages of domestic waters reflue in various receivers from the communal fognaria net, let alone of the prohibition of which to article 29 of sopraindicato the decree.

With the present subscription the Common one of Venice is authorized to use, second the modalities and in the limits previewed from the enforced norm in matter, the numbers of fax and/or supplied addresses email for the communications between Common same, petitioner and planner.

Date __/__/____

COMPANY OF DECLARING
(In case declaring was more of one the present goes underwrite from all)

_____

_____

THE PLANNER _____
(stamp and company)

THE DIRECTOR OF THE JOBS _____
(stamp and company)

The EXECUTOR OF the JOBS _____
(stamp and company)

IN CHARGE OF THE SICUREZZA_____
(stamp and company)

IT ENCLOSES TO THE PERMISSION QUESTION TO CONSTRUCT

(to cross the cases of the produced, necessary documentation based on the tipologia of participation)

Photocopy of the document of identity of declaring (for the substitutive declaration of notoriety of which to the question).
Document recorded attesting the property or tito it of enjoyment of the piece of real estate if the catastale specification of the participation becomes opportune. (if in varying to a concessionato plan and modifications to the property are not taken part, it is not necessary)
Extracted of map with evidenced the area object of participation (for the mainland it goes made reference to the cadastre lands);
in planimetry it will have to be indicated with background painting in color, transparent but indelebile, the lottery of pertinenza with the buildings that will turn out on the lottery to the term of the jobs, applying to same the indices of the flat regolator.
Extracted of P.R.G and/or implementing plan with the exact location of the lottery or piece of real estate object of the participation.
Planimetry/and quoted/and of entirety (advanced 1:200 scale or) with the indication of:

- ✓ Dimensions of the lottery participation object;
- ✓ Points cardinals;
- ✓ Roads with the relative toponomastica and amplitude (planimetry will have to be extended until comprising the public practicability);
- ✓ Position and existing shapes of manufactured (inner and external to the lottery or the piece of real estate) and in plan with specified all the heights and the eventual blind walls;
- ✓ altimetriche, existing Quotas and of plan, the land and the external spaces to the manufactured one reported to quota zero; separations of the manufactured one in plan from the street center, the borders and the surrounding buildings (in case the lottery are interested from various homogenous territorial zones will have also to be indicated the distance from the zone limit);
- ✓ Eventual existing mastings with the indication of the relative essences;
- ✓ areas to public and private parking;
- ✓ shape of eventual parkings or accessories buries to you;
- ✓ superficial permeabili and drenanti;
- ✓ treatment of principle of the ground not built up inside of the lottery;
- ✓ main existing urbanizations (roads, sidewalks, fognatura, net lighting system), where necessary;
- ✓ position of the recinzione in plan or existing. The location of the steps carrai and the pedestrian incomes;

Quoted relief of the existing buildings in the lottery object of participation with indication of the heights and the destinations of use (advanced 1:200 scale or to second of the dimensions of the lottery);
It elaborates to you with graphical demonstration of all the planivolumetrici calculations (that they will have to be brought back on the tables) for the verification of the conformity with the indices of varying P.R.G and of the eventual one;
Plants of several the plans (advanced 1:100 scale or and at least one table in 1:50 scale) with the indication of the planimetric and altimetriche quotas. In all the plants will also have to be indicated the lines of section, superficial and the destination of the various premises, the aeroilluminante surface with the

verification of how much previewed from the norms and enforced regulations, the various real estate units;
Sections (advanced 1:100 scale or and at least a table in 1:50 scale) cross-sectional and longitudinal for every body of factory placed in points meant to you with the vuotatura of the clean heights of the single plans, of the thickness of the solai, the sporti of the jutting out parts, the overflows of the parts to of over of the lines of gronda and the necessary heights for the verification of the urbanistico-building indices;
Prospects of the work planned (advanced 1:100 scale or and at least one table in 1:50 scale) complete of reference to the surrounding buildings, the land and its eventual modifications. In the prospects the altimetrica situation of the course of the plan land will have to be represented also. In case the building is adherent to manufactured others, the designs of the prospects will have to comprise also those of the adherent facades, with the indication of all the materials employs to you, they treatment and color (in the event of works that interest portion of buildings online or to curtain, will be sufficient the rappresentazione of part of the adjacent prospects, traced to simple contour, integrated from photographic documentation that comprises the lateral facades to that one of participation);
Parametric table of comparison of the plants, the prospects and the sections with evidences the participations to you by means of suitable coloration (yellow for the demolitions and red for the constructions), in case of varying or manufactured modifications to existing;
Planimetry (advanced 1:200 scale or) with indication of the net of complete inner fognatura of connection traps and condenses fat people, dimensioning of the eventual ones was septic, until the point of breaking in in the freenet;
Planimetry (advanced 1:200 scale or) with indicated all the works of urbanization in plan (roads, sidewalks, fognatura, lighting system, water, methane) and relative computes metric estimativo;
Axonometry in adequate scale in case for the complexity of the participation demands one vision of with of/the manufactured one/in plan;
Prospects and section of the recinzione;

Plants of the participation in plan with demonstration of the satisfaction of the prescription enforced in matter of discouragement of the architectural feature that denies accesses to the handicapped and declaration of the qualified professional who attests the conformity of the plan to the same normative dispositions;

Ulterior documentation in the event of participations on buildings of historical value or testifies them and they pertinenze, with particular reference to the historical centers:

For the plants: indication of the orditure of the solai, the types of paving and the tipologici finish elements which similar steps, thresholds and, let alone of the type of material;
For the prospects: indication of the structures building and the finish elements which similar coverings, window sills, fixtures, railings and, let alone of relati to you material and colors; For the spaces discoveries: indication of the paving, the elements of perimetrale marking out, inner division, furnishings and/or service, let alone of the materials and the colors, beyond that of the eventual sistemazione to green proposed in the respect of the norms previewed from the regulations of the green;
For the spaces discoveries: indication of the paving, the elements of perimetrale marking out, inner division, furnishings and/or service, let alone of the materials and the colors, beyond that of the eventual sistemazione to green proposed in the respect of the norms previewed from the regulations of the green;

Reliefs in scale adapted to the object, of 1:20 norm, of the architectonic particular, constructive and decorated to you, which frames, cornices, coats of arms, capitelli, elements in wood or iron and, for the external spaces, portoni, esedre, the similar Fontanas, scales and, mastings, with the indication of the executive characteristics and of consistency, let alone of the materials and the colors;

Other documentation:

Descriptive relation of the participation. In the event of historical buildings or it testifies them the relation will have to describe, with reference to the diagrams introduces to you, of the original evolutionary dynamics and the characteristics system manufactured that has carried to the existing situation, with eventual equipment of designs and historical documents, let alone, as far as the transformation plan, the methodologies and techniques of participation and use of the materials;
Copy Authorization of the Sopraintendenza for the BB.AA.AA for participations on notified pieces of real estate according to of the artt. 10 11 – 12 and 13 of Dlgs 42/2004;
Minimal the photographic relief to colors formed cm. 10X15 of the manufactured one or the area of participation and its context (excluded inner restructure) comprised existing mastings, let alone general

planimetry with the resumption points, in originates them (eventual copies);
Unilateral transaction of obligation for the execution of the works of urbanization in plan, relative I compute metric estimativo and relative fideiussoria policy;
Copy eventual conventions recorded and transcribed adjacent property, let alone copy conventions eventually previewed from the enforced norms;
Permission estimate of the VV. FF. or substitutive declaration of insussistenza to it obligation of the Certificate of prevention fires.
Plans and relations of the systems according to of laws 46/1990 and art. 122-135 of D.P.R. 380/01 and succ. mod. and int., in twofold copy.

Attestation of the deposit of the sanitary rights intestate to the A.S.L.

Card ISTAT debitamente compiled and signed

Already acquired opinions from the petitioner according to of art. the 5 codicil 3 of D.P.R. 380/01 and succ. mod. and int, complete of it elaborates to you encloses, debitamente seen you to you of:

- ✓ A.S.L., in the event in which it cannot be replaced from a autocertificazione according to of art. the 20, codicil 1;
- ✓ National Fire Department, where necessary, in order to the respect of the antifire norm.

Relative Autocertificazione to the age of the abuse-abuses and document copy valid of identity, in the event of presentation of sanatoria question.
Autocertificazione approximately the conformity to the sanitary norms hygienic of the participations of residential building - Art. 20 codicil 1 D.P.R. 06/06/2001 n. 380 modified from the Dlgs. 27/12/2002 n. 301.

It elaborates you of plan and relief, let alone the technical relation, must be introduces to you in quadruplice copy, underwrite from the petitioners and the planner. It is specified that **in case features of bound areas** (for all the areas subordinates to the ties of which to the D.Lgs. 42/2004 and succ. mod. and int.), the **number of copies passes from four to six for it elaborates you graphical and the relation and from one to three for the photographic documentation.**
The delivery of the relative documentation to plans and relations of the systems according to of law 46/90 and articles from 122 to 135 of D.P.R. 380/01 and succ. mod. and int. it will have to happen however before the beginning work.
One subscribes with the precisazione that in the cares of the rights of thirds party free from every responsibility the Common one of Venice.

Date __/__/____

COMPANY OF DECLARING
(In case declaring was more of one the present goes underwrite from all)

_____

THE PLANNER _____
(stamp and company)

8.3.2 Suggested Submission Requirements

Submission Requirements for New Construction

The submission requirement is broken down into two parts: Database Information and Diagrams/Drawings. These files should be submitted on one or multiple CD's depending on the size of the files.

Database Information: Can be submitted as part of CAD file or in a separate Microsoft Word document

Identification

-Lot ID
-Address
-Proposed Start Date
-Proposed Completed Date
-Typology
-Surface Area
-Volume
-Height
-Projected Start Date

Building Information

-Type of Construction
-Building Use Ground Floor
-Building Use Upper Floors

Environment

-Rain Collection Type

Energy

-AC type
-Heating Type
-BTUs Required
-Max Energy Load

Sewage

-Type

Diagrams/Drawings: All diagrams must be submitted in a CAD format such as **.dxf** or **.dwg**.
(Integration of the diagrams into a GIS format could be easily done using the Universal Translator function in MapInfo, for example

Sewage

-Must contain all dimensions and location for the following: Sewage Pipes, Lines, Tanks, etc.
-Must contain the following specifications: Maximum Capacity and Maximum Output

Floor Plans

Impermeable surface

Side Views

Roof

-Roof Height relative to surrounding buildings
-Surface Area of each roof section
-Angle of Inclination of each section of roof
-Orientation of each section of roof, measured in degrees clockwise from North

Self-Generating Energy (if applicable)

8.4 *Permission to Construct Form with Notes from Meeting with* Urbanistica

[redacted] – See comment
Yellow – Agrees
Blue – Additional stuff he pointed out we should look at

IT ENCLOSES TO THE PERMISSION QUESTION TO CONSTRUCT

(to cross the cases of the produced, necessary documentation based on the tipologia of participation)

Photocopy of the document of identity of declaring (for the substitutive declaration of notoriety of which to the question).
Document recorded attesting the property or tito it of enjoyment of the piece of real estate if the catastale specification of the participation becomes opportune. (if in varying to a concessionato plan and modifications to the property are not taken part, it is not necessary)
Extracted of map with evidenced the area object of participation (for the mainland it goes made reference to the cadastre lands);
in planimetry it will have to be indicated with background painting in color, transparent but indelebile, the lottery of pertinenza with the buildings that will turn out on the lottery to the term of the jobs, applying to same the indices of the flat regolator.

[redacted]

PRG not required, produced by Urbanistica

Planimetry/and quoted/and of entirety (advanced 1:200 scale or) with the indication of:

- ✓ Dimensions of the lottery participation object;
- ✓ Points cardinals;
- ✓ Roads with the relative toponomastica and amplitude (planimetry will have to be extended until comprising the public practicability);
- ✓ Position and existing shapes of manufactured (inner and external to the lottery or the piece of real estate) and in plan with specified all the heights and the eventual blind walls;
- ✓ altimetriche, existing Quotas and of plan, the land and the external spaces to the manufactured one reported to quota zero; separations of the manufactured one in plan from the street center, the borders and the surrounding buildings (in case the lottery are interested from various homogenous territorial zones will have also to be indicated the distance from the zone limit);
- ✓ Eventual existing mastings with the indication of the relative essences;
- ✓ areas to public and private parking;
- ✓ shape of eventual parkings or accessories buries to you;
- ✓ superficial permeabili and drenanti;
- ✓ treatment of principle of the ground not built up inside of the lottery;
- ✓ main existing urbanizations (roads, sidewalks, fognatura, net lighting system), where necessary;
- ✓ position of the recinzione in plan or existing. The location of the steps carrai and the pedestrian incomes;

Quoted relief of the existing buildings in the lottery object of participation with indication of the heights and the destinations of use (advanced 1:200 scale or to second of the dimensions of the lottery);
It elaborates to you with graphical demonstration of all the planivolumetrici calculations (that they will have to be brought back on the tables) for the verification of the conformity with the indices of varying P.R.G and of the eventual one;
Plants of several the plans (advanced 1:100 scale or and at least one table in 1:50 scale) with the indication of the planimetric and altimetriche quotas. In all the plants will also have to be indicated the lines of section, superficial and the destination of the various premises, the aeroilluminante surface with the verification of how much previewed from the norms and enforced regulations, the various real estate units;
Sections (advanced 1:100 scale or and at least a table in 1:50 scale) cross-sectional and longitudinal for

every body of factory placed in points meant to you with the vuotatura of the clean heights of the single plans, of the thickness of the solai, the sporti of the jutting out parts, the overflows of the parts to of over of the lines of gronda and the necessary heights for the verification of the urbanistico-building indices;
Prospects of the work planned (advanced 1:100 scale or and at least one table in 1:50 scale) complete of reference to the surrounding buildings, the land and its eventual modifications. In the prospects the altimetrica situation of the course of the plan land will have to be represented also. In case the building is adherent to manufactured others, the designs of the prospects will have to comprise also those of the adherent facades, with the indication of all the materials employs to you, they treatment and color (in the event of works that interest portion of buildings online or to curtain, will be sufficient the rappresentazione of part of the adjacent prospects, traced to simple contour, integrated from photographic documentation that comprises the lateral facades to that one of participation);
Parametric table of comparison of the plants, the prospects and the sections with evidences the participations to you by means of suitable coloration (yellow for the demolitions and red for the constructions), in case of varying or manufactured modifications to existing;
Planimetry (advanced 1:200 scale or) with indication of the net of complete inner fognatura of connection traps and condenses fat people, dimensioning of the eventual ones was septic, until the point of breaking in in the freenet;
Planimetry (advanced 1:200 scale or) with indicated all the works of urbanization in plan (roads, sidewalks, fognatura, lighting system, water, methane) and relative computes metric estimativo;
Axonometry in adequate scale in case for the complexity of the participation demands one vision of with of/the manufactured one/in plan;
Prospects and section of the recinzione;

Plants of the participation in plan with demonstration of the satisfaction of the prescription enforced in matter of discouragement of the architectural feature that denies accesses to the handicapped and declaration of the qualified professional who attests the conformity of the plan to the same normative dispositions;

Ulterior documentation in the event of participations on buildings of historical value or testifies them and they pertinenze, with particular reference to the historical centers:

For the plants: indication of the orditure of the solai, the types of paving and the tipologici finish elements which similar steps, thresholds and, let alone of the type of material;
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Reliefs in scale adapted to the object, of 1:20 norm, of the architectonic particular, constructive and decorated to you, which frames, cornices, coats of arms, capitelli, elements in wood or iron and, for the external spaces, portoni, esedre, the similar Fontanas, scales and, mastings, with the indication of the executive characteristics and of consistency, let alone of the materials and the colors;

Other documentation:

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Minimal the photographic relief to colors formed cm. 10X15 of the manufactured one or the area of participation and its context (excluded inner restructure) comprised existing mastings, let alone general planimetry with the resumption points, in originates them (eventual copies);
Unilateral transaction of obligation for the execution of the works of urbanization in plan, relative l

compute metric estimativo and relative fideiussoria policy;
Copy eventual conventions recorded and transcribed adjacent property, let alone copy conventions eventually previewed from the enforced norms;
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Attestation of the deposit of the sanitary rights intestate to the A.S.L.

[redacted]

Might contain useful informations

Already acquired opinions from the petitioner according to of art. the 5 codicil 3 of D.P.R. 380/01 and succ. mod. and int, complete of it elaborates to you encloses, debitamente seen you to you of:

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Autocertificazione approximately the conformity to the sanitary norms hygienic of the participations of residential building - Art. 20 codicil 1 D.P.R. 06/06/2001 n. 380 modified from the Dlgs. 27/12/2002 n. 301.

It elaborates you of plan and relief, let alone the technical relation, must be introduces to you in quadruplice copy, underwrite from the petitioners and the planner. It is specified that **in case features of bound areas** (for all the areas subordinates to the ties of which to the D.Lgs. 42/2004 and succ. mod. and int.), the **number of copies passes from four to six for it elaborates you graphical and the relation and from one to three for the photographic documentation**.
The delivery of the relative documentation to plans and relations of the systems according to of law 46/90 and articles from 122 to 135 of D.P.R. 380/01 and succ. mod. and int. it will have to happen however before the beginning work.
One subscribes with the precisazione that in the cares of the rights of thirds party free from every responsibility the Common one of Venice.

Date

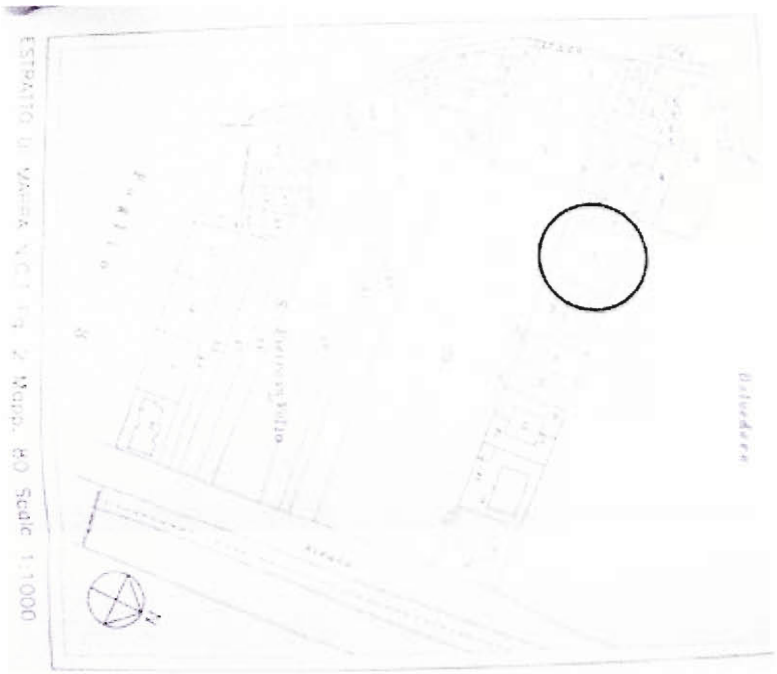
COMPANY OF DECLARING
(In case declaring was more of one the present goes underwrite from all)

_____

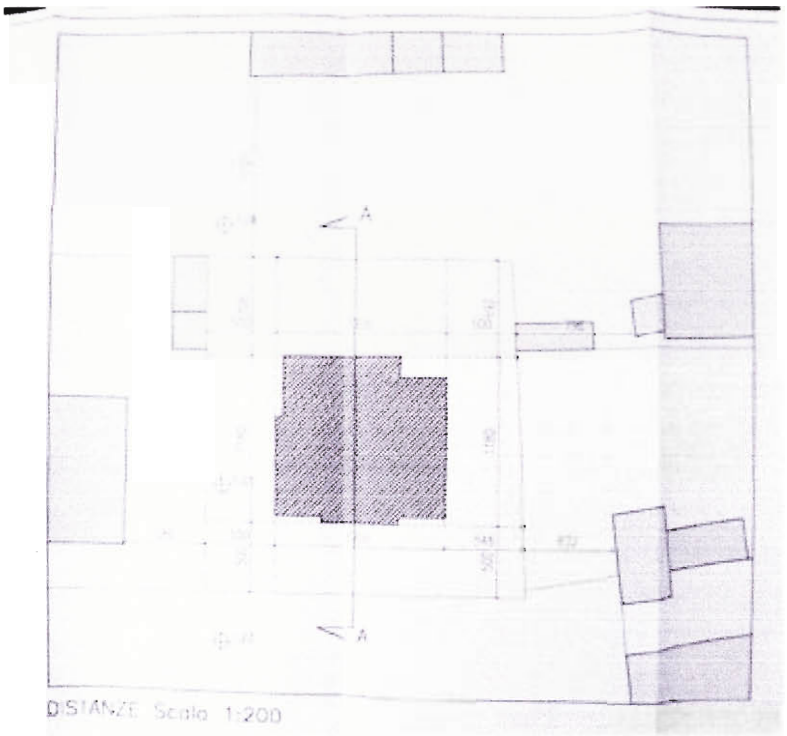
THE PLANNER _____
(stamp and company)

8.5 Completed Permit Information Breakdown

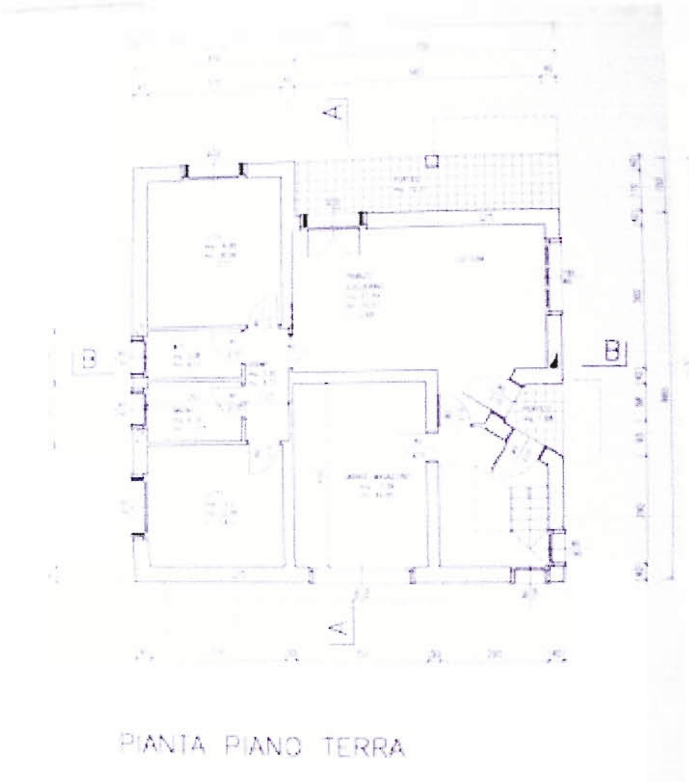
Cartographia – General Location of Lot



Situation of Building on Lot

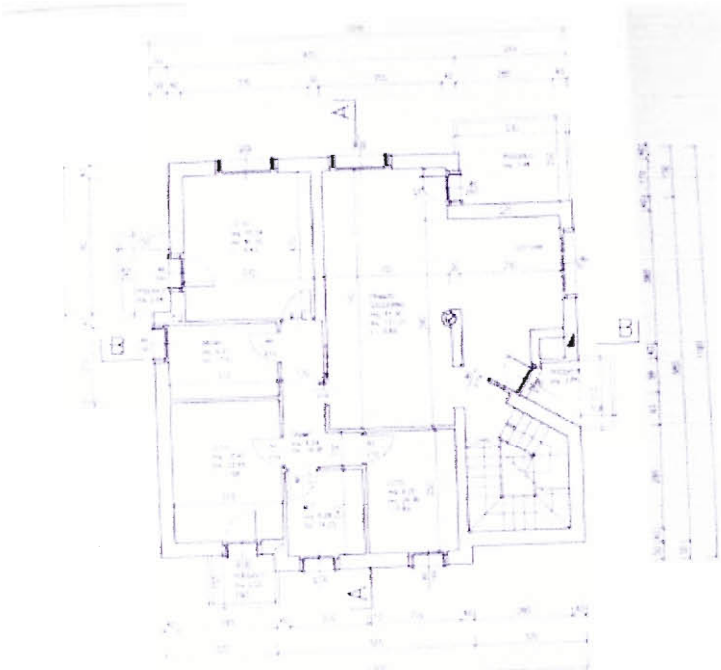


Ground Floor Plans



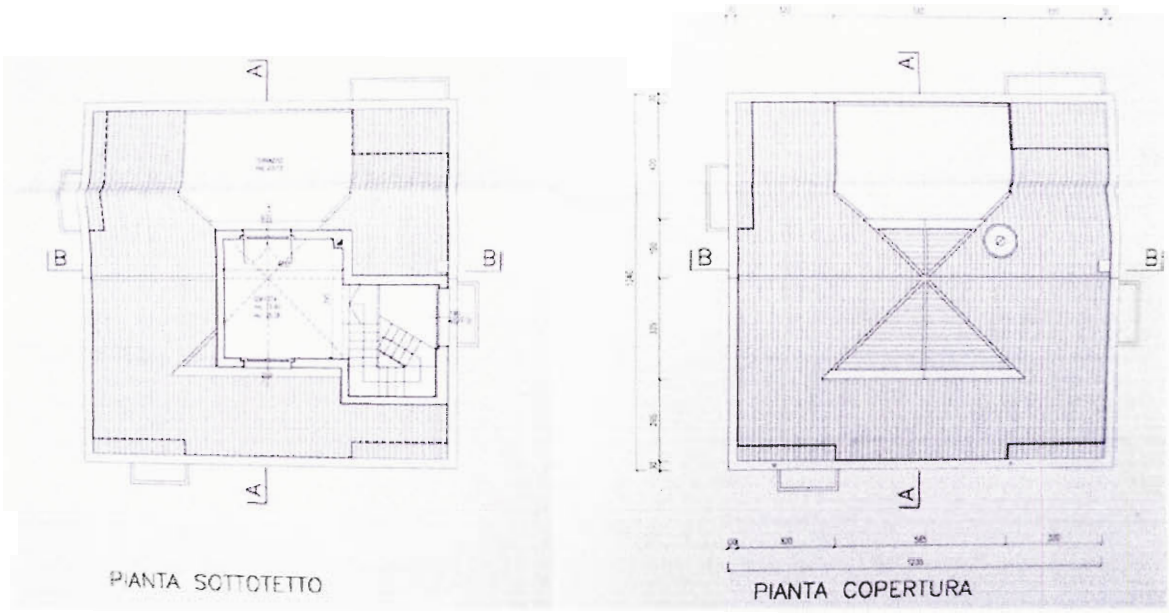
PIANTA PIANO TERRA

Second Floor Plans

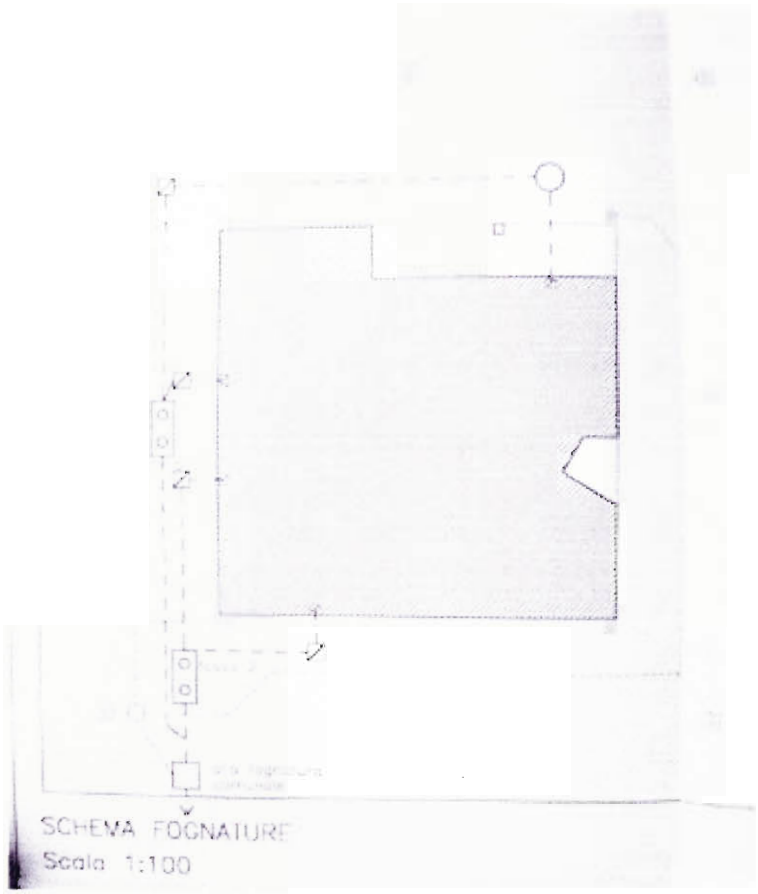


PIANTA PIANO PRIMO

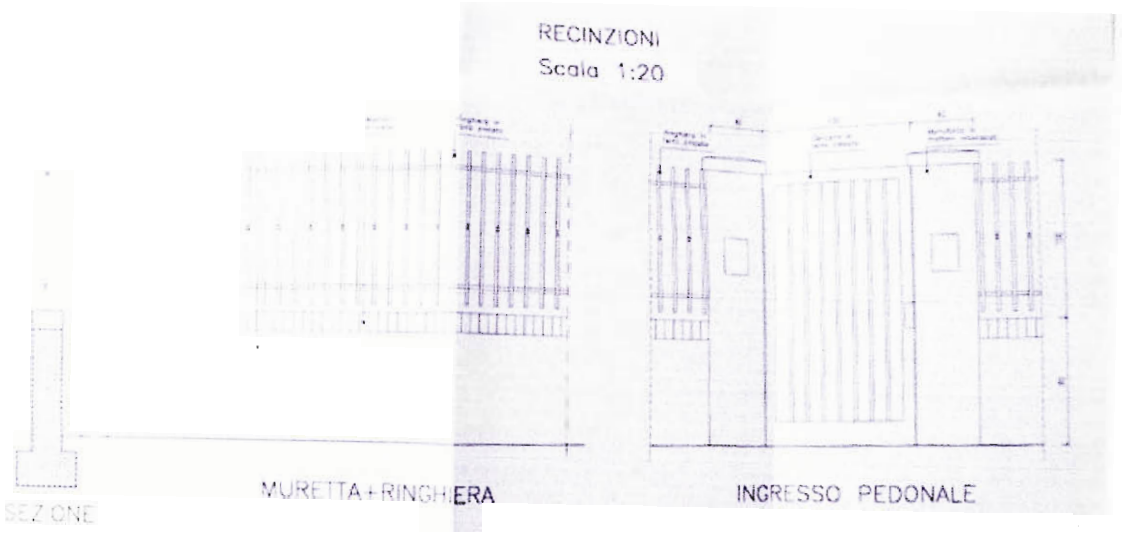
Roof Lines



Sewer System Layout

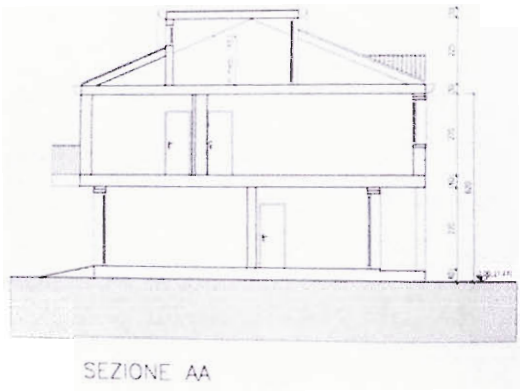


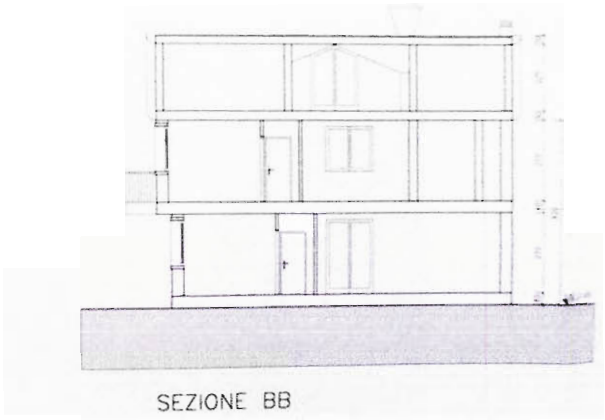
Fencing



Prospetti – Side Views

Cross Sections





Surface Area and Volume Calculations

PROSPETTO

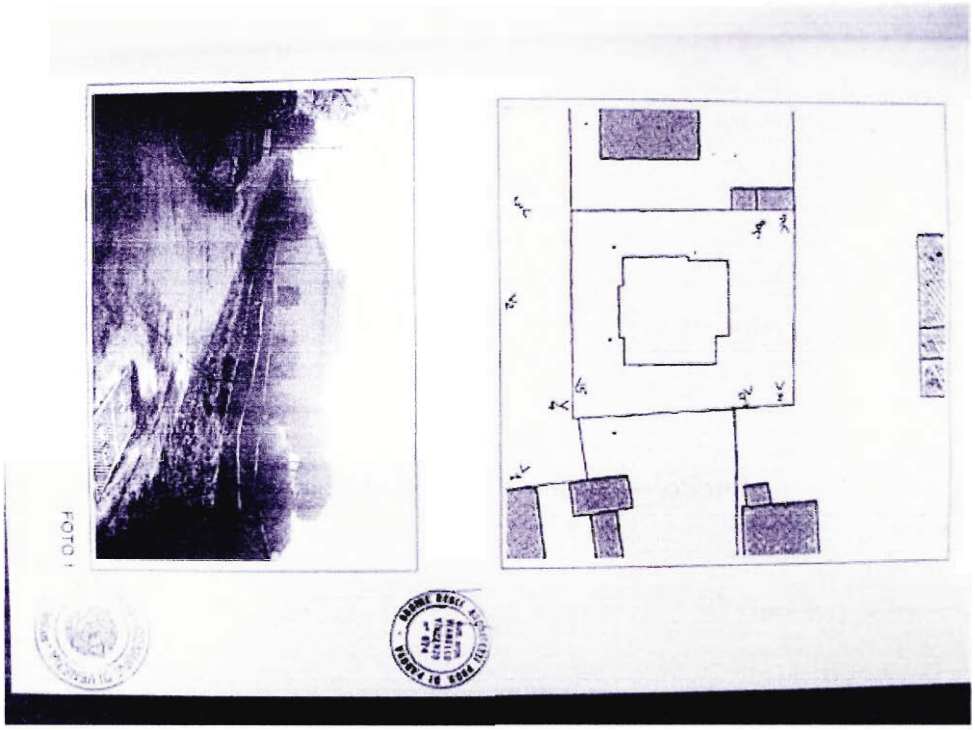
VANO	SUPERFICIE mq	ALTEZZA m	VOLUME mc	SUP. FIN. mq	R.I. mq/mq
ALLOGGIO P. TERRA					
PRANZO SOGGIORNO	27.99	3.00	83.97	5.04	0.68
DISIMPEGNO	3.60	3.00	10.8		
W	3.38	3.00	10.14		
BAGNO	4.16	3.00	12.48		
LETTO	14.80	3.00	44.4	2.00	0.77
LETTO	12.21	3.00	36.63	2.00	0.53
RESIDENZIALE	66.14		198.42		
ALLOGGIO P. PRIMO					
PRANZO SOGGIORNO	41.30	3.00	123.9	7.08	0.69
DISIMPEGNO	6.04	3.00	18.12		
W	5.28	3.00	15.84		
BAGNO	6.51	3.00	19.53		
LETTO	18.54	3.00	55.62	4.45	0.43
LETTO	12.40	3.00	37.2	2.25	0.68
LETTO	9.00	3.00	27.00	1.45	0.83
RESIDENZIALE	96.07		288.21		
TOT. RESID.	162.21		486.63		
ALLOGGIO P. TERRA					
PORTICO	1.98	3.00	5.94		
PORTICO	10.37				
NON RESIDENZIALE	12.35		5.94		
ALLOGGIO P. PRIMO					
GARAGE	17.19	3.00	52.17		
PORTICO	3.66				
PORTICO	7.44				
PORTICO	3.04				
PORTICO	2.50				
TERRAZZA	19.85	2.25	31.65		
TERRAZZO	23.73				
NON RESIDENZIALE	73.76		87.72		
TOT. NON RESID.	86.11		93.66		
TOTALE	248.32		580.29		

DATI URBANISTICI

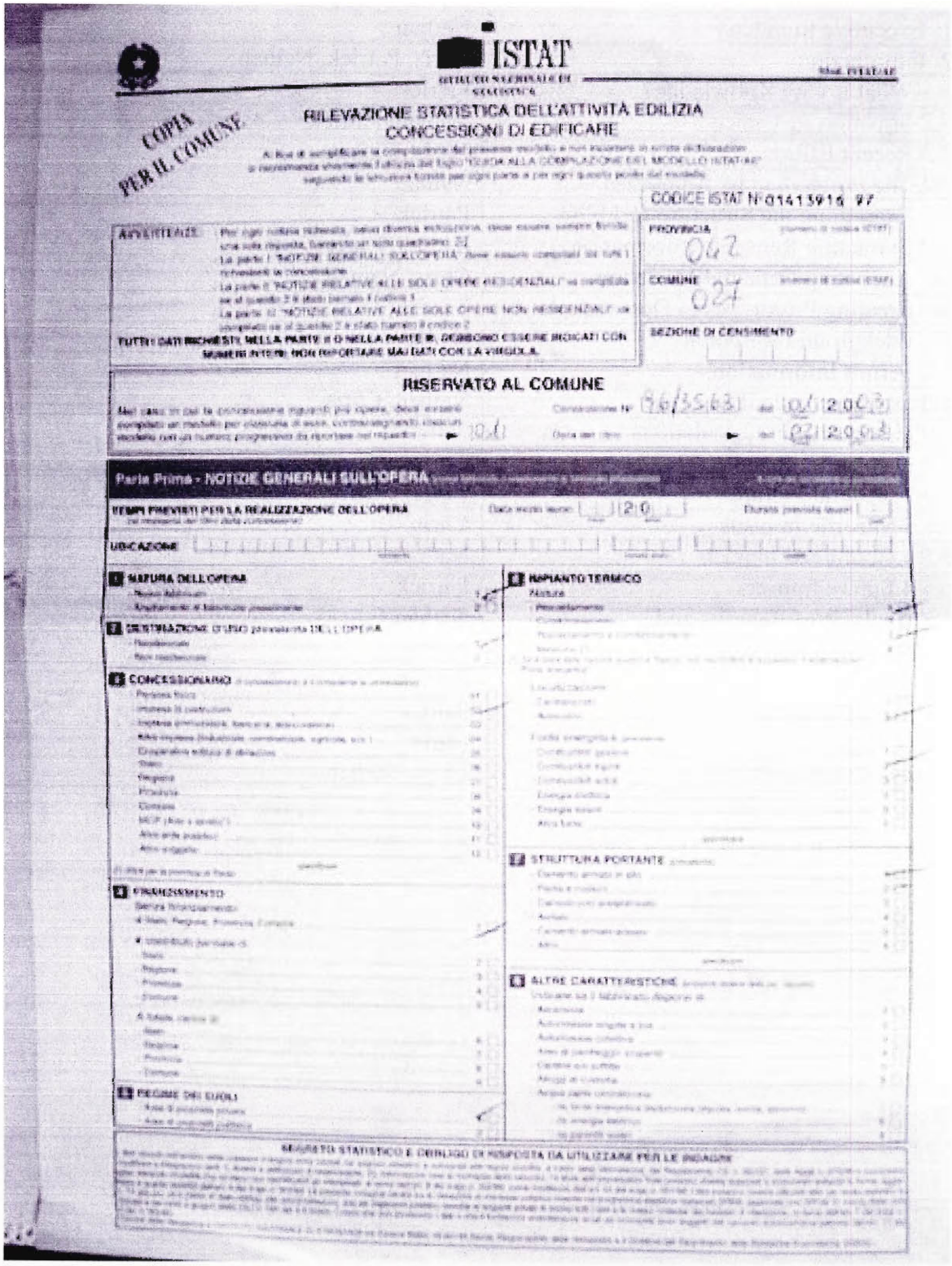
SOTTOZONA B3 DI NUOVA EDIFICAZIONE DI COMPLETAMENTO

SUPERFICIE COPERTA	mq/mq	0.25%
INDICE FONDIARIO	mc/mq	1.50
ALTEZZA	m	6.50
SUPERFICIE LOTTO	mq	527
SUPERFICIE COPERTA DI PIANO (527x0.25)	mq	131.75
SUPERFICIE COPERTA DI PROGETTO		
Piano terra: (11.55x11.30 – 1.50x3.30)	mq	125.56
Piano primo (11.55x11.30 + 0.50x7.00 + 0.50x5.65 – - 3.20x1.50)	mq	132.04
Detrazioni ai sensi della L.R. 30/07/1996 n. 21		
Muri perimetrali (spessore cm. 40)		
Piano terra (11.30+4.50+1.50+7.05+4.60+1.00+1.10+1.80+ +3.30+11.55) x 0.10	mq	4.77
Piano primo (8.35+1.50+3.20+4.60+1.00+1.10+1.80+3.30+ +3.20+0.50+5.65+0.50+3.20+7.00+0.50+4.30) x 0.10	mq	4.97
SUP. COPERTA PIANO TERRA (125.56-4.77)	mq	120.79
SUP. COPERTA PIANO PRIMO (132.04-4.97)	mq	127.07
CALCOLO VOLUME		
VOLUME DI PIANO (527 x 1.5)	mc	790.50
VOLUME DI PROGETTO		
Piano terra 120.79 x (3.50-0.10 detrazione L.R. n 21/96)	mc	410.69
Piano primo 127.07 x 2.70	mc	343.09
Sottotetto 15.80 x 1.65	mc	26.07
TOTALE VOLUME PROGETTO	mc	779.85

Lot Photographs



8.6 ISTAT Form



ISTAT

RILEVAZIONE STATISTICA DELL'ATTIVITÀ EDILIZIA
CONCESSIONI DI EDIFICARE

COPIA PER IL COMUNE

CODICE ISTAT N° 01413916 97

PROVINCIA 042

COMUNE 027

SEZIONE DI CENSIMENTO

RISERVATO AL COMUNE

Parte Prima - NOTIZIE GENERALI SULL'OPERA

TEMPI PREVISTI PER LA REALIZZAZIONE DELL'OPERA

UBICAZIONE

1 NATURA DELL'OPERA

2 DESTINAZIONE

3 CONCESSIONARIO

4 FINANZIAMENTO

5 REGIME DEI SUOLI

6 IMPIANTO TERMICO

7 STRUTTURA PORTANTE

8 ALTRE CARATTERISTICHE

SEGRETO STATISTICO E ORDINE DI RISPOSTA DA UTILIZZARE PER LE INDAGINI

8.7 Authorship Page

Section:	Authored By:
1. Executive Summary	Nathan
2. Introduction	Chris, Patrick, Nathan
3.1 What is City Knowledge?	Patrick
3.2 Situation in Venice	Nathan, Patrick
3.3 Recent Efforts	Chris, Nathan
3.4 The Problem to be Addressed	Nathan
4.1 Examining the Structure and Flow…	Patrick
4.2 Extracting Reusable Information…	Patrick, Chris
4.3 Analyzing Data and Modeling…	Chris, Nathan
4.4 Creating Prototypes to Demonstrate…	Nathan
5.1 Background Research	Nathan
5.2 Permit Information	Nathan
5.3 Database and GIS Layers	Nathan, Chris
5.4 Urban Impact Calculations	Patrick
5.5 Displaying Results	Chris
5.5.1 General Picture	Chris
5.5.2 Specific Impacts	Chris
5.5.3 Combined Impacts	Nathan
5.5.4 Future Impacts	Patrick
6.1 Analysis of Benefits and	Nathan
6.2 Recommendations	Nathan
Field Form	Patrick
Digitizing Permits	Patrick
GIS Layers	Chris
Access Database Work	Chris, Nathan