

Alpine Mountain Huts: A Marketing and Accessibility Plan



An Interactive Qualifying Project
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Technology	JG
Methodology Introduction	All
Inventorying the Rifugi	JG
Documenting Logistical and Geographical Means of Access	RB/AG
Logistics	RB
Geographical	AG
Developing a Marketing Plan for CAI-Venezia	RB
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Organization of Trail Data	AG
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1 Executive Summary

1.1 Introduction and Purpose

Fierce weather and high hiker traffic take their toll on all mountain huts and trails around the world. As tourism increases in the mountains, the paths and huts require more and more maintenance. The number of huts owned by Club Alpino Italiano, the official mountaineering club of Italy, has increased from 476 in 1970, to 765 now. These huts are so important to many excursions, it is the responsibility of any organization with jurisdiction over a set of huts, to keep them well managed and updated.

In Italy, the Dolomites, a section in the eastern Alps, draw thousands of tourists per year. An increase in the tourism in the Alps will naturally increase tourism in the Dolomites. In the Dolomites, the Venice section of CAI, CAI-*Venezia*, owns seven *rifugi* (huts) and 4 *bivacchi* (overnight shelter).

Currently, CAI-*Venezia*'s marketing does not incorporate any English. The marketing the currently exists is sufficient for Italians but does not help English speaking tourist at all. Also the information on each *rifugio* is either incomplete or simply scattered amongst many different sources. Furthermore, the maps currently used for planning excursions in the Dolomites, do not present enough information and can at sometimes, be misleading.

The purpose of this project is to help the *Club Alpino Italiano, Venezia* to better manage its facilities and make them more accessible to a more diversified audience. Thus this project seeks to take advantage of the massive increase in mountain tourism so as to increase usage of mountain huts. We plan on helping CAI-*Venezia* evolve their maintenance plan so that it can be used as a permanent solution for dealing with an ever rising hiker usage.

For our study, we were only concerned with the structures deemed *rifugi*. A *rifugio* is the Italian equivalent of an Alpine/Mountain Hut. Our project was limited to the area of the province of Belluno. It was strictly confined to five of the *rifugi* of CAI-*Venezia* and the paths leading from trailheads. All other shelters and trails were noted for reference. Our time scale began on June 20th, because the *rifugi* did not open until 19 days after the project began.

1.2 Methodology

Successfully inventorying the *rifugi* was a crucial step in determining CAI-*Venezia*'s maintenance requirements for each *rifugio*, as well as providing important information for tourists to plan their trips into the Dolomites.

Rifugio infrastructure was dealt with first upon reaching the establishment because the methodology for this part of the objective required us to search outside, thus we needed sunlight. We reached the *rifugi* in the late afternoon and immediately explored the surrounding area with our digital camera and maintenance field form. Upon reaching the systems listed on the form, we photo documented the units and recorded basic information on their condition. The photo documentation is crucial because

there needs to be a simple way for the unit to be identified if it is going to be evaluated later for maintenance purposes. After we had obtained the visual data on the infrastructure, we used the field form to aid in interviewing the *rifugio* owners about how well the systems were functioning. Once the data gathering had been completed, the images were uploaded from the video camera and properly organized.

Accurate information regarding the *rifugio* amenities could only be obtained at the huts themselves. The on site data gathering started after the infrastructure protocol had been completed. The amenities were commonly found inside the *rifugi*, so it was necessary to do while there was daylight. The methodology for this process was similar to the infrastructure documentation except that the specific written information we were trying to obtain was concerned more with whether or not the amenity existed. After the information gathered from the field forms was completed, transferring the information to electronic databases began. The first step was to copy all of the hand written notes from within the field forms into electronic versions. From these forms, two databases were created in *Microsoft Access*; one on the amenities and one on the maintenance.

The database for the maintenance was originally created with the intention of being a tool for CAI-*Venezia* to create a scheduled maintenance plan. However, all maintenance is handled on a case-by-case bases and this is how our sponsors wish to keep it for logical reasons based mainly on the unpredictability of mountain conditions. Since the goal of our database changed to being a record of the ages and capacities of the units, we simply used instillation dates and capacity as our fields which lied underneath five separate systems; cablelift, septic, PV, Generators, and water connections. Every system and their fields corresponded to its respective *rifugio*.

The database for the amenities needed to be very simply created so that it could be used for a text dump into *MySQL*. The *MySQL* database will eventually be used to power the new CAI-*Venezia* website. Preparing an efficient database for this text dump required us to simply create one large table encompassing all possible fields related to the *rifugi*. There were 7 records, one for each individual *rifugio* under CAI-*Venezia*'s control. The amenities database was eventually expanded into a *rifugi* database which had more information on the *rifugi* then just the amenities. The new database includes contact information, access and trail information, and a section regarding general information about the *rifugi* and their surroundings.

Our methods for finding means of transport to the Dolomites were based on three sources. The first, and primary was the internet. Since most of our methods had online sites, we were able to obtain the most information from it. Our second source was our sponsors at CAI-*Venezia*. We were able to obtain the specific routes necessary to our work in the mountains. Finally, we used maps as a final step in the trip planning process.

Most trail maps are merely paper with lines, and do not offer the hiker an opportunity to view what he or she may encounter. In order to boost the hiker's ability to better plan an excursion a interactive system that shows content and difficulty in a more in-depth way would be beneficial. To achieve this, we came up with a rating system. We defined three ratings systems which we documented. These three new ratings

were based on the terrain type, exposure factor, as well as the general difficulty due to the grade of the terrain. Because of the expanding market facing CAI-Venezia, we looked toward implementing a marketing plan that tailors outside of the organization's traditional market. This effort is a two-fold plan involving an English website and a pamphlet.

Using the structure of the existing website along with existing and new trail information, we published an English website. It included edits of existing information and added sections. The translation and publication of the website also included database work both in Access and MySQL.

The pamphlet used much of the same information found on the website, it however was published in paper format. Using an existing pamphlet, a template was designed with visual appeal and ease of use in mind.

Tabacco maps, scaled at 1:25000, have contour lines, trail routes and indicate, to some degree, terrain. To the inexperienced hiker, Tabacco maps fall short. With the necessity of more complex maps, it will simplify trip planning for anyone interested in the area. In order to create a better mapping system we recorded the significance of the waypoints and generated a labeling system for each point. We used this additional information to make the Tabacco maps interactive.

Using schedules and our data, we designed Trenotrekking itineraries. The idea behind the Trenotrekking was to offer service to those on a limited schedule. Starting with a basic outline including departure point and destination, itineraries used schedules and maps to plan trips.

1.3 Results

Using our resources we found two main methods of getting to the Dolomites, and one to get around the Dolomites. For getting to the Dolomites, the services offered were ATVO SpA and Trenitalia. Both offered daily service during the entire time and prices ranged from €5.60 to €10.60. For getting around the Dolomites, the primary service was DolomitiBus with prices ranging from €1.00 to €3.50. For the trail routes, we consulted our sponsors and maps. Popular routes were determined for the five rifugi in our research and these paths were taken.

Concentrating on the information necessary to travelers and hikers, sections of the website were not translated to English. Modifying some sections of the Italian site, the English version website will only have five pages, compared to the nine Italian sites. The rifugio sections will have modifications including three sections, "Reservations", "Amenities" and "Access Routes" that will have a large amount of information added. Results exist similarly to the methodology in that there was a two-step process through changes and translation. The home page was also modified and sections cut out that did not pertain to non-members.

The pamphlet had several changes including the creation of a symbological "Amenities" section. Also, "Access routes" was added including a map. Other additions included new photos and a section named "Directions for reservations. On the back included directions from Venice with a schematic map.

Using mapping and trip planning, we have created systems where either the hiker or CAI-Venezia may take an active role in planning excursions. With an interactive map, we are making it possible

for people to find exact information on a trail and with Trenotrekking as a type of planning, CAI-Venezia will be able to book large scale groups that may not know of the opportunities of excursions.

Using a series of rating systems, we were able to devise a notation for each section of trail that was colored and shaped according to these systems. The idea behind this rating system is to give the hikers a better idea of what they can plan to encounter. This new system improves upon the Tabacco map, while still utilizing the beneficial data it contains. This new system is a series of map layers, each contain important data about what the hiker will be encountering on the trail.

A finalized Trenotrekking itinerary was completed with advertisement for Rifugio Vandelli. It includes the schedule and cost. Further analysis can be found in the section following it including all of the costs for the sample trip with inclusions and exclusions.

1.3.1 Conclusions

Club Alpino Italiano's case by case method of maintaining their facilities has been concluded as an entirely sufficient process for fulfilling maintenance needs. Given that conditions in the Dolomites are unpredictable, units or structures can not be accurately prioritized for scheduled maintenance.

After investigation of the trail mapping system, we have found the current Tabacco maps are sufficient for the experienced hikers. They are familiar enough with reading maps to be able to interpret the information the Tabacco Maps contain. Inexperienced hikers however, are not as familiar with being able to read terrain and it is more difficult for them.

We found that the current CAI-Venezia website does not contain enough information to tailor to non-Italian speakers. Additionally, information that is necessary to website users was incomplete. Organization of the website is excellent, continued use of database backed PHP will be sufficient. Other than content, the MySQL database needs no changes.

No quick reference trail guides existed. Previous to this were Italian language trail guides which had complete information and recommendations. Much of the information it contained was useful for trip planning and English implementation.

The existing pamphlet for Chiggiato was excellent as a guide for a template pamphlet. It was missing some information that a newer version could give it. All other rifugi did not have any published material except for a small card for Rifugio Vandelli.

Trenotrekking existed from the larger cities of Italy, but because of its proximity to the mountains, Venice did not have tailored itineraries for hiking excursions.

1.4 Recommendations

- **CAI Venezia should not pursue a maintenance plan**
- **Organize and store installation dates and system specs**

Thus, the recommendation for this case is to not pursue efforts into a maintenance plan. However, it is recommended that CAI-*Venezia* organize and store the installation dates and system specs of each of the larger units into a database for quick and easy reference to a unit's age or capacity.

- **Maps created should contribute to the creation of a Sentieri-Web**

The hybrid maps created from this project should be used to develop a Sentieri Web that makes information more easily interpreted by those whom lack the experience.

- **Publish English Version Website**

Publishing the website within the next 15-30 days is extremely feasible. The information requires translation and input into the MySQL database.

- **Complete Quick Reference Trail Guide**

The prototype trail guide does not contain all the necessary information. Distances were estimated along with times and elevation change. Sectioning using an alternative system would also need to be incorporated into the guide. Additionally, because of the nature of this project, possibilities for trail guides would need to find a limit.

- **Publish Rifugio Chiggiato, Rifugio Venezia and Rifugio San Marco Pamphlets**

With all the necessary information, these three pamphlets are at publication stage. Some information needs to be verified by experts or editors. Also, research into copyrights pertaining to Tabacco maps needs to be completed. Photographs contained in the pamphlets belong entirely to CAI-Venezia and WPI.

- **Complete Pamphlets for Rifugio Coldai and Rifugio Vandelli**

Using the template, existing photographs and other information, creating a pamphlet for these rifugi would be quite simple. In "Rifugi: Cento Anni di CAI: Sezione di Venezia" and translating it, all of the necessary information is given for publication.

- **Continue marketing to Remaining Rifugi and Bivacchi**

Based on the methodology behind the pamphlets and trail guides, this work should be continued by a subsequent project.

- **Translate English Pamphlets to Italian**

Because the information for the English pamphlets was drawn partially from Italian sources, creating pamphlets tailoring to Italian speakers would add a great amount of interest to the hikers market.

- **Implement Trenotrekking including further Cost Analysis**

With reduced costs to hikers, planned excursions may be of great use to people who have a limited schedule. Because of the existence of the Vandelli excursion, this should be implemented, perhaps with cost modified through analysis.

- **Research other Trenotrekking excursions**

Using the Vandelli excursion as a guide, other excursions can be created using a similar methodology with cost analysis. This is possible with all of the rifugi and some of the bivacchi.

- **Research the feasibility of ATVO-Trekking excursions**

Because Trenitalia is not the only means of transport to the mountains, services may be arranged with ATVO SPA for excursions around the Valle d'Ampezzano and Cortina d'Ampezzo.

2 Introduction

Fierce weather and high hiker traffic take their toll on all mountain huts and trails around the world. As tourism increases in the mountains, the paths and huts require more and more maintenance.

As shown in Figure 1, hiking has increased a great deal since the 1920s. It is common for people to utilize these huts as a place to sleep at night and to get food and water. Especially since interest in hiking has increased, the number of properties owned by Club Alpino Italiano, CAI, has increased. In the 1970s, there were only 476 huts owned.¹ Since then, CAI now owns 765.² These huts are so important to many excursions, it is the responsibility of any organization with jurisdiction over a set of

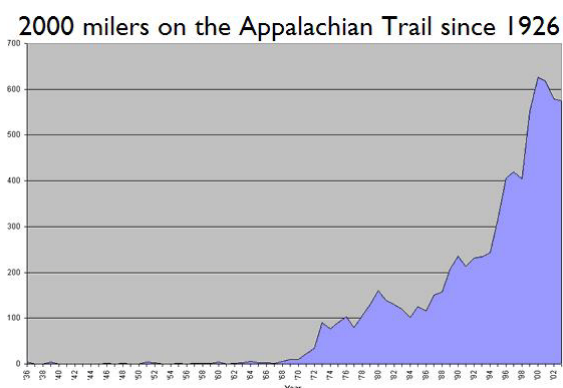


Figure 1: Increase of hikers on the AT

huts, to keep them well managed and updated. The mountains are becoming more of a tourist attraction to a wider range of people and thus it is not just trained professionals taking on the mountains, but inexperienced novices as well. It is imperative that people have access to all of the proper information related to hiking and climbing. It is not unusual for people to travel outside of their cultures so the information that is provided to them needs to be translated into a language that they understand.

The Alps are a wide mountain chain that encompasses multiple countries. In Italy, the Dolomites, a section in the eastern Alps, draw thousands of tourists per year. An increase in the tourism in the Alps will naturally increase tourism in the Dolomites. As tourism increases, hiking increases and the necessity for refuge came to be. The Club Alpino Italiano, CAI, is an organization that was founded to tailor to hikers across Italy. Its founding ideal was to provide food and shelter to its members. It also provides communication for its members to have excursions into the mountains. In the Dolomites, the Venice section of CAI owns seven *rifugi* (huts) and 4 *bivacchi* (overnight shelter).

The CAI Venezia currently handles the *rifugi*'s maintenance and sites information. The "status quo" is that the huts need to be in operating condition. Our goal is to help the CAI improve the efficiency with which they manage their assets. No other studies have been completed about this specific project. There is currently no English version of the CAI-Venezia website, no database on each individual *rifugio*, and no GPS data for trails. Finally, the information for traveling to the *rifugio* is insufficient.

Any mountain huts have the necessity to be maintained and CAI-Venezia has no choice about this issue. However, doing repairs and maintenance on a case-by-case basis, may not be the most efficient process. Maintenance is done in a parallel way in the United States by the Appalachian Mountain Club. Learning about parallels may be useful to the CAI.

¹ Rudner, Ruth. Huts and Hikes in the Dolomites. Sierra Club, San Francisco, 1974

² I numeri del CAI. Club Alpino Italiano. URL: <http://www.cai.it/centrali/numeri.jsp>

The CAI-Venezia does maintenance over the season, but it is assumed that a permanent system is not in place. CAI-Venezia does their work when necessary, but it may be a maintenance calendar does not exist. Specific statistics for the amount of people who go to these huts exists, but nothing references them. Because this project has just begun, there has been no previous work to try to implement any specific systems.

To fill any possible gaps in CAI-Venezia's practice we intend to compile a database containing pertinent information regarding the condition of its huts. We can collect information by visiting each of the huts and assessing the damage and usage. We will also dig deep into the archives available to us which contain past information on the huts' upkeep. Such investigation may lead to greater efficiency in maintaining the facilities. Furthermore, we plan to provide tourists with all of the information that one would require to access the huts. We will partially achieve this modification by translating the information provided by the CAI-Venezia's website into English. In addition, we will gather way-points to produce better orientation along the paths connecting the huts. We will then follow up with into the regional transportation infrastructure. We will evaluate and catalog means of transport by personally utilizing the public transportation services.

3 Background

3.1 History

3.1.1 European and Alpine Tourism

Europe and the Alps have long time been a tourist haven. In 2002, it is estimated that 400 million visited Europe, many of whom visited countries in and around the Alps.³ Today, Europe is tailoring to a larger, more diverse tourist pool. Traditionally, tourists would be Caucasian and either European or American. Most recently, because of the recovering Asian economy, there has been an influx of Chinese and Japanese tourists since 2003.⁴ With globalization continuing and a stronger worldwide economy, tourism will be on the continual upswing.



Figure 2: Europe and Alps

The Alps, especially since the 19th century have become a haven for relaxation and recreation. Many places in the Alps are visible worldwide today. St. Moritz, Zurich and Luzerne are all locations are people are familiar with, all routed from tourism that spread worldwide. Compared to its population of 13 million, the Alps see over 100 million tourists annually, leaving a huge mark on the economy.⁵

³ World Tourism Organization: International Tourist Arrivals, 2002

⁴ Ibid

⁵ Fairbairn, Helen. Walking in the Alps, 1st Ed. (Oakland, CA 2004) p.40

In the southeastern section of the Alps lie the Dolomites. This chain is set in three Italian regions, Trentino Alto-Adige, the Veneto and Friuli-Venezia-Giulia. The Dolomites gained their name from the Frenchman Deodat de Dolomieu, who was the first to describe the limestone rocks in the late 1700s. The appeal of the area is the pristine mountain landscapes. Because of the limestone, the formations of the mountains are unique to few areas, including the Dolomites.



Figure 3: Map of Alps

3.1.2 Hiking and Mountaineering

Along with baseball and many recreational sports, hiking had its roots in the 1800s. Hiking had its first boost in England, a country just through the Industrial Revolution. As a country with few distinguishing mountains, the first chain that was brought to their attention was the Alps, a short distance away on the continent. With developments in a continental railroad, the trails became accessible to anyone who could get to them. The Swiss, accustomed to their terrain had been hiking as a primary method of transportation for centuries, but this was the first point when it became recreational.

The first development of trails in the Alps came from utilitarian trails, used for mules, horses and oxen. Beginning in the mid-1800s, Alpinists as they came to be known began to hike in droves. They were primarily wealthy young Englishmen who came down to hike an unclimbed summit. This period in the 1850s was called the “Golden Age” of mountaineering.⁶ For the masses, such trips were still beyond their means. Such trips were expensive because many of them had to be customized for the hiker. Additionally, there were few centralized groups from which excursions could be planned. In this same period, organizations tailoring to hikers, mountain clubs, were founded. Small chapters and national organizations began to plan large group excursions.

Popularity gained slowly until the 1930s, and following World War II, trails began appearing daily. With continually prosperous economies, more and more people were able to hike. In Europe, many of the hiking clubs took the responsibility of trailblazing. Each organization would take an area and begin to cut trails through.

⁶ Fairbairn 21-22



Figure 4: North Face of Eiger

Independent from the ideals of hiking, mountaineering became a much riskier sport. Unlike its tame counterpart, mountaineering has a traceable birth. It began in 1786, with the ascent of Mont Blanc, by Balmat and Paccard. Equipment of the time was far from it is today. Leather and wool were the most common, however were not waterproof in the least. Improvements in shoes and climbing equipment led to more ambitious treks and more ambitious mountaineers. By 1938, an expedition of the North Face of Eiger, in Switzerland was completed. This was seen as one of the Alps' hardest because of its 1300m, nearly vertical ascent.⁷

The Alps became proving grounds for mountaineers through the 1940s. Many trained for expeditions in the Himalayas. Seeking to conquer the world's 8000 meter mountains, many of the mountaineering techniques learned in the Alps were applied in the Himalayas. In 1953, Mount Everest was climbed by Edmund Hillary and Tenzing Norgay and K2 was climbed by 1954. Mountaineering spread worldwide, outside of Eurasia and the world's seven largest peaks were finally conquered in 1966 with the ascent of Vinson Massif on Antarctica.⁸

The Dolomites have not always been under the reign of Italy. Before World War I, much of the Dolomites were controlled by Austria and German speaking. Much of the region is bilingual, including areas which speak a third language, Ladin. The language is a fusion of Latin with the native language of years past. Although, the language is slowly falling out of practice for the more popular Italian, it is not uncommon to see signs marked bilingually.

⁷ Ibid

⁸ Ibid

With the onset of World War I, Austria found itself too overextended for a two front war. With all the troops in Russia, Austria chose to withdraw troops from the mountains and defend a more northern border. Towns in the western Dolomites were claimed by Italy including Bolzano, Bozen in German, and Cortina d'Ampezzo.⁹ Because of the hotbed of activity in the Dolomites during World War I, hiking had a special birth. Many of the modern trails were used as supply routes during wartimes. An important aspect of the Dolomites that was added because of World War I was the Vie Ferrate.

Via Ferrata, or literally translated to “Iron Way”, were established as a system to aid alpine troops during World War I. Using handrails, wire cables and ladders, today they assist hikers along trails that would have been exclusive to seasoned mountaineers. Most are simple enough to require no special equipment outside of rope and carabineers. They became popularized in the 1930s and are unique to the area. Proper equipment for using the more stringent vie ferrate include a harness, helmet and gloves as shown in Figure 5. To most hikers who choose to visit the Dolomites, conquering a via ferrata is an achievement in itself and essential to a trip. During the 1930s, Club Alpino Italiano, along with Società Alpinistica Trentina, began building more vie ferrate due to increased demand.¹⁰ Club Alpino Italiano continues today to be an important organization for the region and its hikers.



Figure 5: Via Ferrata

3.1.3 Club Alpino Italiano

The Club Alpino Italiano, or Italian Alpine Club in English, was founded amidst the golden age of mountaineering. Founded on October 23, 1863 in Turin¹¹, the hope was to organize excursions for its members. Only in the past few years had other countries established hiking clubs. England and Austria founded them a year before Italy and Switzerland only a few months earlier. Over the years, their primary goal was to promote hiking and mountaineering in addition to taking care of the hikers themselves. This was done with rifugi, bivacchi and trail maintenance.

Today, CAI has over 304,000 members throughout Italy. Under its central headquarters, still in Turin, there are 480 sections interspersed throughout the country, with an additional 320 subsections. Included, there are also groups with special interests. These include groups that promote Alpine education, such as the Club Alpino Academico Italiano.¹² One section of recognition is the section in the city of Venice.

⁹ Stedman, Harry. *Trekking in the Dolomites*. Trailblazer Publications: London, 2001. 37

¹⁰ Ibid

¹¹ Il CAI. Club Alpino Italiano. www.cai.it/centralia/storia.

¹² Sez. C.A.A.I. Club Alpino Italiano http://www.cai.it/periferici/hp_sezione.jsp



Figure 6: Rifugio San Marco

tear is generated from the number of hikers that come through and use the facilities. It follows the general rule that the more people that use something, the quicker it is going to break. The larger the facility, the more expensive the maintenance is; as well as the more amenities that are offered, the more repair costs associated with them.

The most effective way to track the maintenance costs is with a database. A database is the most effective way to track amount of money spent to maintain the upkeep. Another important item to note is the frequency of the operation. This information helps the owners of the facilities to analyze the situation and generate the most cost effective plan. In some cases if there is a point where something can be repaired before it has gone to the point of breaking, it generally is much cheaper to fix. It also helps to be able to plan budget wise to know when something is about due for repairs, which minimizes downtime. Through skillful data basing practices maintenance can be optimized.

CAI-Venezia was founded in 1893 and stands as one of CAI's oldest sections. Today it has over 1300 members.¹³ Centered in Cannaregio, the section tailors to citizens who opt to hike in the Veneto. The section maintains seven rifugi including Rifugio San Marco pictured in Figure 6 and four bivacchi.

3.2 Maintenance

In order to keep the lodges and trails in the prime condition, regular maintenance must be performed in order to keep them in the best working condition.

The most conceivable source of wear and



Figure 7: Rifugio San Marco 2

¹³ Quanti Siamo. Club Alpino Italiano, Sezione di Venezia. http://www.caivenezia.it/01_lasezione_04_chisiamo.php

3.3 Hiking and mountaineering technology



Figure 8: TorsoLite Inflatable Sleeping Pad

people taking on the mountains.

Global Positioning System (GPS) has been a remarkable asset to the hiking community. It allows people to know their exact location on the globe and find the precise direction to any position marked by a way-point. Global Positioning System satellites transmit signals to equipment on the ground. GPS receivers passively receive satellite signals, but they do not transmit them. GPS receivers need an unobstructed view of the sky. For this reason they are used only outdoors and they often do not perform well within forested areas or near tall buildings.

There are at least 24 running GPS satellites at all times. The satellites orbit with a period of 12 hours. Ground stations are used to accurately track each satellite's orbit. The precision of a position determined with GPS depends on the type of receiver. Most hand-held GPS units have about 10-20 meter precision. Other types of receivers use a method called Differential GPS (DGPS) to obtain a greater accuracy. DGPS requires an additional receiver fixed at a known position nearby. Observations made by the stationary receiver are used to correct positions recorded by the roaming units, producing an accuracy greater than 1 meter.

When the system was created, timing errors were inserted into GPS transmissions to limit the accuracy of non-military GPS receivers to around 100 meters. This part of GPS operations, called Selective Availability, was done away with in May 2000.¹⁴

The massive increase of interest in hiking has brought with it a pool of technological innovations in both hiker equipment and mountain huts. Some of the advances in equipment include inflatable foam beddings, hybrid climbing sneakers, and computerized orientation devices. These new technologies add to the safety and comfort of hiking and can instill confidence into less experienced hikers, leading to a greater number of



Figure 9: The Frixion

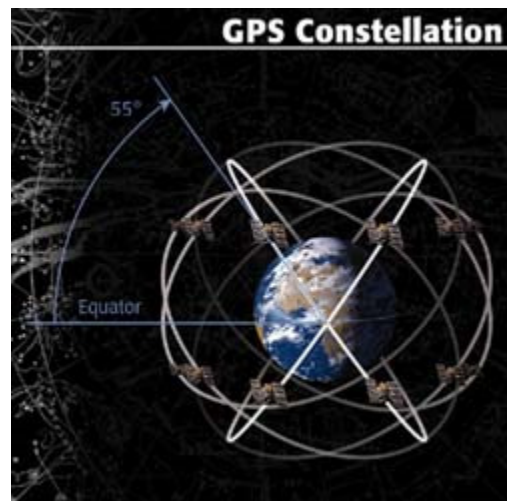


Figure 10: GPS Constellation

¹⁴ <http://www.nasm.si.edu/exhibitions/gps/work.html>

3.3.1 Huts

It can be speculated that if improvements in hiking equipment are being made then improvements in the huts will also be made, and this is exactly the case. Huts now offer a wide range of comforts to hikers; Full dining facilities, electricity, and even hot water. One of the most remarkable

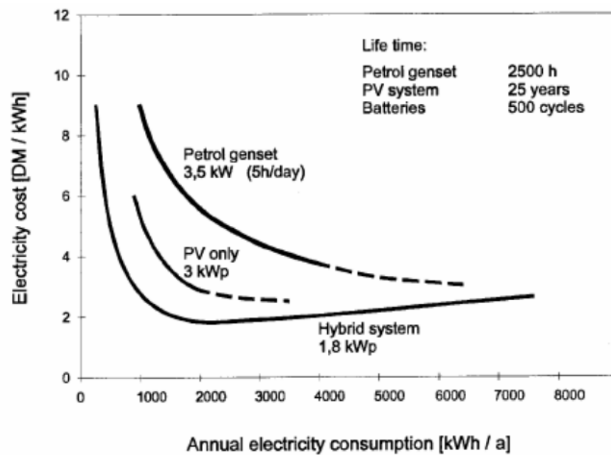


Figure 11: Alternative Energy Sources

enhancements of the huts is their utilization of renewable energy sources for electricity. In many cases, sunlight is harnessed and used as the primary source of power for the huts. In other cases, the huts are run off of strictly diesel generators, but now there are also many huts running off of hybrid PV (Photovoltaic)-diesel configurations. In the Alps, more than 30 PV-diesel hybrid systems have been set up to power alpine-huts very reliably. Figure 11 shows how research proves that huts benefit financially from using the hybrid systems over the two energy sources on their own.

4 Methodology

The purpose of this project is to help the *Club Alpino Italiano, Venezia* to better manage its facilities and make them more accessible to a more diversified audience. Thus this project seeks to take advantage of the massive increase in mountain tourism so as to increase usage of mountain huts. We plan on helping CAI-*Venezia* evolve their maintenance plan so that it can be used as a permanent solution for dealing with an ever rising hiker usage. The primary objectives of our mission were:

- To inventory assets of CAI-Venezia
- To document logistical and geographical means of access
- To expand the marketing plan of CAI-Venezia
- To determine maintenance needs
- To supply methods by which trips are planned

For our study, we were only concerned with the structures deemed *rifugi*. A *rifugio* is the Italian equivalent of an Alpine/Mountain Hut. *Rifugi* differ immensely by the types of amenities that they offer. A standard feature is the provision of sleeping quarters, which usually consists of a bed with blankets. All *rifugi* offer hot meals depending on available supplies.

Our project is limited to the area of the province of Belluno. It will be strictly confined to five of the *rifugi* of CAI-*Venezia* and the paths leading from trailheads. These trailheads were easily accessed through methods of public transportation. All other shelters and trails will be noted for reference.

Our time scale began on June 20th, because the *rifugi* did not open until 19 days after the project began. Therefore, all on-site data was gathered within a five-week period.

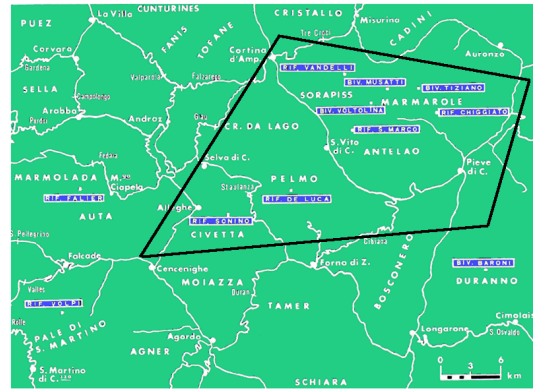


Figure 12: Area of Study

4.1 Inventorying the Rifugi

Successfully completing the objective, inventorying the *rifugi*, was a crucial step in determining CAI-*Venezia*'s maintenance requirements for each *rifugio*, as well as providing important information for tourists to plan their trips into the Dolomites. The primary goal of this objective is to take information that is scattered about, and put it into organized database format.

4.1.1 Documenting Rifugio Infrastructure

The documentation of the *Rifugio* infrastructure included data collected while in Venice as well as data collected at the *rifugi*. The components of the *rifugio* infrastructure that were of concern to our project were all located on the outside of the *rifugi*, not necessarily connected to the building, but at least in its general vicinity. For example, the PV units were connected to the buildings, but the cable lifts were at least 30 meters from the establishments.

All units were documented by photos, non-specific notation (basically the visual condition or other notable aspects), logistical information based on the unit's performance, and specific data on each systems maintenance/upgrade history and/or future. All types of data collected in this part of our objective were aimed at providing a way for CAI-*Venezia* to organize their maintenance records. The *rifugi* are constantly undergoing new projects and CAI-*Venezia* would benefit greatly from being able to efficiently access and record this information.

This data is well documented in two main sources; records located in the secretary's office and on a CD provided for us by CAI-*Venezia*. Appendix VII provides an example of the performance specs found on this CD. The on site data was mainly for visual reference to the system and non-specific notations.

Rifugio infrastructure was dealt with first upon reaching the establishment because the methodology for this part of the objective required us to search outside, thus we needed sunlight. We reached the *rifugi* in the late afternoon and immediately explored the surrounding area with our digital camera and maintenance field form, seen in Appendix I, a. Upon reaching the systems listed on the form,

we photo documented the units and recorded basic information on their condition. The photo documentation is crucial because there needs to be a simple way for the unit to be identified if it is going to be evaluated later for maintenance purposes. There was no real defined method for the photo documentation, aside from the necessity of capturing the entire unit in one image so that it would be easily recognizable to any persons trying to distinguish it. After we had obtained the visual data on the infrastructure, we used the field form to aid in interviewing the *rifugio* owners about how well the systems were functioning. Once the data gathering had been completed, the images were uploaded from the video camera and properly organized. The label formatting looked as follows, (*RifugioName-UnitName-UnitPictureNumber*).

4.1.2 Documenting *Rifugio* Amenities

Accurate information regarding the *rifugio* amenities could only be obtained at the huts themselves. We located all necessary information inside or around the outside of the *rifugio*. Locations included several different areas; stand up shower/toilettes were found mainly out back of the *rifugi*, and most *bivacchi* were found underneath the *rifugio* deck.

The types of data that were collected for this part of the objective fell mainly into logistical data, basic (yes/no) response to if the actual amenity existed, and photo documentation. The (yes/no) data was collected so that persons could make simple searches into a dense database and quickly find whether or not the desired amenity exists at any specific *rifugio*. The logistical and photographic data is collected for the more curious persons. For example, tourists would be especially interested in specifics. All types of data were found in a couple of ways. The information is documented on several websites, but as stated before, the only way to be confident about the validity of the data is to visit the establishments, speak with the owners and view the amenities for ourselves.

Data collected prior to visiting the *rifugi* was extracted from two websites and a CD produced from CAI-*Venezia*'s internal archives. The two websites just referenced were, www.altaquota.com and www.ciavenezia.it, the latter being the official website of our sponsors. The information on both of these websites had some, data that were inaccurate, outdated, or incomplete. For the reasons just stated, most of this data was used in the preparation of our field forms, Appendix I. The data utilized from the CD consisted of accurate floor plans of each *rifugio*. Examples of these floor plans can be viewed in Appendix V.

All on site data were collected during the time periods represented in Appendix VI. These data were our most reliable source, due to the fact that we had direct contact with the amenities. The information gathered on site is the actual data that we put into our databases and later analyzed.

The on site data gathering started after the infrastructure protocol had been completed. The amenities were commonly found inside the *rifugi*, so it was necessary to do while there was daylight. The methodology for this process was similar to the infrastructure documentation except that the specific written information we were trying to obtain was concerned more with whether or not the amenity

existed. If the amenity was found to be available, the logistics were thoroughly noted. Photo documentation was taken with an attempt to portray the best elements of the *rifugi*. The method of labeling the pictures was done in the same fashion as those labeled during the infrastructure process, because one of our goals was to help market the *rifugi*. While on our survey of the *rifugio* amenities, we continuously compiled a list of questions for the *rifugio* owner. The answers to these questions were recorded in the field form's "additional notes" section.

4.1.3 Creating Amenities and Maintenance Databases

After the information gathered from the field forms was completed, transferring the information to electronic databases began. The first step was to copy all of the hand written notes from within the field forms into electronic versions. The field forms were created in *Microsoft Excel*, so the information was simply typed back into the blank field form in *Excel* and then the resaved with correct *Rifugio* name in the heading. From these forms, two databases were created in *Microsoft Access*; one on the amenities and one on the maintenance.

The database for the maintenance was originally created with the intention of being a tool for CAI-*Venezia*, but later in the project we learnt that CAI-*Venezia* has no need for a tool such as a maintenance database. All maintenance is handled on a case-by-case bases and this is how our sponsors wish to keep it. After learning this information, the purpose for our database changed greatly and so did the fields in the database. The break down of the database is as follows; a switchboard asking for read-only or editable information, a switchboard asking for which *rifugio* record, and finally an interface asking which system to travel to on the form. Each system was stored as a sub-form and was positioned on its own tab. Since the goal of our database changed to being a record of the ages and capacities of the units, we simply used instillation dates and capacity as our fields under each tab. An additional tab, "to do list" is formatted as a sub-datasheet so that it can contain its own records. This is necessary because projects are proposed and completed continuously and it is important to be able to record all of these projects permanently, thus the "to do list" is always expanding.

The *rifugio* database was originally set up so that the switchboards and form structure were identical to the maintenance's. However, this structure hindered our ability to meet our project objectives. The database needed to be very simply created so that it could be used for a text dump into *MySQL*. The *MySQL* database will eventually be used to power the new CAI-*Venezia* website. Preparing an efficient database for this text dump required us to simply create one large table encompassing all possible fields related to the *rifugi*. There were 11 records, one for each individual *rifugio* and *bivacchi* under CAI-*Venezia*'s control.

4.1.4 Converting from .xls to .mdb

Crucial to our project is the transfer of our collected data into *Access* tables. As described above, we created database tables that reflected our field forms so that the information could be easily entered into the correct fields and stored appropriately. There was no real electronic translation of data during this process. The methodology was completely physical. The data was read from the field forms, one field at a time, and then typed into the corresponding field in the database. Appendix VIII displays completed versions of all of the electronic field forms for each *rifugio*. Appendix IX shows the tables in *Access* after the data had been transferred over.

4.2 Documenting Logistical and Geographical Means of Access

An objective of high importance, documenting means of access allowed for us to further our data collection. Data collected as part of this objective also contributed directly to supplying trip planning.

4.2.1 Logistics

With our area of study approximately 200 kilometers from our home base of Venice, it was imperative to find the best means of transportation. Much information exists, however, only part of it is relevant enough to include. With resources at hand, we decided three methods to ascertain the information. These included the internet, contacts at CAI-Venezia, and maps available to us.

Using the internet, we were able to gather enough information that we could determine the best ways of getting to our area of study. After determining our departure point in the mountains, we researched what means would get us to the location.

Another resource was our sponsors at CAI-Venezia. Having made many trips to the mountains for various excursions, we believed that information gathered from them was useful. Using weekly meetings with the vice president, we were able to determine the exact route and itinerary of our excursion.

Lastly, after purchasing maps of the area of study, we determined where to depart from and what routes to take. Using the legend and prior knowledge of hiking, we decided on routes that were not of extreme difficulty or routes that required special equipment.

4.2.2 Geographical

Trail maps are wonderful tools for planning excursions with. However, most trail maps are merely paper with lines, and do not offer the hiker an opportunity to view what he or she may encounter. In order to boost the hiker's ability to better plan an excursion a interactive system that shows content and difficulty in a more in-depth way would be beneficial. To solve this problem we traveled to the Southeastern Dolomite region to gather our data.

4.2.3 Collecting Waypoints

As we have traveled along the trails to the *rifugi* we have recorded waypoints which correspond to points of interest. Originally we recorded points of interest which we considered to be important to a hiker such as panoramas, water sources, trailhead, trail junctions and other points of interest using a *Garmin Etrex* GPS device. When we took a waypoint utilizing GPS we used a digital camera to take pictures of the objective. After taking the picture we recorded the number the GPS designates to the waypoint and recorded observations about the waypoint that will be later used in the interactive program. In addition to the points of interest we are have also documented the type of terrain along the trail, and delegated a classification to it. These classifications are Switch Backs, Steep Grade, Scramble, Via Ferrata and Normal Terrain. Each of these classifications is defined. Documentation is similar to the points of interest. We took pictures of the terrain and have recorded them according to the classification of terrain type specified above.

We realized that this classification is an insufficient means to use as a system. In order to create the most beneficial system to anyone who would use it, we came up with a different rating system. We defined three new ratings systems which we documented. These three new ratings were based on the terrain type, exposure factor, as well as the general difficulty due to the grade of the terrain.

4.3 Developing a Marketing Plan for CAI-Venezia

With any organization in a growth stage, a plan is necessary for the best expansion. For CAI-Venezia, growth was desired in the number of hikers that utilize their facilities. But because of the nature of the organization, the primary consumer base was Italian speakers. Expansion from this included any hikers, many of whom speak English and German. The development of the plan was a twofold effort. The first was an improvement on the existing website. Secondly, the plan involved an improvement and streamlining of existing pamphlets.

4.3.1 English Website

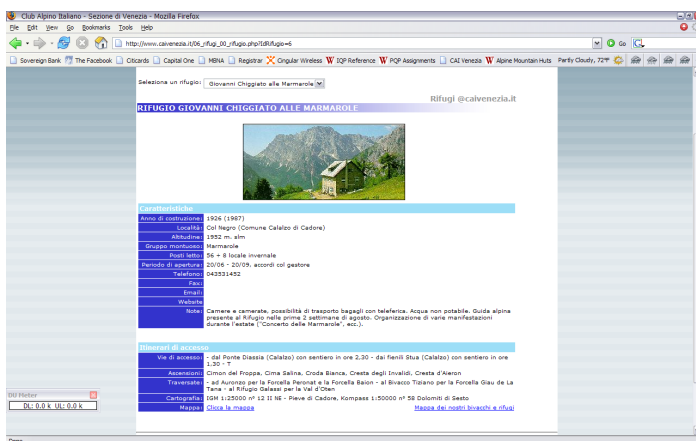


Figure 13: CAI-Venezia Website

The current CAI-Venezia website, www.cai-venezia.it, is a good resource for planning trips and also marketing the organization to its members. Unfortunately, to users outside of CAI-Venezia, there are limits to the information contained on the pages.

Web users cannot make reservations on the website. Additional resources must be added to the website to allow it to market the organization best.

The first is to add information to fill in any missing information. The second is to translate the site to widen its audience to include English speakers.

The first step in adding information is to determine the construction of the website itself. Adding information is not difficult as the website itself is built in HTML and PHP and houses a MySQL database. With this knowledge, the first step is to edit the HTML, the visible code. Because the website is Italian, this work was completed in Italian. Using the existing website, the second step is determining what information must be added or changed. All existing website information was verified and corrected if necessary. Sections were added to the existing website interface to ease the web user.

Following the additions and changes to the website, the second step is to translate sections of the website to English. Firstly, we determined that only a few sections required such translation. Secondly, from a technical standpoint, there were two steps that could be taken. The webmaster had the choice of duplicating the current MySQL database or adding to the current Italian database. Construction for both would take approximately the same time. Additionally, the PHP construction on the website would be simple.

4.3.2 Pamphlet

Only one rifugio currently has a pamphlet, a are concise, tri-folded sheet. Although there are many pictures, the information it contains only does a partial job in advertising the rifugio.

Existing information contained in the pamphlet, was transferred to a master template. The basic formatting of the master includes history of the hut, information on the mountain range, access routes and excursions from the hut.

From a design standpoint, the pamphlet should contain as much information without crowding itself. Also, for aesthetic purposes, the pamphlet must have enough pictures to draw the customer in. Additional information that will be gathered from data collection will be added to the pamphlet to make it complete.



Figure 14: Rifugio Pamphlet

4.4 Supplying Methods by Which Trips are Planned

Current maps suffice for experienced hikers. Tabacco maps, scaled at 1:25000, have contour lines, trail routes and indicate, to some degree, terrain. For planning purposes, Tabacco maps fall short. With the necessity of more complex maps, it will simplify trip planning for anyone interested in the area. Additionally, with the expansion of hiking, pre-planned trips and guided trips are on the rise. Some planned trips exist but are limited to the area they are in.

4.4.1 Mapping Gathered Information

In order to create a structured background to base our database of trail data from, we organized the information we used along the trail in preparation for entering it within *MapInfo*. We wrote down the significance of the waypoints and generated a labeling system for each point. The points are primarily organized according to the trail which they are taken on and put into that trail's folder. Each individual trail has subfolders for classifying the waypoints within it. These folders are labeled Panoramas, Water Sources, Trailheads, Trail Junctions, and Points of Interest. Within each of these folders there is a folder which corresponds to a specific waypoint, and the folder is accurately labeled. The exception is Points of Interest; since each trail can possibly contain a unique point of interest that can't fall into one of these categories there will be another folder within this one which describes the unique point.

Within the specific folder there are 5 files. The raw data that the GPS uses for a waypoint system is in 3 formats. In its original form it is in a ".gpx" format which is the format that *EasyGPS* downloads in from the GPS. It is also in a ".xls" format translated by *Microsoft Excel* into a format that *MapInfo* can work with. It also exists in the format that *MapInfo* translates it into, which is a layer that contains the information we put into it in addition to representing the waypoint on the map. Another of the files contained, is a digital picture of the waypoint which is in ".jpeg" format. The fifth file is a ".txt" file which notes specifics about the waypoint that would be useful information for someone who would be visiting that position.

After the file system of our trail data has been created, it will be possible to use *Microsoft Access* to make a database that accesses each specific information point in the folders. This standard of file storage system makes it possible for *Access* to be used within *MapInfo*. *Access* will be able to display the pictures as well as any text files and coordinates that are associated with the point of interest.

4.4.2 Trenotrekking

Trenotrekking is a new form of excursion that is emerging. Such trips suggest single day and overnight trips to rifugio, such as Chigiato. These trips revolve around offering cheap accommodations, quick trips and good food. Similar to our trip, such Trenotrekking offerings would begin from major Italian cities. From Venice, departing from Santa Lucia before 8 or Mestre around 8, the Trenotrekking guide would recommend trails to and around the rifugio. It would also give the hiker some idea of the terrain to be faced and difficulty. Any recommendations for Trenotrekking excursions would lead the hiker back to the train station and return them to their home city.

Information gathered through trail mapping and other data collection will lead to developments of "trenotrekking" packages. The first step toward this was determining the cities from which the most trips will occur. Secondly, after choosing a destination, the packages will have predetermined paths depending on how long the excursion will be. Using the amenities determined by another part of the project, trenotrekking will include meals and an overnight stay.

5 Results and Analysis

5.1 Determining Logistical and Geographical Means of Access

Using multiple resources and methods, including the internet, our sponsors, maps and rifugi gestori, we found how to get around. Transportation throughout northeast Italy, the Dolomites and Belluno Province have good coverage and offer service for low costs.

5.1.1 Logistical Means of Access

From the internet we were able to find all of the routes necessary to get us to the trailheads. Our two primary sources for long distance travel were determined to be ATVO S.p.A., a regional bus service, and Trenitalia, Italy's national train service.

We found that ATVO offers a single daily service bus that departs from Venezia, Piazzale Roma according to the schedule found in Appendix II. The service is approximately €7.00-10.00 depending on the distance and final destination. In addition to a northbound service, ATVO offers a southbound service departing daily from Cortina d'Ampezzo. With the same stops as the northbound service, we were able to find the fastest routes home.

The other long distance service was Trenitalia. The trains run seven days a week with heavier service during rush hour periods. Major destinations reachable using Trenitalia were Calalzo di Cadore and Belluno. Both of these towns connect with other services that reached further into the Dolomites. Service was cheaper than that of the ATVO bus service, with prices ranging from €5.60-7.50. Train schedules for both northbound and southbound trains can be found in Appendix II.

The internet was also a resource in finding our short distance service in the Dolomites. DolomitiBus offered service to and from nearly all of towns throughout the Dolomites. Most routes had terminals in larger towns at or near the train station. DolomitiBus schedules that were utilized are available in Appendix II. Service was extremely cheap and was determined by distance traveled. Prices ranged from €1 to €5 and varied by 10 kilometer increments

Attaining tickets for all the public transportation was easy, with services available 24 hours per day, or purchasable upon entry. As discovered during on-site work, Trenitalia charges a heavy surcharge of €25 per person for tickets purchased on the train.

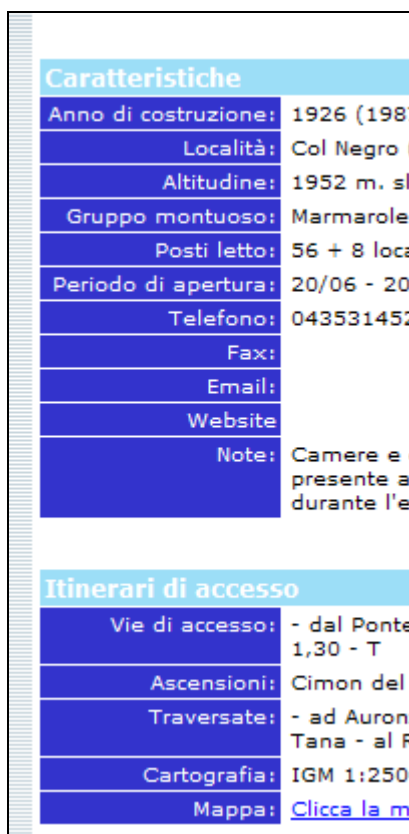
As preliminary work before departure, the first step toward the hike was doing research with the maps. A week in advance of our scheduled departure, we used the map to determine the best route to ascend and descend. Our routes can be found in Appendix III as part of our trail guide. After determining the best routes in our opinion, we asked the opinion of our sponsor at CAI-Venezia. We ascertained the time required for the entire trip and the times of each leg of the route. Most importantly, we found whether the trail we were to use was too difficult or had the chance of becoming difficult pending weather conditions.

5.2 Developing a Marketing Plan for CAI-Venezia

Using known means of marketing, such as the internet and pamphlets, we have expanded the advertising realm of CAI-Venezia to an English speaking audience. Additionally, with the verification of information, Italian and German speakers have access to complete, concise information that can assist them with their needs.

5.2.1 Website

The website work existed outside of the project's temporal boundaries because of on-site circumstances. Additionally, work on the website did not require in-person interaction and was extended beyond July 31. Results exist similarly to the methodology in that there was a two-step process through changes and translation.



Caratteristiche	
Anno di costruzione:	1926 (1987)
Località:	Col Negro (C)
Altitudine:	1952 m. slm
Gruppo montuoso:	Marmarole
Posti letto:	56 + 8 loca
Periodo di apertura:	20/06 - 20
Telefono:	043531452
Fax:	
Email:	
Website:	
Note:	Camere e p presente a durante l'e

Itinerari di accesso	
Vie di accesso:	- dal Ponte 1,30 - T
Ascensioni:	Cimon del
Traversate:	- ad Auron Tana - al R
Cartografia:	IGM 1:250
Mappa:	Clicca la m

Figure 15: Website Sidebar

Concentrating primarily on what information was important to the website; changes were made to the “Rifugi and bivacchi” section. Currently, there is merely a section denoted “Notes.” With our field work and data collected from CAI-Venezia, this section will be transformed to Amenities and Reservations. The amenities will be more detailed and include offers of food and drinks. The reservations section includes directions to making a reservation, including the rifugio phone number and a link to useful Italian phrases. Another addition will be to the section marked “Access.” This section currently lists the trails used to get up to the rifugio, with times. Combining our resources and data analysis, we changed the section to have a greater description about each excursion, including graphics and a map.

Information that was added included detailed information about the rifugi operators and special or annual events that may attract hikers to the rifugi. Also, to the greatest assistance to the user, the website will contain directions to making a reservation for an overnight stay.

Next, was the selective translation of the current CAI-Venezia website to English. Depending on the structure of the MySQL database, the website's English content must be added separately. Only three of the pages hosted by CAI-Venezia were translated. The other pages belonging to the website were not translated because they are tailored to members of the section, all of whom speak Italian. The pages translated were “Rifugi and Bivacchi”, the home page and “La sezione.” The home page turned out simpler than its sister Italian site, and has links to other English language pages. The existing “La Sezione” contains information about the history and current status of the section; this was simply translated giving web users a better idea about the section. “Rifugi and Bivacchi” will be translated to English with the additional changes made previous to translation.

5.2.2 Pamphlet

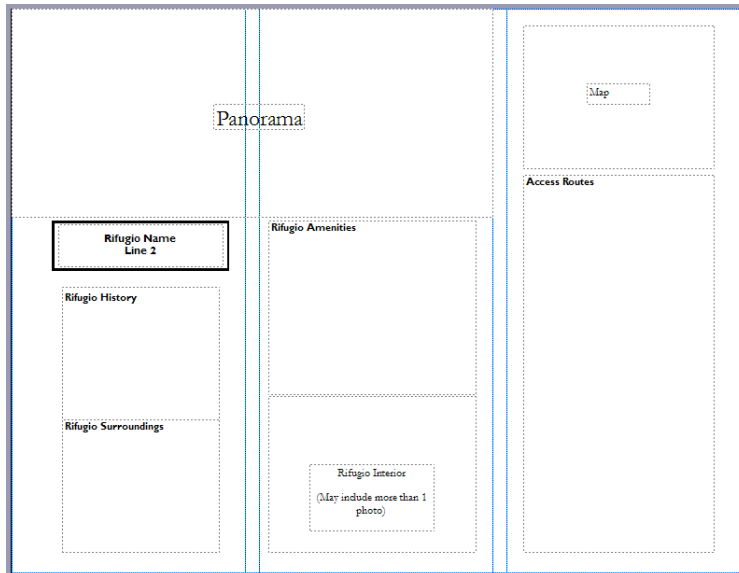


Figure 16: Pamphlet Template Interior

From the previous version of the Chiggiato pamphlet, the blank template was made in a similar manner using Publisher. The inside design was changed to include more information. For Chiggiato, the sections about the mountains surrounding the rifugio and its home mountain chain were combined.

Details were added in the new section named “Amenities” It included information important to patrons of the rifugio. Another key

addition is the map to the section named “Access Routes.” Previously, this section only listed the ways, without a map, making visualization more difficult.

Pictures that were added to the interior included a wide panorama of the surrounding area as the primary visual. The other central picture on the inside of the pamphlet focused on the interior of the rifugio. This was placed just under “Amenities” to keep the readers attention.

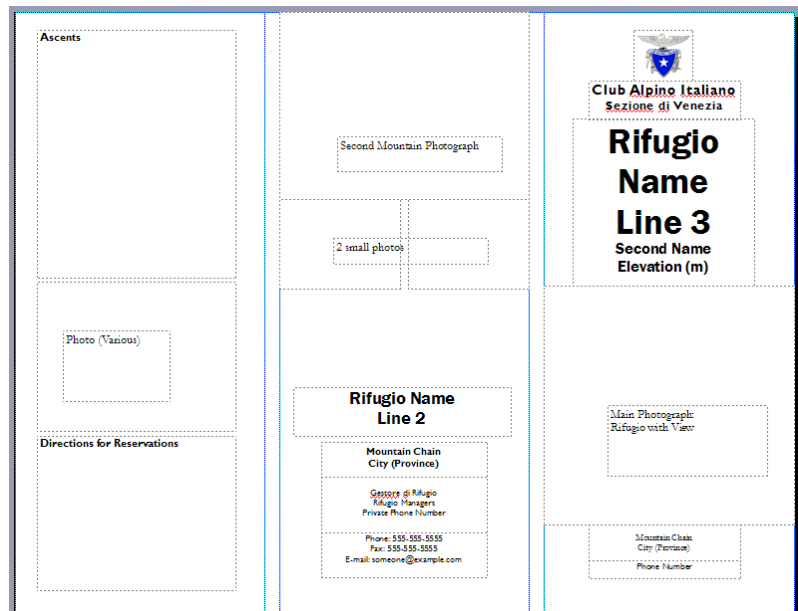


Figure 17: Pamphlet Template Exterior

The exterior also had quite a few changes. Because the front page was adequate and well designed, no changes were made. The front page includes the organization logo with name, the rifugio name, a photograph and location with phone number. It was designed to give all the essential information to the reader.

The far left page of the exterior is the page that is folded within when closed. With the assumption that it is read after the access page, it contains information about the ascents and excursions from the rifugio. For visual purposes, a photograph is added on this page to divide the information. Another important addition, like the map found on the interior is the addition of the “Directions for

Reservations” section. Within it contains necessary information and rules that patrons will need to know.

The reverse page, centered on the exterior appears as the back when folded. Like the front this contains all the necessary information about the rifugio a phone number and as well as the name of the rifugio manager. For visual appear, there are three pictures, another of the mountains and two interesting photos. This varied depending on the rifugio because some required more directions than others. Centered vertically on the reverse cover are directions from Venice including a road and rail schematic.

Completed pamphlets in addition to a paper edition of the template can be found in Appendix IV.



Figure 18: Road and Rail Schematic

5.3 Supplying Methods by which Trips are Planned

Using mapping and trip planning, we have created systems where either the hiker or CAI-Venezia may take an active role in planning excursions. With an interactive map, we are making it possible for people to find exact information on a trail and with Trenotrekkung as a type of planning, CAI-Venezia will be able to book large scale groups that may not know of the opportunities of excursions.

5.3.1 Creating Interactive Map

The next step in our process, after returning from the mountain, was to transfer all of the GPS waypoints from the *Garmin Etrex* to our computer. This transfer began with simply attaching the GPS unit to the computer by means of serial port and cable. Next, a specific type of software was needed so that the computer and the *Etrex* could communicate. In our case, we used a program called *EasyGPS* to receive the waypoints from the *Etrex*. After the waypoints were downloaded, we saved them in a format that could be read and understood by *Microsoft Excel*, in this case we used “.gpx”. Next, we took the “.gpx” file and opened it in *Microsoft Excel* and resaved the information as an “.xls”. This transfer is a crucial step because the GIS software does not understand “.gpx” but it will understand the “.xls”.

After the “.xls” was made we opened it in our GIS software, *MapInfo*. The longitude and latitude for each waypoint were then translated into individual points which were portrayed on a blank GIS layer. In other words, a “.tab” file was created in MapInfo for the waypoints which could be laid directly over a GIS map of the particular region of the Dolomites that we traveled through. To make sure that these waypoints lined up with the trail we took up the mountain, we first scanned in the tabacco map and laid that on top of the GIS map of the region. To accurately line the tabacco map on top, we had to take three coordinates that we knew to be true, and place them on the tabacco map. *MapInfo* did the rest of the work by lining those same coordinates from the GIS map, up with the ones on the tabacco. Now that the tabacco map was geographically lined up to a coordinate system *MapInfo* was able to accurately load the “.tab” layers of the waypoints that we created. The layers are separated into categories depending on the nature of the waypoints.

Once we completed created the waypoints we needed to color in the sections accordingly to what we decided each section should be labeled as. This is where the GIS map gains an advantage over the tabacco map because each colored section will be interactive. Unfortunately we decided our trail rating system such as Switch Backs, Steep Grade, Scramble, Via Ferrata and Normal Terrain would be insufficient, and not really improving upon the current map. So instead we devised a different method to rate the trail system. We are rated it on a relative difficulty which can be seen by color. There are five specifications of difficulty, green, blue, yellow, orange and purple, ordered from lowest difficulty to highest respectively. We used several different categories to determine the difficulty factor. We rated the difficulty of the terrain, which falls into categories such as dirt, asphalt, large rocks, gravel, ledge and landslide. We also rated the exposure of terrain and divided it into five categories, no, low, moderate, high and full. Exposure is a rating of danger factor of the terrain. Our third rating comes from the basic level of difficulty due to the grade of the terrain. These three different rating systems contribute to trail layer where the five color system is utilized. The color isn't decided by all three systems in conjunction. The rating system that has the highest color specification is the overlying color that is used on the trail layer. This is the most effective and beneficial way to improve upon the Tabacco maps. However, the user is able to click upon that section of trail and the basic trail information as well as the level of difficulty from each of the three rating systems is displayed. The tables containing this information are in a *Microsoft Access* database format, and when the trail section is selected by the user, MapInfo accesses the table containing this data and displays it in MapInfo format. The way we designed our layer, we have the multiple colors, but we preserve the tabacco maps original trail ratings. We simply change that section of the trail into the solid lines, dashes, dots or crosses while still giving it our own color system.

In addition to the trail layer, we also created three more layers. We created a rifugi layer that shows the rifugi owned by CAI-Venezia. When the user clicks on the rifugi it accesses a table containing all the basic information about the rifugio, as well as amenities information. We also have created a points of interest layer which shows any points of interest such as parking, other rifugi, casera, waterfall or any

other points of interest. Clicking on these points will again access a table that contains the information about this point. We also created a Via Ferrata layer that loads a table when selected that will give information about the nature of the ferrata. It gives the relative length of the ferrata as well as it says if any gear is needed to traverse it.

5.3.2 Trenotrekking

Rifugio A. Vandelli al Lago Sorapiss

Day One

- 07.56 Depart Venezia-Santa Lucia
- 10.59 Arrive Calalzo FS
- 10.50 Depart Calalzo
- 11.48 Arrive Cortina d'Ampezzo
- Lunch (on your own)
- 14.03 Depart Cortina d'Ampezzo
- 14.20 Arrive Passo Tre Croci
- Trail 215 Hike, 2-2 1/2 Hours
- Dinner at Rifugio Vandelli

Day Two

- 07.00 Breakfast at Rifugio Vandelli
- 08.00 Depart Rifugio Vandelli
- Trail 216 Hike, 3 1/2-4 Hours
- Lunch at Rifugio Faloria
- 13.30 Funiviatto Cortina d'Ampezzo
- 14.02 Depart Cortina d'Ampezzo
- 15.00 Arrive Calalzo FS
- 15.04 Depart Calalzo FS
- 16.41 Arrive Conegliano
- 16.58 Depart Conegliano
- 18.04 Return to Venezia-Santa Lucia

€75,00 CAI Members
€85,00 Non-Members

Fare includes:
Round trip tickets on Trenitalia and DolomitiBus
Single way ticket on Funivia Faloria
Dinner at Rifugio Vandelli including first plate, second plate, dessert and water, additional beverages extra.
Breakfast at rifugio, self-service includes coffee and tea.
Lunch at Rifugio Faloria, includes first plate and beer.

For information, contact CAI-Venezia (041) 714900
Trenitalia Information
DolomitiBus Information
Rifugio Vandelli
Rifugio Faloria

Figure 19: Trenotrekking Advertisement

support this kind of marketing because of their accessibility to main roads. No rifugi require hikes in excess of 3 hours. Furthermore, there are many rifugi accessible to CAI-Venezia's. With negotiations, it is likely that arrangements can be made for Trenotrekking excursions.

5.3.3 Trenotrekking Cost Analysis

Using existing information about transportation systems, including Trenitalia and DolomitiBus, and information available at rifugi, we were able to determine costs for Trenotrekking excursions. Using the Trenotrekking excursion to Rifugio Vandelli, our methods can be noted.

Beginning with the cost of transportation, Trenitalia costs €7.00 for nearly all trips to Calalzo di Cadore. DolomitiBus service from Calalzo to Cortina costs €3.50. From Cortina to Passo Tre Croci, the cost is an additional €1. Lastly, the Funivia costs €10.60. With necessary round trips included, the transportation costs total €32.60. This price remains fixed unless an agreement can be reached between CAI and Trenitalia, so it cannot be adjusted.

A sample Trenotrekking itinerary includes all transportation to the rifugio and meals. An example is an overnight trip to Vandelli. Included on the advertisement is an itinerary for the trip beginning early morning on day one, and ending after 6 the next day.

The sample itinerary includes six hours of hiking on two trails, three meals and train, bus and aerial cableway tickets. Under the price on the advertisement are the exact details. The meals include a drink, but only water is included with dinner.

Additionally, the advertisement has the three organizations responsible for the trip, Trenitalia, DolomitiBus and CAI-Venezia. At the bottom, it has all the necessary contact information in case questions arise. The advertisement can also be posted online as an HTML document or PDF.

CAI-Venezia's other rifugi are all able to

Prices that can vary are meal prices and overnight stay prices. The package includes three meals, first dinner, then breakfast and lunch. Dinner includes a three course meal; the average first dish is €7.00, the second is €10.00 and dessert is €3.00. Totaled with the water, the only included drink, the cost is €18.60. The overnight stay, which varies the price between CAI-members and non-members, is €8.50 or €17.00. Price for breakfast is set by the section and is €5.50. Lastly, lunch at Rifugio Faloria is priced high because of its proximity to Cortina d'Ampezzo. Average first plates cost €8.00 and beer is €3.50. The final cost of the food and stay is €55.60 for non-members, €47.10 for members.


	A	B	C	D	E	F	G
1	Rifugio A. Vandelli al Lago Sorapiss						
2	TRENOTREKKING COST ANALYSIS						
3	Trenitalia						
4	Venezia	Calalzo	€ 7.00		€ 79.70	Member Price	
5	Calalzo	Venezia	€ 7.00		€ 88.20	Non-Member Price	
6							
7	DolomitiBus				€ 80.00	Member Price Rounded	
8	Calalzo	Cortina	€ 3.50		€ 90.00	Non-Member Rounded	
9	Cortina	Calalzo	€ 3.50				
10	Cortina	P.so Tre Croci	€ 1.00				
11							
12	Funivia						
13	Faloria	Cortina	€ 10.60				
14							
15	Transportation:	€	32.60				
16							
17	Meals						
18	Dinner:	€	18.60				
19	First		€ 7.00				
20	Second		€ 10.00				
21	Dessert		€ 3.00				
22	Water		€ 1.60				
23							
24	Breakfast		€ 5.50				
25							
26	Lunch						
27	First		€ 8.00				
28	Beer		€ 3.50				
29	Overnight Stay		€ 17.00				
30							
31	Food and Bed:	€	55.60				
32	Member	€	47.10				
33							
34							
35							
36							

With a total of €79.70 for members, and advertising price of €75.00 is feasible, however €80.00 is more likely. For non-members, something which Trenotrekking is likely to attract more of, the cost is €88.20. Advertising at €90.00 would give the organization an overhead. The majority of the cost benefit falls to the gestori of the rifugi. They gain the most by having more guests. Additionally with the low overhead of food costs, it's likely that the gestori will not see a great gain from it. However, with the inclusion of only a half-liter of water, guests are likely to spend more on wine and beer.


Figure 20: Vandelli Trenotrekking Cost Analysis

6 Appendix I: Rifugio Field Forms

a) Infrastructure

 <Rifugio> Infrastructure	
Photovoltaic Unit(s):	
Lightning Rod(s):	
Septic System:	
Generator(s):	
Gas Tank(s):	
Cable Lift System:	
ADDITIONAL NOTES:	

b) Amenities

 <Rifugio> Amenities	
Maximum Capacity:	
Available Water:	
Electricity:	
Restroom Facilities:	
Cooking Facilities:	
Packaged Goods:	
ADDITIONAL NOTES:	

7 Appendix II: Transportation Schedules

BELLUNO-VENEZIA																											
Treno n°	11190	Ba005	5677	11009	5739	3701	2759	5740	11115	20775	11112	11119	5680	2461	11121	11121	11122	5751	11015	3711	11140	11144	11149				
BELLUNO p.	6.04	6.50		7.00	7.37	9.09	10.30				11.25	13.26	13.57		14.26	14.26	15.39			17.34	19.25	21.39					
Montebelluna																											
Venezia																											

VENEZIA-BELLUNO																												
Treno n°	5902	5924	11107	5920	5971	Ba005	20770	2759	11106	11110	5672	5855	2646	Ba010	5954	Bu011	22616	11121	11126	11124	11131	2834	5902	11138	5757	5980	5882	11146
VENEZIA p.	5.10		6.17				7.02	7.41	7.56			9.55					12.02	13.37	15.02	16.56	17.33							20.02
Montebelluna																												
Belluno																												

Figure 21: Belluno-Venezia Train Schedule

Linea 25 BELLUNO P.OSP.CIVILE - BL F.S. - LONGARONE - PECOL - FORCELLA STALANZA																						
f	f	F	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f
		1	3																			
			11.27																			
6.20	7.25	9.20	11.38	12.50		15.30	17.30	18.08														
6.22	7.27	9.22	11.40	12.52		15.32	17.32	18.10														
6.24	7.29	9.24	11.42	12.54		15.34	17.34	18.12														
6.28	7.33	9.28	11.46	12.58	14.41	15.38	17.38	18.16														
6.34	7.39	9.34		13.04	14.47	15.44	17.44	18.22														
6.40	7.45	9.40		13.10	14.53	15.50	17.50	18.28														
6.43	7.48	9.43		13.13	14.56	15.53	17.53	18.31														
6.50	7.55	9.50		13.20	15.03	16.00	18.00	18.38														
6.54	7.59	9.54		13.24	15.07	16.04	18.04	18.42														
6.57	8.02	9.57		13.27	15.10	16.07	18.07	18.45														
7.04	8.09	10.04		13.34	15.17	16.14	18.14	18.52														
7.08	8.13	10.08		13.32	15.21	16.18	18.18	18.56														
7.10	8.15	10.10		13.58	15.23	16.20	18.20	18.58														
				14.01	15.28		18.26	19.18														
7.14	8.19			14.03	15.30		18.28	19.20														
7.16	8.21			14.08	15.35		18.33	19.25														
7.20	8.25			14.10	15.37		18.35	19.27														
7.22	8.27			14.18	15.45		18.43	19.36														
7.31	8.36			14.25	15.50		18.50	19.40														
7.35	8.40			14.30																		

Fermate facoltative: Baldenich Bocciodromo, Bivio Nogare, Belluno Eaton, Belluno Mob.Bortoluzzi, Andreane, Ponte N.Alpi Supermercati, V.le Cadore, Ponte N.Alpi Casera, Rist. da Benito, Faè stab. Faesite, Ristorante Quattro Valli, Villanova, Pirago, Igne Bivio, Forno Bivio per Zoppè, Forno Scuola Media, Rutorbol, Tainera, Mareson Hotel Corona, Pecol Nuovo, Palafavera al Ponte

f = giornaliera F = festiva fv = feriale escluso il sabato fLMeV = feriale Lunedì - Mercoledì - Venerdì

1 = dal 18 giugno al 4 settembre e 10-11-17-18 settembre 2005 2 = dal 8 al 19 agosto 2005 non transita per Villanova Z.I. ma per Faè 3 = dal 1 luglio 2005

Figure 22: Belluno-Pecol DolomitiBus Schedule (Northbound and Southbound)

Linea 72/3/1 CORVARA-ARABBA-CAPRILE-AGORDO AUTOSTAZIONE-BELLUNO FS

	F	f	f	F	f	f	m	f	f	Ff	f	Ff	f	f	Ff	Ff
						1										
Corvara Alb. Posta											12.45					
Passo Campolongo											12.55					
Arabba			6.20								13.05		14.55			
Bosco Verde			6.25								13.10		15.00			
Tablè della Giaiola			6.30								13.15		15.05			
Pieve di Livinallongo			6.33								13.18		15.08	16.35		
Andraz			6.38								13.23		15.13	16.40		
Cernadoi Bivio			6.42								13.27		15.17	16.44		
Collaz			6.47								13.32		15.22	16.49		
Rucavà			6.50								13.35		15.25	16.52		
a.			7.00								13.45		15.35	17.02		
Caprile																
p.	6.10	7.00	7.35	7.50	7.50		8.50	12.02	12.02		13.45	14.35	15.35	17.05	18.00	
S. Maria delle Grazie	6.14	7.04	7.39	7.54	7.54		8.54	12.06	12.06		13.49	14.39	15.39	17.09	18.04	
Alleghe Piazza	6.18	7.08	7.43	7.58	7.58		8.58	12.10	12.10		13.53	14.43	15.43	17.13	18.08	
Masarè	6.21	7.11	7.46	8.01	8.01		9.01	12.13	12.13		13.56	14.46	15.46	17.16	18.11	
Avoscan	6.26	7.16		8.06	8.06		9.06				14.01		15.51			
Cencenighe	6.10	6.35	7.25	7.55	8.15	8.15	8.45	9.15	12.22	12.22	14.10	14.55	16.00	17.25	18.25	
Ghirio	6.12	6.37	7.27	7.57	8.17	8.17	8.47	9.17	12.24		14.12	14.57	16.02	17.27	18.27	
Listolade	6.17	6.42	7.32	8.02	8.22	8.22	8.52	9.22	12.29		14.17	15.02	16.07	17.32	18.32	
Taibon S. Cipriano	6.20	6.45	7.35	8.05	8.25	8.25	8.55	9.25	12.32		14.20	15.05	16.10	17.35	18.35	
a.	6.23	6.48	7.38	8.08	8.28	8.28	8.58	9.28	12.35		14.23	15.08	16.13	17.38	18.38	
Agordo Autostazione																
p.	6.25	6.50	7.45	8.10		8.30		9.30	12.37		14.25	15.10	16.15	17.40	18.40	
Belluno F.S	7.05	7.30	8.25	8.45		9.10		10.10	13.17			15.05	15.50	16.55	18.20	19.20

Fermate Facoltative: Corvara Hotel Salvan, Corvara Bivio, Passo Campolongo Hotel Planac, alb. Chertz, Varda, Alfauro, al Forte, Livinè, Pieve di Livinallongo Sud, Excelsior, Bivio Larzonei, Sassac, I Tuffi, Alleghe Vallazza, Alleghe Impianti, Masarè al Camping, Sala, Bries, Tocco Central, Tocco.

f = feriale Ff = giornaliera F = festiva m = mercoledì feriale 1= dal 1 agosto 2005

Figure 23: Alleghe-Belluno DolomitiBus Schedule (Southbound)

VENEZIA - Mestre - Treviso - CORTINA POSSIBILITA' DI PROSEGUIMENTO DA E PER DOBBIACO E S. CANDIDO CON AUTOLINEE S.A.D.		Il servizio si effettua nei giorni evidenziati											
		GEN	FEB	MAR	APR	MAG	GIU	LUG	AGO	SET	OTT	NOV	DIC
7.00	PADOVA (P. Boschetti) LIDO DI JESOLO (P. Drago) AEROPORTO MARCO POLO SAN DONA' DI PIAVE (ATVO)	1S	1M	1M	1V	1D	1M	1V	1L	1G	1S	1M	1G
7.00		2D	2M	2M	2S	2L	2G	2S	2M	2V	2D	2M	2V
		3L	3G	3G	3D	3M	3V	3D	3M	3S	3L	3G	3S
		4M	4V	4V	4L	4M	4S	4L	4G	4D	4M	4V	4D
		5M	5S	5S	5M	5G	5D	5M	5V	5L	5M	5S	5L
		6G	6D	6D	6M	6V	6L	6M	6S	6M	6G	6D	6M
		7V	7L	7L	7G	7S	7M	7G	7D	7M	7V	7L	7M
		8S	8M	8M	8V	8D	8M	8V	8L	8G	8S	8M	8G
		9D	9M	9M	9S	9L	9G	9S	9M	9V	9D	9M	9V
		10L	10G	10G	10D	10M	10V	10D	10M	10S	10L	10G	10S
		11M	11V	11V	11L	11M	11S	11L	11G	11D	11M	11V	11D
		12M	12S	12S	12M	12G	12D	12M	12V	12L	12M	12S	12L
		13G	13D	13D	13M	13V	13L	13M	13S	13M	13G	13D	13M
		14V	14L	14L	14G	14S	14M	14G	14D	14M	14V	14L	14M
		15S	15M	15M	15V	15D	15M	15V	15L	15G	15S	15M	15G
		16D	16M	16M	16S	16L	16G	16S	16M	16V	16D	16M	16V
		17L	17G	17G	17D	17M	17V	17D	17M	17S	17L	17G	17S
		18M	18V	18V	18L	18M	18S	18L	18G	18D	18M	18V	18D
		19M	19S	19S	19M	19G	19D	19M	19V	19L	19M	19S	19L
		20G	20D	20D	20M	20V	20L	20M	20S	20M	20G	20D	20M
		21V	21L	21L	21G	21S	21M	21G	21D	21M	21V	21L	21M
		22S	22M	22M	22V	22D	22M	22V	22L	22G	22S	22M	22G
		23D	23M	23M	23S	23L	23G	23S	23M	23V	23D	23M	23V
		24L	24G	24G	24D	24M	24V	24D	24M	24S	24L	24G	24S
		25M	25V	25V	25L	25M	25S	25L	25G	25D	25M	25V	25D
		26M	26S	26S	26M	26G	26D	26M	26V	26L	26M	26S	26L
		27G	27D	27D	27M	27V	27L	27M	27S	27M	27G	27D	27M
		28V	28L	28L	28G	28S	28M	28G	28D	28M	28V	28L	28M
		29S	29M	29V	29D	29M	29V	29L	29G	29S	29M	29G	29G
		30D	30M	30S	30L	30G	30S	30M	30V	30D	30M	30V	30V
		31L	31G		31M		31D	31M		31L		31S	

Figure 24: ATVO S.p.A. Bus Schedule with Dates of Operation

8 Appendix III: Trail Guide

The paths we will be traveling are the best maintained and the most notable. Because of our intention to increase the popularity of the rifugio, these paths are the best to take. In addition to seeking advice from CAI-Venezia about the trails to use, we will consult two other sources.

The first are the already available pamphlets. Each rifugio has previously produced pamphlets featuring pictures and routes of access. In each access description, it lists the time, elevations and the limit of travel by car. We will also ask for the most recommended route from the rifugio proprietor. Because they have traveled the routes to a great extent, they can tell us what routes will have the best trip and gather the most information.

8.1.1 Chiggiato

To get to the area, we took a local train that departed from Venezia-Santa Lucia. We decided on a direct train with no changes, however most of the trips from Venice may require a change in either Ponte nelle Alpi or Conegliano. The fare was €7 per person and the trip took just under three hours. The arrival

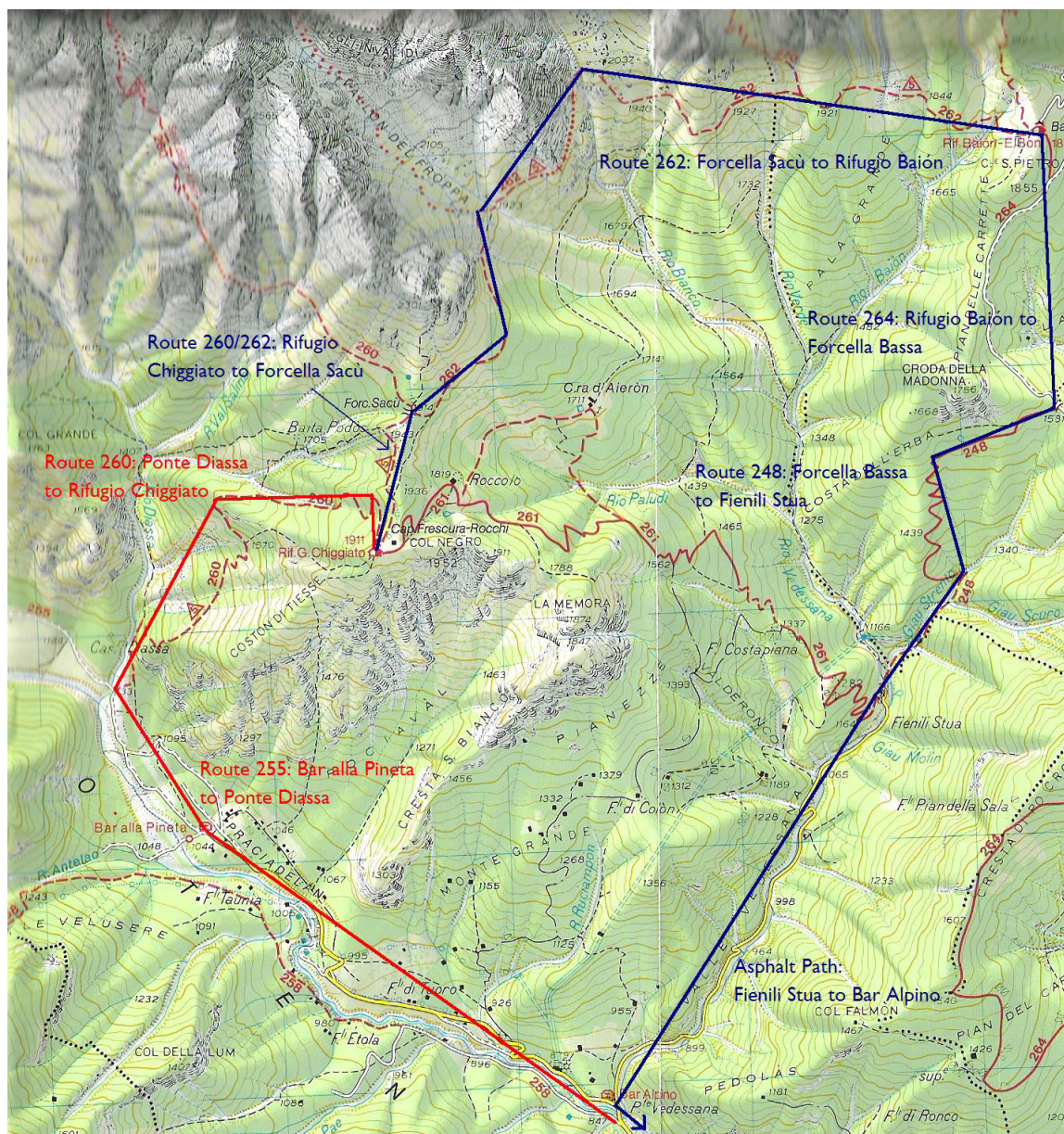


Figure 25: Map of Chiggiato Excursion

station was Calalzo-Pieve di Cadore-Cortina. Although DolomitiBus runs service from the station, none headed in the direction we wanted. Another option was taxi from the station to Bar alla Pineta, at the cost of approximately €10.

For our Rifugio Chigiato excursion, we focused on two primary excursions. The first was the more difficult of the recommended ascents. From Calalzo di Cadore, we followed the asphalt leading to Bar alla Pineta. The first section of Route 255 was a wide gravel path with a gentle ascent. The short path led to a split at Ponte Diassa. Route 255 from Bar alla Pineta to Val Diassa took about twenty minutes at a fair pace. The change in elevation was from 1044 meters at the bar to 1133 meters at Val Diassa. From there, we took our first mountain path.

Route 260, included as part of Alta Via 3, took approximately 2 hours and 30 minutes and leads to the hut. Sections of the trail were steep, with many switchbacks requiring frequent stops. Beginning from Val Diassa at 1133 meters, the trail offered many spots from which to view the surrounding mountains. The trail also featured few areas that are consistently level. Although it began southwest of Chigiato, it approached from the north and finished at its highest elevation of 1911 meters.

For our return journey, we followed a route recommended by Chigiato's proprietor. Starting from Chigiato, we began on Route 260/262 which led north from Chigiato paralleling our ascent route. At Forcella Sacù, Routes 260 and 262 separated and we remained on Route 262, bound for Rifugio Baión. The trail throughout remains fairly level and follows a bowl shaped path around the inside of the peaks of the Marmarole. The maximum elevation reached along the trail was about 2000 meters before the halfway mark. Outside of the highest point, the trail remained at about 1930 meters, with gentle ascents and descents. The trail ends approaching Rifugio Baión at 1825 meters.

In certain locations along the path, there were areas requiring some hands on work. Two areas, which were clearly marked on the map, were Via Ferrate. These were not difficult and did not require special equipment. In addition to the Via Ferrate, there were sections that required us to climb rocks. Another area that required some skill was areas of fallen rocks. These areas could not be predicted because of the ever changing nature of the Alps. Some of the route also crossed small creeks, but this was a small issue.

Departing from Rifugio Baión, we began on Route 264 which departs south. The path was wide and descended gently to a gravel path. Wide enough for vehicular use, this gravel path, still part of Route 264 was rutted from water and use. Some sections were steep as the trail, over approximately 30 minutes, descended from 1855 meters to 1531 meters. We left the trail at Forcella Bassa as 264 continued through the hills.

From Forcella Bassa, we took Route 248, a well marked and wide trail. Route 248 began as a slow gentle descent for about 15 minutes. The trail then led downward in a series of long, sweeping switchbacks. This descent took approximately 20 minutes and led from 1520 meters down to 1340 meters. A few areas of the trail were heavily wooded and nearly the entire trail was under cover of trees.

When we reached the bottom of the switchbacks, the trail followed Giau Strento down to Fienili Stua. The path crossed the water on a few occasions, but it was not deep enough to pose a danger.

After Fienili Stua, at 1125 meters, the trail turned into asphalt and remained that way until Bar Alpino. The route along the creek was scenic with several pools and waterfalls. The descent ended at the elevation of 847 meters. We returned from Bar Alpino to the station and left on an evening train, with a stop at Ponte nelle Alpi. With a delay, the train still took only three hours to return back to Venezia-Santa Lucia.

8.1.2 Venezia

Beginning in the same way, from Venezia-Santa Lucia, we will take a train to Calalzo di Cadore. A direct train takes approximately three hours and costs €7.00. From Calalzo, we will take DolomitiBus line 3 that stops in Borca di Cadore. From Borca, it is a short distance to cross the Ponte di Cancia.

Route 476 begins as a gravel path at 891 meters and ascends quickly to 1284 at Pister. From Pister the trail becomes less wide and more rugged, the trail remains wooded until Tabià di Ciàuta where it meets Route 475. The trail reverts to gravel for a short distance and then continues as a wooded path.

Route 475 ascends gently up the mountain with consistent views of Pelmo to the west and Antelao to the northeast. The trip takes approximately two hours to get to Passo di Rutorto with a total ascent of approximately 475 meters and a peak of 1953 meters. The path reaches Rifugio Venezia from the south on Route 471. The elevation at the rifugio is 1946 meters.

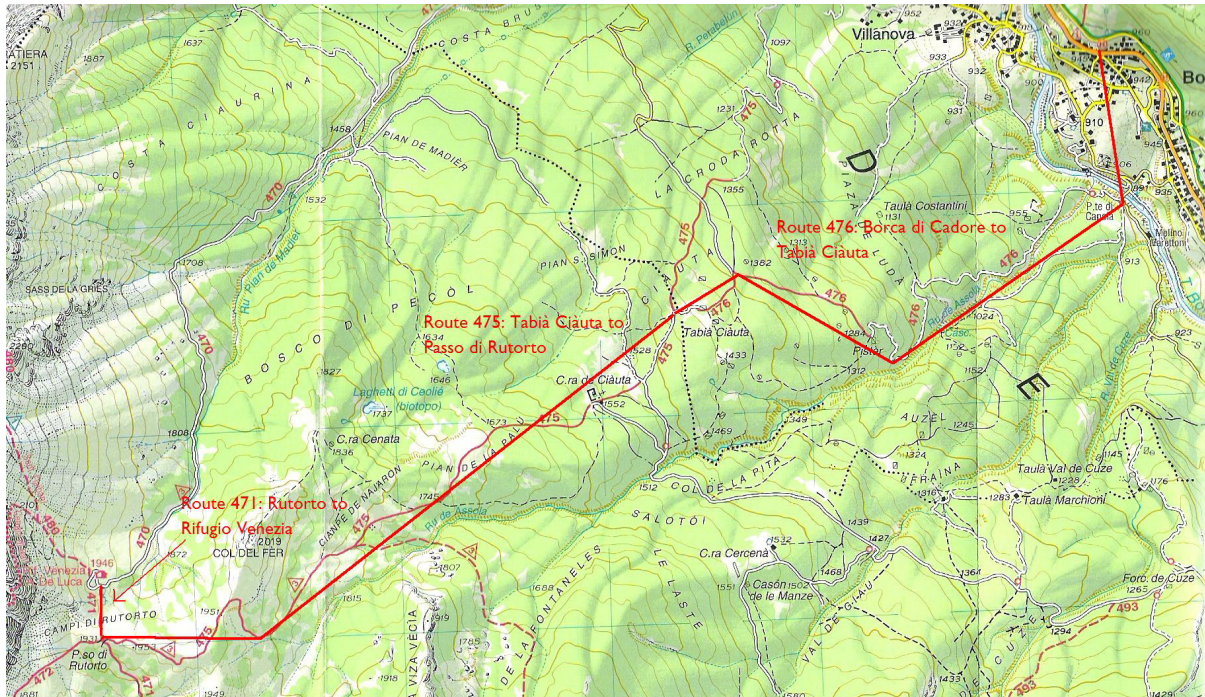


Figure 26: Rifugio Venezia Ascent Excursion

Unlike the excursion to Chiggiato, we will not be returning to a specific point. Instead from Rifugio Venezia, we will leave facing north and heading toward Cima Forada and Rifugio Città di Fiume. Following Route 480, we will face a steep, narrow path that reaches a pass at 2476 meters. At Cima Forada, we will then head west toward our final destination, Rifugio Passo Staulanza. On the formerly

numbered 480, there are many switchbacks on the open path. This section is fairly steep, but is then followed by a gentler path, half on rock, half in the woods. Halfway into the woods, the path meets Route 472. From there it is a short walk to the rifugio.

After a dinner at Rifugio Passo Staulanza, we will catch the DolomitiBus to Longarone or a taxi to Pecol or Belluno. We will then return to Venezia-Santa Lucia by train.

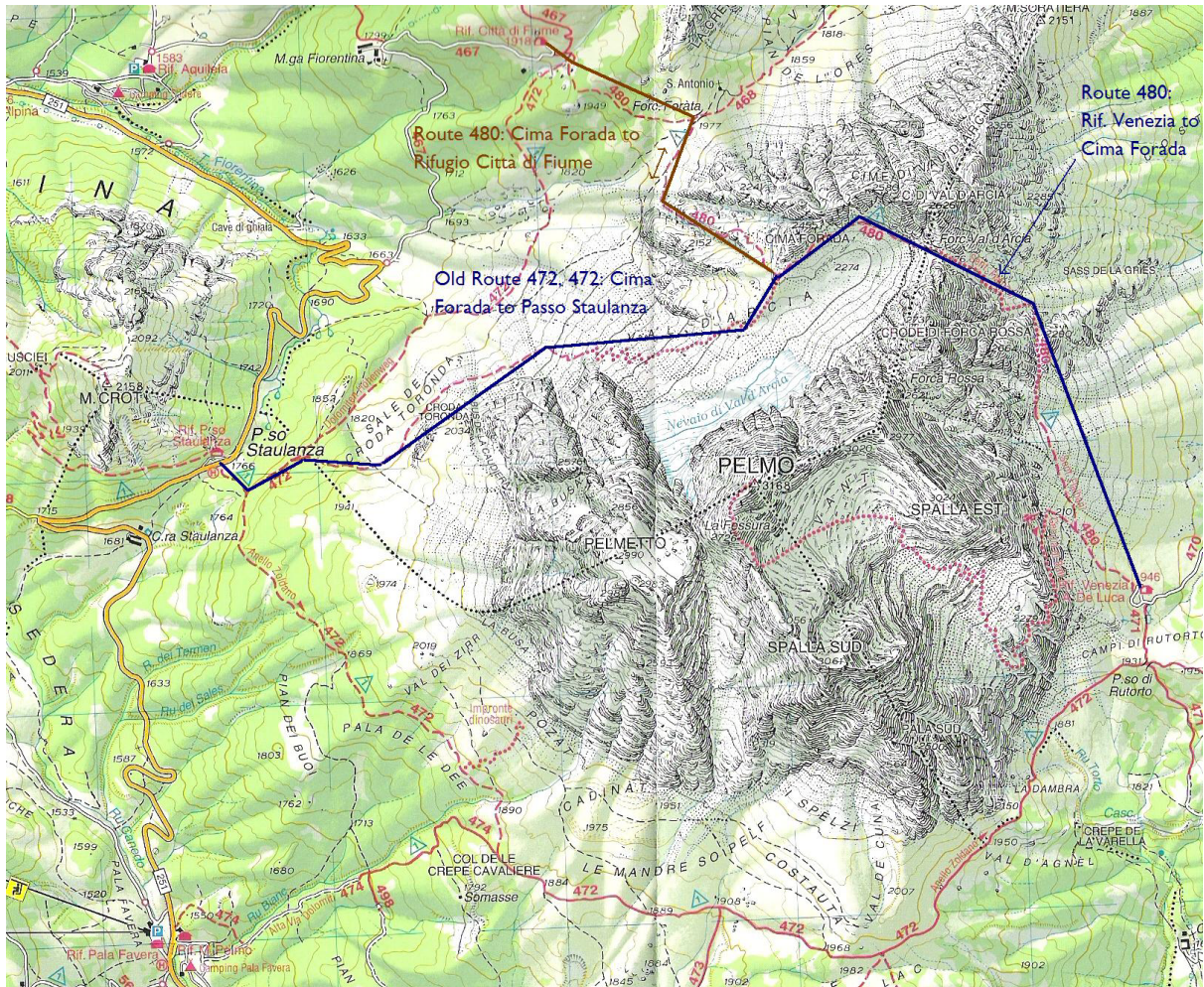


Figure 27: Rifugio Venezia Descent Excursion

8.1.3 Coldai

Beginning from Venezia-Santa Lucia, we took a train to Longarone-Zoldo, with a change at Castelfranco Veneto. The cost was €7.45 and took 3 hours with a 40 minute wait. Because the transportation system is designed to sync, there was no wait for the next bus to Pecol. The DolomitiBus line 17 brought us to Pecol at the cost of €3.35, which is approximately 40 kilometers from Longarone. Because the line to Passo Staulanza runs only twice daily, the journey required us to walk two kilometers to the trailhead at Rifugio Pala Favera.

At Pala Favera, we began our excursion on Route 564. This route had limited access by vehicle but had the chance of becoming impassable with inclement weather. Beginning at 1507 meters, the ascent is gentle and easy. After an ascent of approximately 250 meters, the trail joins with Route 556. At Casera di Pioda, there is water available for drinking, and the trails divide.

Following Route 556 toward Coldai, the gravel path extends approximately a kilometer beyond the Casera. After that, there are gentle switchbacks following along the side of the mountain. From the Casera at 1816 meters, the ascent is 316 meters to Coldai at 2132 meters. Route 556 requires little extra skill and has only a few areas that could be considered a scramble. Because of the construction of the path, erosion has created many switchback cuts, shortening the trail. From Pala Favera to Coldai, the ascent takes approximately 2 ½ hours, but can be completed in less than 2.

The ascent can also be shortened by a chairlift that operates year-round departing from Pala Favera. However, this does not run in bad weather conditions, or when hiker traffic is not heavy enough. The chairlift shortens the trip by 1 ½ hours, and removes 350 meters from the ascent.

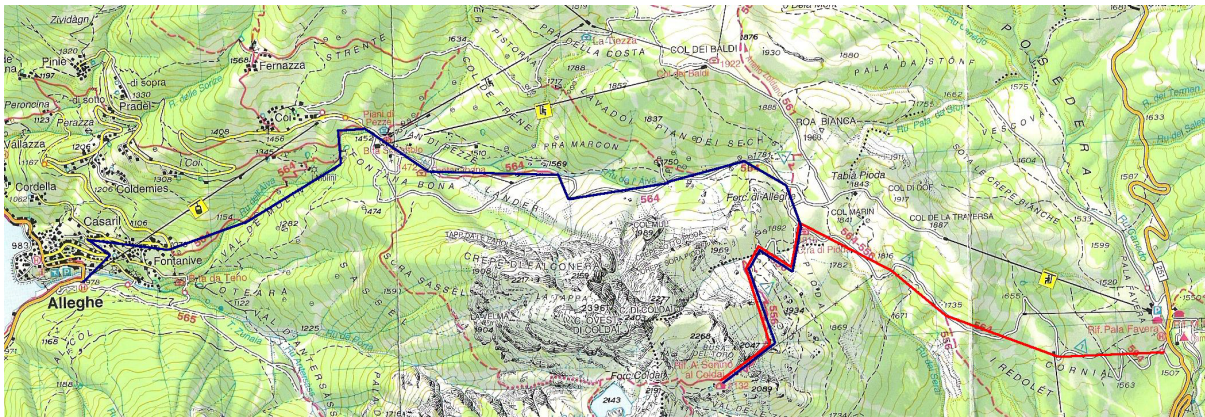


Figure 28: Coldai Excursion

The descent began from Coldai, returning on the same path that was used to ascend, Route 556. Simple as the ascent, there was little difficulty in the trail and it led down to Casera di Pioda. Rejoining Route 564, the path returned to a very wide gravel trail, with some sections in asphalt. Along Route 564 there were numerous summer houses. The descent was consistent and within an hour, we lost about 500 meters of elevation. The gravel path ends at a ski slope that leads down to a ski village. This area, accessible to vehicle traffic attaches to a web of chairlifts, most of them operational in winter, but one operates in good weather during the summer.

The village itself contains many buildings, mostly open during the wintertime. There are three primary buildings, Fontanabona, Piana di Pezzè, and B.ta Scoialtolo. All of these were closed when we passed because of the inclement weather. Departing from the ski village, the trail remained dirt and narrow. Entering Val de Molin, the elevation began at 1450 meters, but descended rapidly. Little skill was required but the trail had some areas that were washed out. After a descent of 300 meters, the trail levels out and follows the Ru dell Àiva. Crossing two bridges, the trail has views of pools and the river.

The trail ends at the upper village of Alleghe, Fontanive. Using stairs or the switchback asphalt roads, it took about 15 minutes from the trailhead to the lake. Altogether, losing a kilometer in elevation, the descent took about 2 hours, This can be shortened by utilizing a chairlift and gondola, which shortens the trip to approximately an hour. Chairlifts range in price from €4.00 to €5.00.

For our return to Venice, we took a taxi from Alleghe to Belluno, and took a train to Venezia-Santa Lucia at the cost of €5.60 via Conegliano. The train trip from Belluno is only 1 hour, 47 minutes and the final departure is at 7:29 pm.

8.1.4 San Marco – Vandelli

Our final excursion brought us on a three day trip to two *rifugi*. Beginning from Venezia-Santa Lucia, we took the train to Calalzo di Cadore for €7.00. From there we took the DolomitiBus line 30 to San Vito di Cadore, and our trailhead at Chiapuzza at the cost of €2.20. After walking the very short distance from the bus stop to the trailhead, we began our journey.

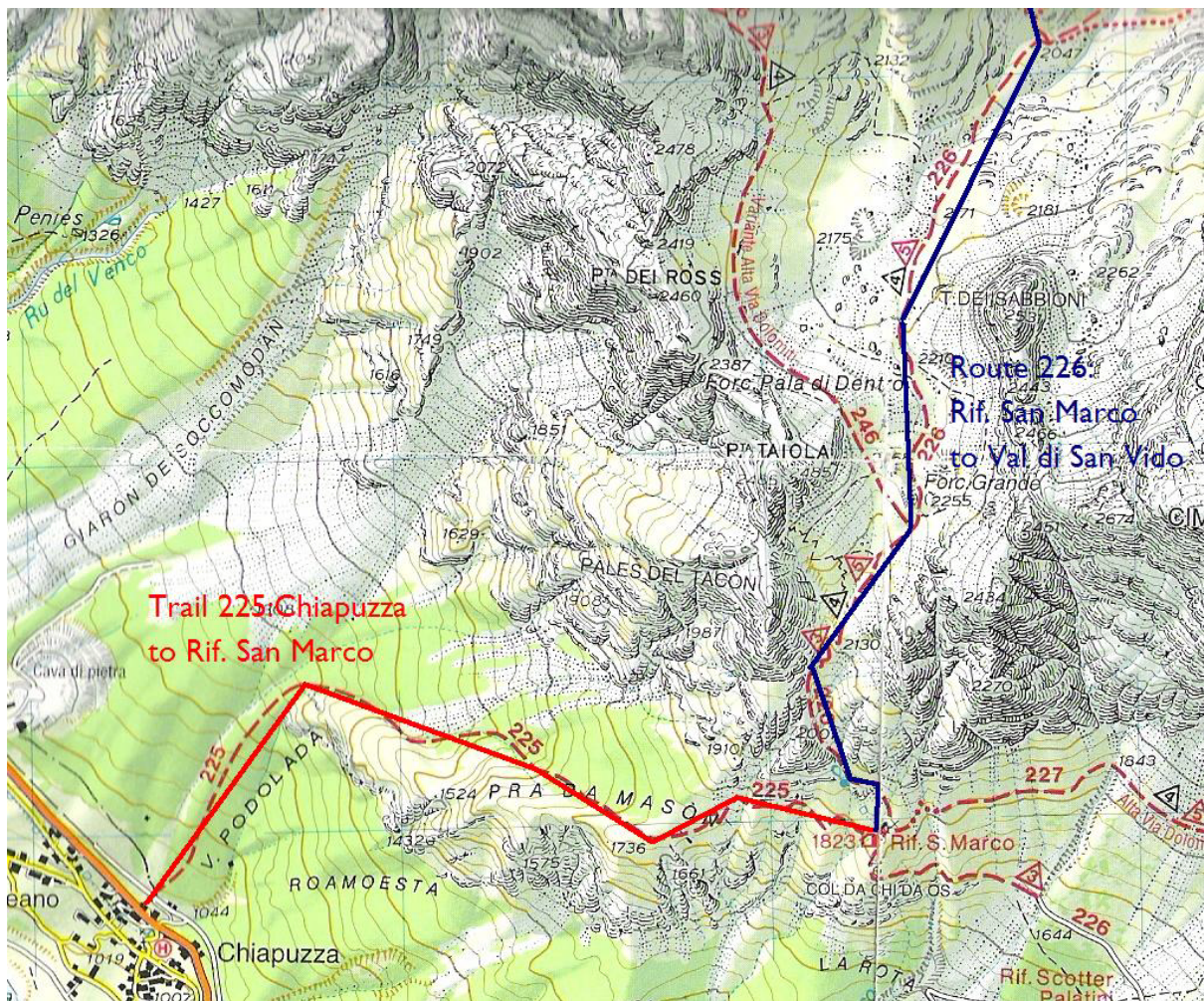


Figure 29: San Marco Ascent, Transition

From Chiapuzza, we followed Route 225. Beginning at 1044 meters, and ending at 1823, the ascent is steep for most of it. With thin tree cover, shade is difficult to find. The path is wide and gravel, making the hike fairly easy. The majority of the trip followed along a deep drainage channel which was followed by some woods. After getting above the tree line, the trail follows along the mountainside. The approach to Rifugio San Marco follows through a meadow. The trip took approximately 2 hours.

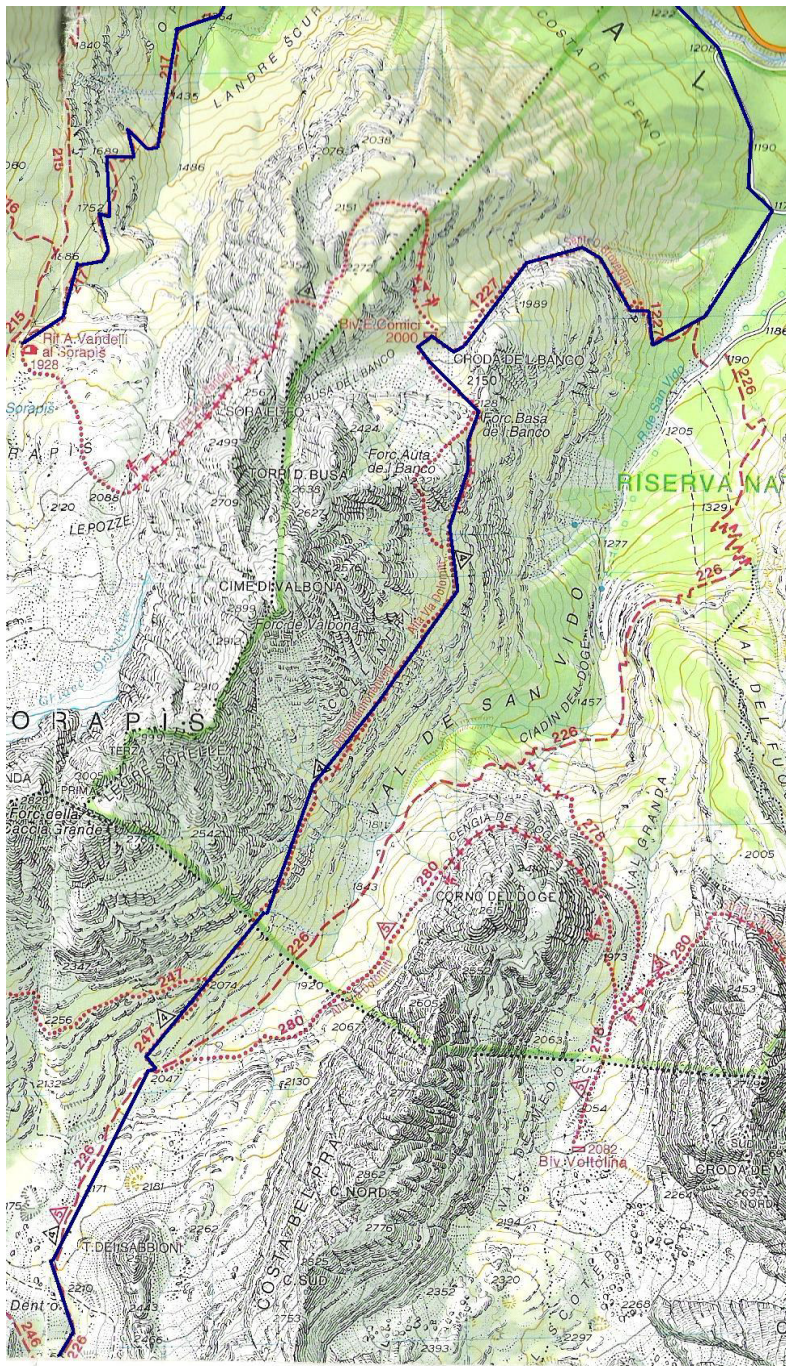


Figure 30: San Marco-Vandelli Transition

cliffs. The path reaches through Forcella Basa del Banco and then descends down towards Bivacco Comici. Progress to this point was approximately 4 to 4 ½ hours of hiking. After a break at the base, we continued down the valley on Route 1227.

The next morning we began the longest leg of any of our trips. Departing from San Marco, we proceeded north along Route 226 through Forcella Grande. This part of the path contained many switchbacks to quickly gain elevation. Route 226 continued until it split into three at the southern tip of the valley.

For a short distance, we traveled along Route 247; this section was steep and required some hand over hand climbing. When Route 247 continued west, we traveled north along the western face of the valley on Route 243.

This section was narrow and traveled up and down along the contours of the rock face. Containing four sections of vie ferrate, the path was difficult and time consuming. At Forcella del Banco, we chose to travel along the Via Ferrata.

The Via Ferrate was approximately 300 meters long with areas of high danger above

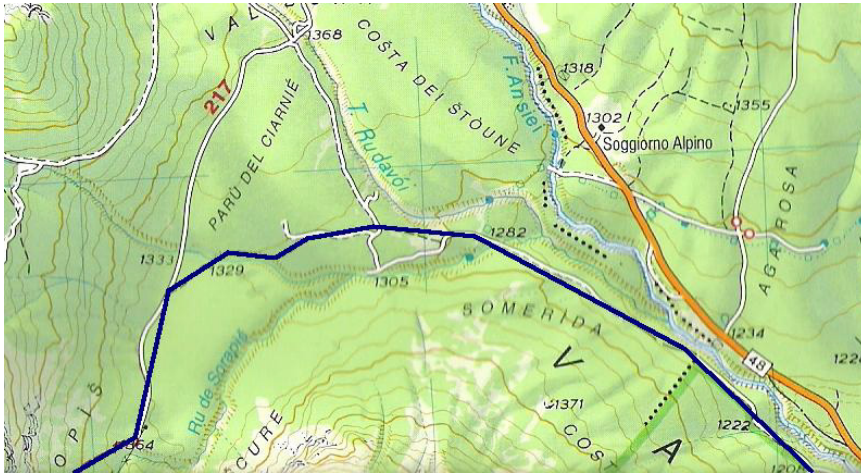


Figure 31: Northern Section of Transition

Route 1227 was steep for long sections and contained many switchbacks. Three sections of the path had vie ferrate, two involved repels. An additional section involved supporting ourselves along tree branches through a slippery section of mud.

The led down to a drainage area with large rocks and a wooded area with leaves covering most of the path. Route 1227 ended at an gravel road at around 1100 meters.

Following above the Fiume Ansiei, the gravel path takes approximately a half hour. To shorten the trip, we followed two paths that cut through the woods that were not marked, but because of use were clear. This led to Route 217 which continues beyond the gravel path for about 300 meters as gravel to the base of Rifugio Vandelli's cable lift.

Route 217 was a clearly marked path that had heavy use. Following switchbacks, the path gains much elevation after a short distance, the path slowly meanders through the woods until it reaches its peak elevation at Vandelli. Most of the path is wooded and the total ascent is approximately 600 meters. The trip from San Marco to Vandelli took 9 hours, and the last leg on Route 227 took approximately 2 hours.

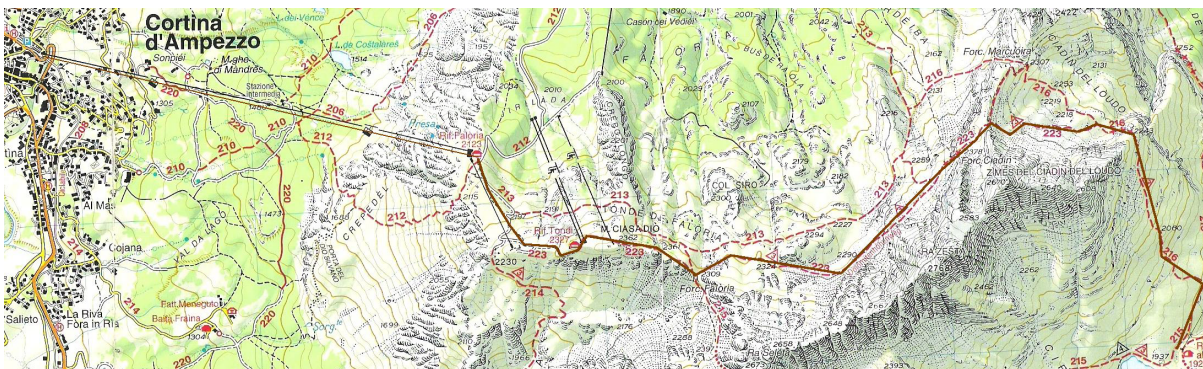


Figure 32: Vandelli Descent to Cortina

Following an overnight stay at Rifugio Vandelli, we continued to the west to Cortina d'Ampezzo. Following Route 216 north from the rifugio, it gains approximately 300 meters to get around the mountain. After a short section of via ferrata and descent, we continued along Route 223, the southern route that loses and gains less elevation. At Forcella Ciadin, Routes 216 and 223 intersect again. We continued along 223 which was made up of landslide areas of small and large rocks. Except for one section of snow, 223 remained at a level elevation until Monte Casia Diò. The ascent was approximately 60 meters and ended at Rifugio Tondi.

When continuing from Tondi, we took the short walk from Tondi to Faloria. Funivia Faloria ran every half an hour at the cost of €10.50 per person. After a 20 minute aerial lift ride, the Funivia ends at Cortina d'Ampezzo Autostazione. From there we took the ATVO bus, for €10.60 down to Venezia-Piazzale Roma.

9 Appendix IV: Pamphlets

Attached Documents Include:

Template Pamphlet

Chiggiato Pamphlet

Venezia Pamphlet

Trenotrekking Vandelli Advertisement

10 Appendix V: *Rifugi* Floor Plans



Figure 33: Chigliato Floor Plans

(Example of floor plans used in our collection of data on the infrastructure and amenities for each rifugio. This particular set of plans is specific to *rifugio* Chigliato. All plans are in .dwf format and are extremely detailed.)

11 Appendix VI: Calendar

Sun	Mon	Tue	Wed	Thu	Fri	Sat
6/12	6/13	6/14	6/15	6/16	6/17	6/18
6/19	6/20	6/21	6/22	6/23	6/24	6/25
		Chigiato				
		Ascent	Descent			
6/26	6/27	6/28	6/29	6/30	7/1	7/2
		Venezia				
		Ascent	Descent			
7/3	7/4	7/5	7/6	7/7	7/8	7/9
				Coldai		
		Ascent	Descent			
7/10	7/11	7/12	7/13	7/14	7/15	7/16
		Vandelli		San Marco		
		Ascent	Transition	Descent		
7/17	7/18	7/19	7/20	7/21	7/22	7/23
7/24	7/25	7/26	7/27	7/28	7/29	7/30
7/31						

12 Appendix VII: Example of specs on CD

Annual Energy Production (4,00 months analysed)		Estimate
Equivalent DC energy demand	MWh	0,683
Equivalent DC demand not met	MWh	0,005
Specific yield	kWh/m ²	23,9
Overall PV system efficiency	%	4,3%
Renewable energy delivered	MWh	0,679
	kWh	679

Figure 34: Energy Production and Consumption at Chiggiato

(Break down of the amount of energy produced by Chiggiato's PV system, and the amount of DC energy demanded but not met)

13 Appendix VIII: Field Form Data


 Alpine Mountain Huts <small>Venice Project Center - Summer 2005</small>		Chiggiato Amenities
Maximum Capacity:	50 persons	
Available Water:	non potable, bottled water available for purchase	
Electricity:		
Restroom Facilities:	Shower toilet mirror sink, Stand up shower toilet in back	
Cooking Facilities:	Private kitchen, Dining room, small bar, hot food, all fresh food, some canned goods, makes some goods to sell for trail, chocolate cake... etc.	
Packaged Goods:	not really	
ADDITIONAL NOTES:		

Figure 35: Chiggiato Completed Amenities Form



Chiggiato Infrastructure

Photovoltaic Unit(s):	2 units, Information on CD. More being installed
Lightning Rod(s):	None observed
Septic System:	CD. Not working (baacteria)
Generator(s):	CD
Gas Tank(s):	
Cable Lift System:	decent condition, falls off sometimes. Staff believes it needs regular maintenance
ADDITIONAL NOTES:	
Heli pad, other projects being planned (on CD)	

Figure 36: Chiggiato Completed Infrastructure Form



Venice Project Center - Summer 2005

Venezia Infrastructure

Photovoltaic Unit(s):	2 PV units. Mounting on roof for more PV has been completed, but those PV are not installed yet.
Lightning Rod(s):	None observed, although there is a weather tower system which would act as a good grounding system
Septic System:	Existent but does not work the way it should because it is too odd for the bacteria
Generator(s):	3 Generators, 27x Battery array
Gas Tank(s):	Propane Tanks
Cable Lift System:	N/A - They can drive up
ADDITIONAL NOTES:	



Venezia Amenities

Maximum Capacity:	60 max but 53 persons allowed 2nd floor: 10 Rooms 3rd floor: 3 rooms
Available Water:	Bathroom water is non-potable (signs posted) Water is available for refill (ask staff) Hot showers (4 euro for 25 liters)
Electricity:	6 generators off at night, with battery backup Light all of the time
Restroom Facilities:	2nd floor: (south end) 2 sinks, 1 toilet, shower, bidet " " (north end) 2 sinks, 1 toilet 1st floor: (outside) Stand up toilet, sink
Cooking Facilities:	
Packaged Goods:	Souvenirs, chocolates, chips, pans, postcards, local maps, dolomite passports, t-shirts
ADDITIONAL NOTES:	
Bar, Dining room for about 60, Wood furnace, Cellular service is not available, Built in 1892 (1st Rifugio in Dolomites.	



Coldai Infrastructure

Photovoltaic Unit(s):	20 good units, look quite new
Lightning Rod(s):	
Septic System:	working well
Generator(s):	Primary and Secondary
Gas Tank(s):	
Cable Lift System:	Looks in good condition, there is a cart to go to cable lift

ADDITIONAL NOTES:

Faucet outside, aqua potable, 2 big oil drums, large oil can by generators, 10 person bivacco



Coldai Amenities

Maximum Capacity:	80 normal, 102 in emergency
Available Water:	Potable, Free
Electricity:	
Restroom Facilities:	Multiple bathrooms, private stalls, hot showers for 4 euro
Cooking Facilities:	
Packaged Goods:	Candybars, postcards, books
ADDITIONAL NOTES:	
Huge cucina, Menu available in Italian and German, hot room to hang dry clothes	

Figure 37: Coldai Completed Amenities Form

14 Appendix IX: Access Tables

Rifugio Table				
Rifugio ID	Amenity Name	Available	Additional Info	Price (Euro)
1	Max Capacity	No		€0.00
1	Packaged Goods	No		€0.00
1	Potable Water	No		€0.00
1	Restroom Facilities	No		€0.00
1	Shower	Yes		€0.00
2	Max Capacity	No		€0.00
2	Packaged Goods	No		€0.00
2	Potable Water	No		€0.00
2	Restroom Facilities	No		€0.00
2	Shower	No		€0.00
3	Max Capacity	No		€0.00
3	Packaged Goods	No		€0.00
3	Potable Water	No		€0.00
3	Restroom Facilities	No		€0.00
3	Shower	No		€0.00
4	Max Capacity	No		€0.00
4	Packaged Goods	No		€0.00
4	Potable Water	No		€0.00
4	Restroom Facilities	No		€0.00
4	Shower	No		€0.00
5	Max Capacity	No		€0.00
5	Packaged Goods	No		€0.00
5	Potable Water	No		€0.00
5	Restroom Facilities	No		€0.00
5	Shower	No		€0.00

Rifugio Table

ID	Rifugio ID	System Name	Installation	Serviced	Specs	Photo	Additional Information
1	1	Water					
2	2	Water					
3	3	Water					
4	4	Water					
5	5	Water					
11	1	Cable Lift					
12	2	Cable Lift					
13	3	Cable Lift					
14	4	Cable Lift					
15	5	Cable Lift			Does Not Exist		
16	1	Generator					
17	2	Generator					
18	3	Generator					
19	4	Generator					
20	5	Generator					
21	1	PV		11/10/1984			
22	2	PV					
23	3	PV					
24	4	PV					
25	5	PV					
26	1	Lightning Rods					
27	2	Lightning Rods					
28	3	Lightning Rods					
29	4	Lightning Rods					
30	5	Lightning Rods			Does not exist		
31	1	Septic					Bacteria too cold to properly degrade biomass
32	2	Septic					
33	3	Septic					
34	4	Septic					
35	5	Septic					