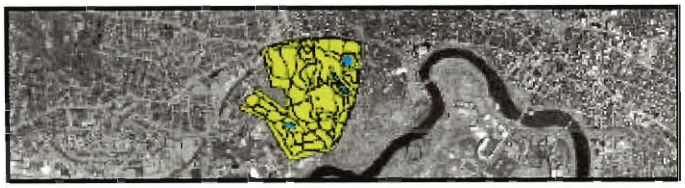
Creation of Cataloging System for Mount Auburn Cemetery

Includes Memorials, Curbing, Fencing, and Path Signs



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ABSTRACT

The purpose of this project was to create and implement a cataloging system for Mount Auburn Cemetery to document the memorials within a region of the cemetery. Effective field practices, database forms, and mapping components have been produced to make cataloging as efficient as possible. The team has documented 500 memorials, but approximately 60,000 remain. Therefore, a Training Manual has been produced to facilitate the survey of the entire cemetery by Mount Auburn staff and interns.

ACKNOWLEDGEMENTS

The completion of this Interdisciplinary Qualifying Project would not have been possible without the help and guidance of many individuals. The project team would like to thank them all for their time and efforts and without their patience and enthusiasm none of this would have been possible.

First, and foremost we would like to thank the administration and the employees at Mount Auburn Cemetery for allowing us to work with them and for allowing us to have the opportunity to work at such a magnificent place. Foremost, we would like to acknowledge our liaison, Ms. Jean Marie Hall, Assistant Director for Buildings and Structures, her support through out the entire term gave us the necessary guidance that we needed to produce this entire project. Her enthusiasm and attention made working for Mount Auburn a wonderful and unforgettable experience. Next, her assistant "Gus" Frasier must be mentioned. Gus aided us greatly in putting this project together and helping with the initial steps of retrieving all of the needed lot cards, maps, and field forms to work with. His efforts and time never went unnoticed and we greatly appreciate his work. Included in the list of Mount Auburn employees that must be mentioned are Ms. Meg Winslow, the Curator of Historical Collections, and Ms. Janet Heywood, Director of Interpretive Programs. Both of these women were willing to give us their time and explain to us some very important background information that made for a solid foundation to work from for our project completion.

We would also like to thank our advisors for the Boston Project Site, our on-site advisor Stephen Pierson, and our co-advisor Fabio Carrera. Thank you Professor Pierson for your advice, guidance, and persistence in pushing us to produce the best project possible. And thank you Fabio Carrera for your advice, time and support through this entire project. Our experience at Mount Auburn would not have been possible without your previous work done with them, and we therefore thank you for this opportunity that you provided for us to work at such a beautiful place.

EXECUTIVE SUMMARY

INTRODUCTION

Located in Cambridge, Massachusetts, Mount Auburn Cemetery has been a remarkable inspiration to many cemeteries and park systems in the United States. Mount Auburn, consecrated in 1831, was the first large-scale designed landscape in North America open to the public. Its picturesque landscape led the way for the design of the Emerald Necklace in Boston, as well as Central Park in New York City. With its tasteful memorials and natural beauty, Mount Auburn is a place where the living come for comfort, and to grieve, learn and meditate in their everyday lives.

Mount Auburn Cemetery prides itself in its vast selection and array of beautiful memorials. There are over sixty thousand memorials erected within its confines, commemorating over 100,000 interred individuals. Since its inception as a working cemetery, Mount Auburn has kept records of the individuals interred in the lots, the memorial erected in their honor, and the location of it within the lot. Unfortunately, no records were maintained of what type of memorial was erected or the components of the memorial. This poses several issues for the administration of the cemetery. As time passes and stone degrades, many aspects of a memorial may fade away, such as its inscription, sculpture, or whole pieces of it entirely. To properly maintain the memorials, some record must be kept to look back upon to be able to restore the memorial. If accurate records are maintained, it may aid in preserving sanctity and beauty in Mount Auburn Cemetery.

GOALS AND OBJECTIVES

Mount Auburn Cemetery is looked upon as a trendsetter by historical organizations in many aspects of resource management. In order to maintain this positive and integral role in the community, Mount Auburn has recently implemented a master plan. In the "Master Plan", recommendations were made to the administration to institute a cataloging system of the cemetery's physical resources. So that proper records can be kept, the goal of this project was to establish an effective cataloging system that could be expanded upon to include all aspects of the cemetery's physical environment. The components involved in reaching the goal are consistent with the principles of the "Master Plan".

The three main components proposed to build the cataloging system each provide useful tools for all to use. The first component to an effective system was to develop successful field methods. The cataloging of the physical resources of the cemetery can be implemented, with maximum efficiency, in order to obtain documentation of the contents of Mount Auburn. Next, creating a well-organized database produced a readily accessible storage media for the vast amount of

resource information contained within Mount Auburn. Data within the database can be manipulated to bring forth any relevant information that the administration may deem useful and important to the integrity of the cemetery. The database component was incorporated with a mapping application to create a user-friendly point-and-click means of obtaining information. Following this, mapping provided a way of graphically representing the data collected and displaying spatial relations. These components provide an information management system aided Mount Auburn in acknowledging and responding to memorial conditions.

METHODOLOGY

Four main methods were used in the development of the cataloging system: preliminary tasks, field work, database set-up with data entry, and mapping. There are two preliminary tasks that were completed before the team could begin the field work. First, to ensure successful data collection in the field, field forms were developed. In order to prepare the surveyor with a complete list of tasks to be accomplished, thorough and easy to understand forms were provided. Second, to successfully organize the data collected in the field, a database was developed to record the information collected on the field forms. A database was chosen as the media for data organization because it is the easiest and best mode of storing large amounts of data. User-friendly forms were developed in Microsoft Access97 that will enable the user to easily and effectively enter data directly off the forms used during field work.

Field work was the prime step in the methodology. The bulk of the information within the database came from the field work conducted by the team. It was crucial to be consistent in the data collection methods to ensure the team obtained as much correct information as possible from each survey. The team broke up into pairs to cover the most area as efficiently as possible, as well as to be able to consult with one another on obscurities, such as material or design type of a memorial. Field sweeps were conducted thematically to ensure consistency in data collection of similar object types. These sweeps were grouped based on the following themes: Central lot monuments; grave markers; fences, curbing, paths, roads and signs; and digital photographs. The information collected in these various sweeps was stored in the database previously developed.

Data entry was another integral step within the methodology due to the fact that data must be entered correctly to avoid complications with data extraction. This data is important because once entered, various queries will be run on the information in the database to bring forth potential situations that would need to be acted upon. For example, a query could be run on loose monuments and once a list is generated, action could be taken to prevent a potentially dangerous situation. If any data were entered incorrectly, the information requested by the query will be

incomplete. This may pose serious implications in the future; therefore, careful attention was given into each form entered.

Mapping was done concurrently with data collection and data entry as lots were surveyed because it allowed results to be visualized with reference to the real world. Each type of artifact has its own layer in MapInfo, including separate layers with indications of loose or missing memorials, memorials with algae or biota growth, and the memorials out of plumb. The Access database provided a means of storing vast amounts of information and the use of maps helped to spatially represent that data. By utilizing the protocols between MapInfo and Access, the team created a seamless joining of the two programs. This allowed for a visual representation of the information gathered that was more user-friendly than the Access interface. The database and mapping linked together provides a strong management tool, in that the cemetery can use maps to pinpoint problematic situations that may exist.

RESULTS AND ANALYSIS

The results can be organized into four main areas. First, a complete inventory of the island containing Bigelow's Chapel has been completed, including all condition assessments of the memorials, as seen in Figure 1. Second, the team has set a solid foundation for the continuance of this project to be expanded upon to incorporate the entire cemetery. This is a one-of-a-kind system that has never before been implemented by another cemetery. The third result of this project was an information management system for the administration of Mount Auburn Cemetery. The database produced can hold all information that has been collected in the field. Mapping components, as seen in Figure 2, can be used to pinpoint memorials with certain conditions, such as loose memorials in need of repair. Fourth, a Training Manual has been written to easily train any future interns that will continue this project. The manual covers all aspects of cataloging, from field work to database forms and data entry to mapping methods.

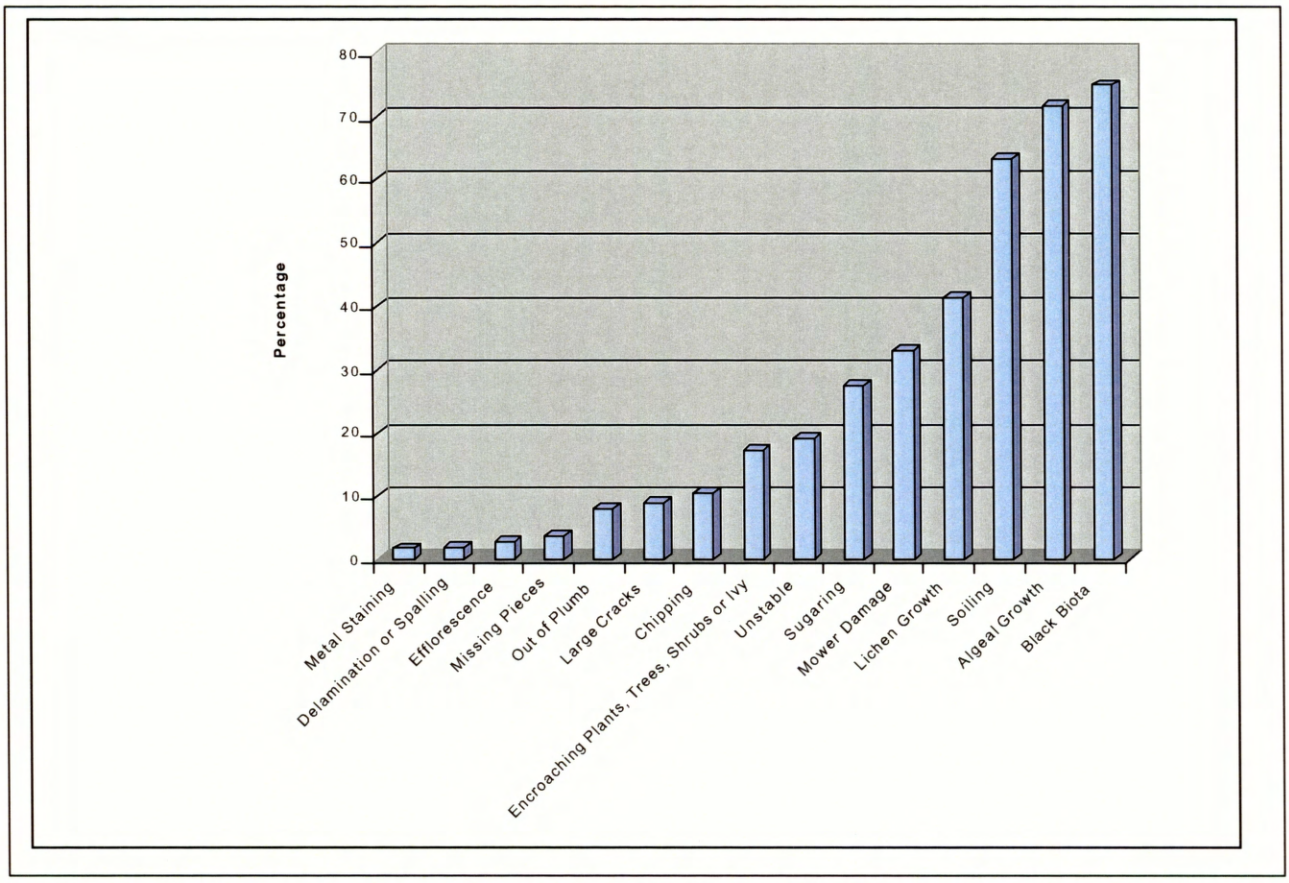

Figure1. Memorial Conditions. The distribution of the types of conditions prevalent in the island surveyed.

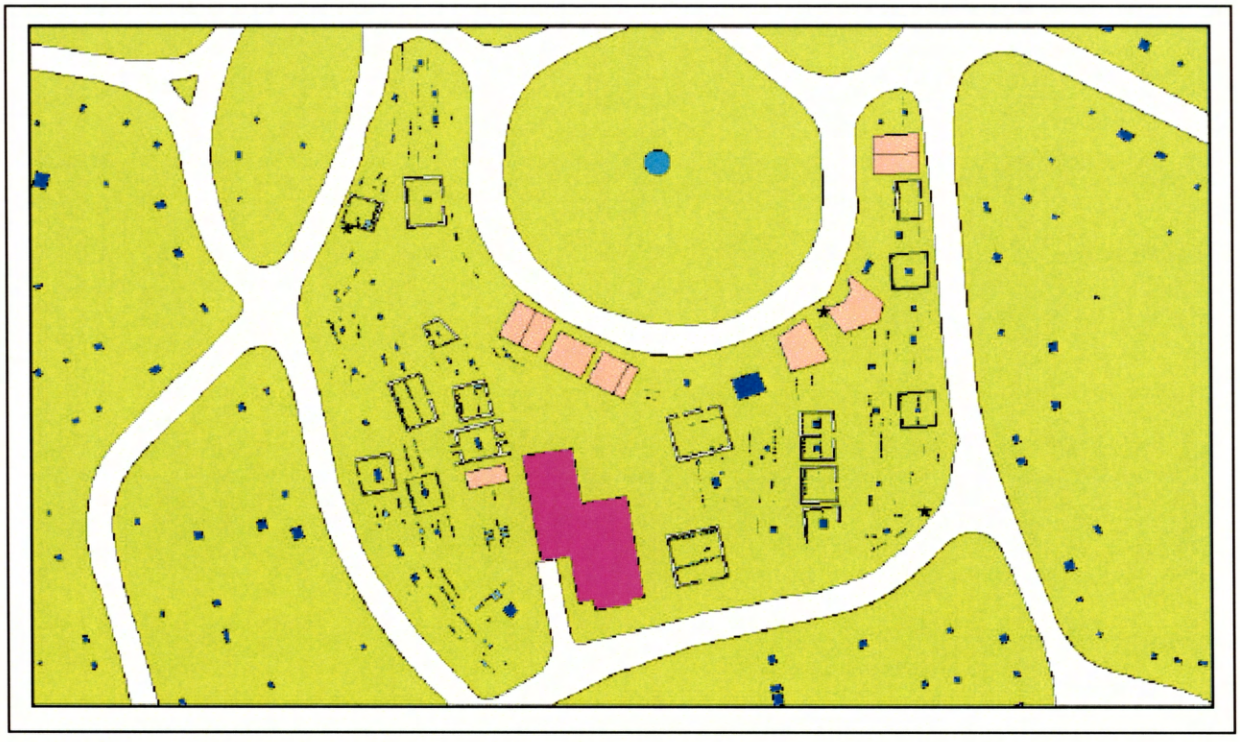

Figure2. Map of the Cataloged Island. The overall map shows how the island would be viewed from above.

RECOMMENDATIONS AND CONCLUSIONS

In conjunction with the Master Plan, the main goal of the project was to develop an effective methodology to efficiently catalog the physical resources within Mount Auburn Cemetery. All objectives have been completed, and a test island within the cemetery has been successfully cataloged. The system developed can now be implemented throughout the remaining islands of the cemetery. For further extension of the catalog, the tree survey from the Horticulture Department can be integrated to produce the full topology of the cemetery. This topological map can be fully analyzed, showing all trends existing in Mount Auburn, and aid in implementing future management policies and maintenance procedures. Ultimately, these procedures will enable Mount Auburn Cemetery to implement efficient and effective stewardship of their cultural resources.

AUTHORSHIP PAGE

All members of this four-person team have contributed equally to all portions of this paper and the Training Manual. All members were actively involved in the computer work required to produce the maps and database that are the products of this project.

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1. INTRODUCTION

Mount Auburn Cemetery was the first rural cemetery built in the United States. Located in Cambridge, Massachusetts, Mount Auburn has been a phenomenon to visit since it was officially consecrated in 1831. Contained within its confines is a beautiful array of obelisks, memorials, mausolea, as well as many horticultural characteristics. Inspired by Paris' Père Lachaise and Oriental gardens, Mount Auburn was developed by Dr. Jacob Bigelow, along with the Massachusetts Horticulture Society (MHOR), who was actively involved in introducing the variety of botanicals present today.

Since its inception as a working cemetery, Mount Auburn has kept records of the individuals interred in the lots, the memorial erected in their honor, and the location of it within the lot. Unfortunately, no records were kept of what type of memorial was erected or the components of the memorial. This poses several issues for the administration of the cemetery. As time passes and stone degrades, many aspects of a memorial may fade away, such as its inscription, sculpture, or whole pieces of it entirely. To properly maintain the memorials, some record must be kept to be able to restore the memorial. Accurate records may aid in preserving sanctity and beauty in Mount Auburn Cemetery.

Within the past year, Mount Auburn Cemetery has taken steps forward in the cataloging of some physical resources. Student teams from Boston University have been working diligently to catalog all present mausolea within the cemetery. Yet the cataloging done represents only a small fraction of the type of memorials cataloged. The goal of this project is to extend what has been started to include all types of memorials found within the cemetery. To achieve the goal, this project has implemented a system to efficiently catalog and document all physical aspects of a trial island - the island containing Bigelow's Chapel. This island was chosen because of its historical im portance and its significant location within the cemetery.

A database was chosen not only because it's the most efficient means of storing large amounts of information but also for how well it lends itself to manipulating the information contained. The la ck of a general database for storage of information on the memorials may have an effect on the maintenance and cleaning procedures by the staff at Mount Auburn Cemetery. In the database, information such as dimensions of the object, materials used to build it, owner, and the state of conservation the object was recorded. With these conditions in mind, the team can provide information about the memorials to the administration. The results from the field work can be used to analyze present conditions, and the procedures currently used.

Upon completion of the project, the team introduced an effective data collection and recording scheme as well as a training manual to the administrators of Mount Auburn. This scheme aids the administration in the upkeep of priceless memorials found within the cemetery, and the training manual guides them and any future interns through the cataloging and computer program aspects. Ultimately, the team hopes to reduce the deterioration of memorials and to preserve the sanctity and beauty of Mount Auburn Cemetery.

With the goal and purpose of the project stated, a brief overview of the report is provided to inform the reader of details within the report. Chapter Two contains all historical and background information pertinent to the project. The history of cemeteries, including Mount Auburn Cemetery is discussed, as well as cemetery management. Finally, the horticultural characteristics of Mount Auburn Cemetery are discussed. Chapter Three will cover the methodology, documenting the procedure that was used to achieve the goal of an effective cataloging system. Results and Analysis, will be discussed in Chapter Four. This chapter will show the reader the quantitative results from the data collected in the field, and the underlying trends found by further analysis of the data. Conclusions and Recommendations will follow in Chapter Five and sum up the findings of the project and make suggestions to the administration for further projects and procedures that should be implemented in the near future. .

2. BACKGROUND

For as long as the human race has existed it has perished. It is for this reason the human race has had burial practices since Neolithic times. These practices have progressed from a simple burial to the modern day elaborate garden cemetery, leading one to one wonder how these practices have evolved over time. As cities grew larger and space became scarce, the location of burial left the city for more open rural landscapes such as Mount Auburn Cemetery. Through all these changes, it has become necessary to manage cemetery resources. This rich history of cemeteries has paralleled the state of humanity and has reflected society through its burial practices. This chapter will outline the progression of simple burials to the modern day garden cemetery and the management practices of cemeteries.

2.1. The History of Cemeteries

Throughout time, mankind has entertained many ways to bury the deceased. Burial practices evolved from early graves in caves, to the elaborate tombs of the Egyptians and the catacombs of the Etruscans, Romans, and early Christians. The human race has at times given death its own place away from the living and at other times has taken it into the world of the living. People surrounded death with life and activity, or even celebrated religious rites in the houses of the dead. Mankind's placement of the departed has almost come full circle from the times when the ancient necropolises were away from the living to the current view of the rural, park-like cemetery.

The earliest way of interring in most western and eastern societies was to use a tomb. The idea of the tomb is that it was a house similar those of the living, dating as far back as the days of Neolithic populations, buried in caves similar to those of the living. In some societies, such as the Egyptians, the tomb contained many of the rooms and items that a normal home would have [1]. The tomb would house a dining hall with a feast set up for the deceased. At the table in this hall there would be a statue of the deceased[2]. In this society, the houses of the dead were far more extravagant than the houses of the living. This pattern of thought is mirrored in the practices of the Chinese, Romans and the Lycians, where palaces were replicated as tombs for the dead. The place where the common man was buried in these early times was drastically different from that where the rich were laid to rest. The common man could have a small-unmarked grave or a mass grave if he were a slave. The belief of this era was that the common man did not have as much respect in the afterlife as the rich and noble did.

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[1] Curl, James Steven, A Celebration of Death. New York: Charles Scribner's Sons, 1980. p. 6
[2] Ragon, Michael. The Space of Death. Charlottesville:UPV, 1983. p. 27

The Roman idea of burial developed into the catacombs. The catacombs started as abandoned mines where bodies were placed when they were not cremated. These underground tunnels were originally not segregated by race or religion. This lasted until the Jewish community of Rome decided to make their own catacombs so they would not have to lie for eternity with the pagans. These catacombs were made alongside the roads outside of the city. The ultimate expression of these ideas was the early Christian catacombs. The Christian catacombs are the best known because of their expansive size beneath the cities of Rome and Naples, as well as other cities in and around Italy[3].

Each metropolis of ancient times would have a corresponding necropolis. The necropolis would be indicative of the memorialized person's station in life[4]. The grouping of tombs near a city shows much about the city. The wealth of a city is apparent in its neighboring necropolises, where the small plain tombs are frequently those of the poor or common people while the larger and more elaborate belong to the wealthier men and women of society, such as nobles, clergy, and merchants.

The problem that developed with the distant tombs of ancient times was that grave robbers would break into them and steal any valuable items from the tomb. For this reason, the burial grounds were moved from the outer edges of a town to the town's center during the late Roman Empire and early middle ages. Also at this point the cemeteries began to be walled up to add security against grave robbery.

This moving of burials into town slowly developed to the practice of entombment in churches. This practice started with Emperor Constantine, who was buried in a church in the city of Constantinople in 411 B.C[5]. Then, as the churches filled up their yards and crypts, more and more areas of the church would be used and the area beneath it would become filled. Eventually, the bones of those beneath the church would be moved elsewhere to make space. Well-known examples of this church burying practice include Westminster Abby in London, where the royal family of England resides, and St. Peter's Basilica in Rome, where popes are laid to rest.

The over-crowding of churches led to the creation of the "charnel house" in the Middle Ages[6]. This is where the bones of the dead were placed after the churches ran out of space. These houses of burial also became the social center of many European towns of the middle ages. This was because of their central location within the cities. "Charnel houses" were large enough to house many people for a social event such as a theater troop's performance. These bones houses also were the location of religious celebrations on feast days when the churches overcrowded.

Around 1800, the practice of using the old churchyards and the other city areas reverted back to the internment of the deceased in individual graves away from the city of the living. At this time, the

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[3] Ibid, 59
[4] Ibid, 39
[5] Ibid, 50

modern cemetery movement began in Europe. The idea was to put aside a large plot of land outside the city for the deceased to be buried in. The rural-cemetery movement stemmed from the overcrowding of cities, because there was nowhere left in the city to bury people. Health concerns posed by intramural burial were also a factor in the establishment of the rural cemetery. When the cemeteries flooded they were thought to contaminate the water supply. St. Louis Cemetery was built outside of New Orleans for this reason. St. Louis helped begin the movement of cemeteries from the cities.

Mount Auburn's consecration in 1831 is considered the beginning of the rural-cemetery movement in the United States. Following the Revolutionary war, Boston experienced a time of rapid growth, and by the 1820s had nearly tripled its population. The city was unprepared for the increase in urbanization, and fear of contamination of the water supply by in-city burials was common. Therefore the need of a cemetery outside the city, in a rural area was imminent. Prior to this, burials within cities were often near the center of town. The central location made it convenient for most citizens to visit their loved ones and take care of the burials. Moving the cemetery to the outside of the city made it much more difficult for the families to visit the departed on a regular basis, which fed the need for services that could be provided by a cemetery caretaker.

2.2. Garden and Rural Cemeteries

Like rural cemeteries the first garden cemetery was built as an answer to a lack of inner-city burial space adjacent to the church. Generally, a garden cemetery was a plot of land set aside, within the confines of a large city, that made burial space more personal and sacred than the common lots typically seen in inner-city lots. At points throughout history, garden cemeteries would be built entirely separate from the metropolis it was intended to accommodate, thus being named a rural cemetery. Often, before public parks were in existence, the prettiest garden in a small town was the rural cemetery[7]. Although it is possible for a rural cemetery to have characteristics of a garden cemetery, it will be considered "rural" nonetheless. Conversely, a garden cemetery may not always be rural, for it can be constructed and developed in an area contained in a large city. In this section, the birth of these two types of cemeteries will be discussed and how they have influenced present-day cemeteries throughout the world.

The first and most influential of the garden cemeteries in the United States was Mount Auburn, located in what was then a suburb of Boston. Mount Auburn, consecrated in 1831, was not a public cemetery, but a private, non-profit cemetery[8]. It is the first large-scale designed landscape in

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[6] Ibid, 51
[7] http://centralia.ctc.edu/~dmartin/Bot250/readings/u6.html
[8] http://www.ci.worcester.ma.us/parks/cemetery_history.htm

North America open to the public. Like other garden cemeteries, the founding of Mount Auburn Cemetery resulted from the lack of inner-city burial space.

Ecclesiastical institutions in the Boston area tried to lessen this problem by making their own land a place of burial. In 1819, Saint Paul's Episcopal Church petitioned the first Boston City Council for its basement to be "recognized as a public cemetery." The committee studied and approved the proposal for the crypt. When Josiah Quincy became mayor of Boston in 1823, one of his first orders of business was an attempt to undo the "dangerous precedent" set by the City Council in permitting burials in church cellars, fearing that more Boston churches would take advantage of the privilege Saint Paul's received. On June 25, 1823, Mayor Quincy ordered a complete investigation of all urban burials. Ideally, Quincy wanted the city to open a common place of burial with "wall and watch" to "maintain the sanctity of the sepulchers" [9]. After filing a forty-page report, Quincy formed a second committee to select a site for creation of this new cemetery. Unfortunately, this commission did very little, except create new, extramural burial places.

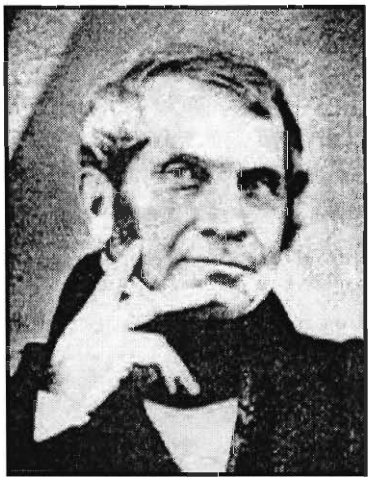

Figure 3. Portrait of Dr. Jacob Bigelow.

In light of this issue, more and more steps were being taken to improve the situation. The mayor wrote to Dr. John Collins Warren to elicit suggestions on how to end urban interments. Warren replied that he would only favor finding additional land within the city, and that "it would be advantageous to the health and beauty of the city to open new cemeteries in different parts and especially in the vicinities of churches[10].

Proposals for alternatives to Boston's graveyards continued, but only one individual took action – Dr. Jacob Bigelow. Bigelow, seen in Figure 3, was one of Boston's new elite, the son of a small-town minister. His proposed cemetery would not be purely functional, but would fill many other cultural needs, such as honoring the deceased, teaching moralistic lessons and fostering a sense of the past as pertinent to present and future. He gathered supporters, and held his first cemetery meeting. After this meeting, George Bond and John Tappan volunteered to search for a fitting site. They tried to acquire pieces of lands from their owners, but many declined. Meanwhile, he concentrated on attracting the attention of the city's cultural leaders and discussing literature and the creation of voluntary associations for making Boston the "Athens of

[9] Linden-Ward, Blanche. Silent City on a Hill – Landscapes of Memory and Boston's Mount Auburn Cemetery. Columbus: Ohio State University Press, 1989. p. 164.

[10] Idem.

America"[11]. One of the associations was the Massachusetts Horticulture Society (MHOR), which was granted a charter in 1829 to develop the quality and diversity of plants grown in New England. Henry A. S. Dearborn led this organization, and Bigelow became part of this society by becoming its corresponding secretary.

As soon as MHOR undertook sponsorship of the cemetery, Dearborn asked societies in London and France to send him literature and maps on similar landscapes and funerary monuments. He received the information, most of it containing details about Père Lachaise. Dearborn tried his best to incorporate all the greatest aspects of Père Lachaise, and turned to English gardeners and aesthetic theorists.

George Watson Brimmer, a merchant and member of the same circles as Bigelow purchased seventy-acres of rolling, wooded land on the town line between Cambridge and Watertown, as real estate values were soaring. The beauty of this land inspired Brimmer to nickname it "Sweet Auburn". On June 8, 1831, MHOR convened a public meeting of potential cemetery subscribers to describe plans, purposes, and functions of the cemeteries. Purchase of the 72-acre property would be complete as soon as one hundred subscribers of $60 were found[12]. Each subscriber would be entitled to a family burial lot of fifteen feet by twenty feet[13]. The $6,000 raised was used to purchase Sweet Auburn from Brimmer[14]. A week later, Dearborn announced that the land would be used for both a cemetery and an experimental horticulture garden, to be created separately on two sections of ground, which attracted other horticulturists to become active in the cemetery project. Dearborn created a committee of twenty prominent Bostonians, who frequently met to discuss how to publicize the cemetery. Bigelow soon thereafter changed the name of Sweet Auburn to Mount Auburn.

Dr. Bigelow created Mount Auburn Cemetery with several founding principles. It was to be built on a large-scale, permanent site with a rural setting. It was to contain a picturesque landscape with family plots, and it was to be a non-profit, non-sectarian cemetery. These founding principles led the way for future development to be done in a manner that would preserve the beauty and pleasure of Mount Auburn.

In its first year, Mount Auburn was more popular than Père Lachaise was in its first two decades. Prosperous Bostonians were eager to purchase their own burial space. The creation of Mount Auburn reflected the modernization of American culture. Despite this, Mount Auburn was inspired by older English gardens and French cemeteries, which completed Bigelow's vision of "fostering a sense of the past as pertinent to present and future". Figure 3 shows the impact Dr.

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[11] Ibid, p. 174.
[12] Marion, John Francis, Famous and Curious Cemeteries. New York: Crown Publishers, 1977. p. 56.
[13] Linden-Ward, p. 185.

Bigelow made on the cemetery - the Mount Auburn Cemetery Chapel was built by Bigelow himself. Even to this day, Mount Auburn is visited and revered by many as a symbol of the Boston Area.

2.3. Cemetery Management

The workings of a cemetery have become increasingly complex as a result of privatization. Handling the daily tasks associated with a cemetery is not a glorious job but necessary for the preservation of the deceased. The delegation of responsibilities to various departments within a cemetery helps to keep organization and increases efficiency. Most cemeteries have to balance the commercial goal, whether it is a business cemetery or a non-profit cemetery like Mount Auburn, with the integrity often associated with the deceased. Usually a director is in cha rge of defining and maintaining this balance for the cemetery.

The rise of for-profit cemeteries in the mid-nineteenth century furthered the need for caretakers. Privately owned cemeteries began to spring up and, in order to attract business, they had to provide services that exceeded those of public cemeteries. These cemeteries began to provide services like maintenance and perpetual care to plot owners. With the emergence of privately owned cemeteries came the need for someone to oversee the daily business of the cemetery. Prior to this, cemeteries were often maintained and coordinated by a member of the church the cemetery was associated with. This marked the transition of the cemetery from a service provided by a church, to a corporation with a business agreement with a particular diocese. The need for cemetery management was becoming greater and is now common practice.

The cemetery director handles such tasks as organization, personnel administration, development, sales and service, operations and maintenance, regulations, and finances. A director also manages key aspects of the overall cemetery organization. It is common for a director to establish departments dedicated to meeting specific tasks or handling key aspects such as setting objectives, planning the cemetery's needs, building the cemetery organization, maintaining public relations activities and making appraisals[15].

The director might also be in charge of the personnel administration or delegate this to the head of that department. This area of the cemetery organization would be responsible with handling the selection of personnel, employment standards, employee relations, personnel policies, training and

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[14] Marion, p. 56.
[15] Klupar, G. J. Modern Cemetery Management. Chicago: Catholic Cemeteries of the Archdiocese of Chicago, 1962. pp1-34

development, training programs, internal communications, union relations and safety. Personnel is one of the aspects that most businesses need, but must be tailored to meet the needs of a cemetery[16].

The development department of the cemetery is responsible for the acquisition of land, its layout and its use. The development department is predominantly responsible for the landscaping aspect of the overall cemetery grounds. Some of the factors this department might be responsible for are working with consultants, preparing the plans for the cemetery's actual layout, making plans for expansion, and bringing those plans about. The actual purchasing of the land for initial use or later expansion would be delegated to the sales and service department[17].

While trying to avoid over-commercialization of a cemetery and preserve it as a solemn place of religion the sales and service department is necessary if any of the other services require money. The sales and service department concern themselves with such things as the cemetery charter, offerings of goods and services to plot owners, administering a counseling program, service representatives, special needs, and pricing. The sales department is responsible for most of the business aspects of the cemetery[18].

Operations and maintenance are often given their own department due to the fact that this is a large part of the functioning of a cemetery. If this department does its job well, the aesthetic prestige of the cemetery will help to increase plot sales and establish a respect for those buried there. Managing this department is no small task and deals with things like organizing the work force, planning and scheduling work, setting operating standards, controlling work performance, handling operational problems, reducing operational costs, building maintenance, plot maintenance, selecting and maintaining equipment[19].

When managing a cemetery it is also necessary to be knowledgeable of the relevant laws and regulations. These laws and regulations may fall under religious regulation, civil law, legal tenure, governmental regulations, exemptions, internal regulation, lot and grave planting and maintenance funds and perpetual care. A cemetery must not only meet the requirements set forth by legislature, but must also do its part to uphold the requirements set forth by the church. Meeting both these high standards is not a small task and is usually given a very high priority by the cemetery director[20].

The financial department is concerned with the internal economic aspects of the cemetery. This department is responsible for the operating revenue, expenditures, handling of accounts, controlling labor costs, office records, record management and care funds. It works closely with the sales and service department, and together they handle all economic aspects of the business of the cemetery.

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[16] Ibid, p35-90
[17] Ibid, p91-130
[18] Ibid, p130-168
[19] Ibid, p169-248
[20] Ibid, p249-336

Having presented a general view of what managing a cemetery entails, it would be beneficial to talk about Mount Auburn specifically[21].

2.4. Cemeteries as Businesses

In the recent half-century cemeteries have become emerging sources of profit in the commercial sector. The values of a cemetery have shifted more towards the business ends and have weakened the strong traditional religious ties commonly associated with a cemetery. Large corporations have removed the personal intimacy of relationships between a person and the cemetery for the sake of raising their stock a few points. Things like maintenance, conservation, and historic preservation are deemed unprofitable and most commonly will only be done at some expense to the plot owner or their family.

A good example of this is The Leowen Group. The information that is made available through their website[22] is primarily concerned with the business ends of death. The one link that is there called "coping with grief" is a plug for a book they are trying to sell. There is relatively little information of a humanistic nature.

Mount Auburn has continued to uphold its values as a solemn place to remember someone's passing in spite of this modern corporate trend in cemeteries. As a non-profit cemetery Mount Auburn is strongly concerned with the condition of its monuments and memorials and understands its role as a cultural resource.

Mount Auburn's continued existence as a non-profit public cemetery is a testament to its integrity as an organization. A master plan was written in 1993, which set guiding principles for the cemetery and a second master plan is currently in the beginning stages. The administration is dedicated to upholding the image and integrity of Mount Auburn through the key principles of being and innovative cemetery and continued public use and education. Mount Auburn has never been just a cemetery and continues being a treasured cultural asset. Some of its many roles are a horticultural resource, a historic and cultural artifact and a sanctuary for wildlife.

The key goals to be achieved or maintained through administrative policies were outlined in the 1993 master plan. These goals are: 1. Preserve and strengthen the Cemetery's visual character and historic design intent; 2. Reaffirm the future of Mount Auburn as an active and innovative cemetery for burial and/or memorialization; 3. Facilitate the appreciation and appropriate use of Mount Auburn cemetery; 4. Protect and enhance the health of the cemetery's natural systems; 5. Protect the historic and functional integrity of Mount Auburn's built elements; 6. Support and strengthen the high quality of the maintenance and management of the cemetery. These notions are examples

[21] Ibid, 337-404
[22] www.leowengroup.com

of the mindset of the administration and the high regard that they hold the organization they work for in.

2.5. Mount Auburn Cemetery and its Horticulture

Mount Auburn Cemetery is not just a cemetery, it is also a wonderful site for horticulture and arboriculture. The gardens within Mount Auburn are some of the most amazing and beautiful within the United States. The sight of Mount Auburn was selected because of its green oasis and its great stand of mature trees. This sight also is set on terrain that varies greatly, making the landscape more exceptional then most. By the 1830's, most trees within Cambridge had been removed for houses, and the acreage left where Mount Auburn is located was the most prominent and appropriate space for Dr. Bigelow's intentions. Therefore, the landscape and its world-renowned arboretum are topics worth discussion.

The horticulture of Mount Auburn Cemetery is the first noticeable trademark when entering the cemetery. Mount Auburn Cemetery is presently a 174-acre cemetery and resting place for over 100,000 of New England's deceased and immigrants from around the globe. The pride of the cemetery is its collection of trees, consisting of seventy-five genera, three hundred forty-one species, and 3,000 specimens, as estimated in a 1979 census. Although these numbers are not the biggest in the country, what makes Mount Auburn's trees so unique is the quality and the diversity that exist within it.

The diversification throughout the cemetery provides color and texture during all times of the year. This diversity extends the spring and summertime blooms, in autumn it accentuates the fruits and colors, and in the winter the shapes. The most variety can be found among the trees. Fifty-two percent of the trees are native to North America, sixty-one percent are deciduous, nineteen percent are coniferous and twenty percent ornamental flowering. Maple trees are the most numerous; there are twelve species and five hundred sixty-six specimens. Also numerous are the Siberian Pea tree, the Filbert tree, Caster Aralia, and the Japanese snowbell. Mount Auburn has one hundred sixty-nine pine trees with seventeen species, one hundred forty-five crabapple trees with thirty-seven species, and five hundred dogwoods with thirteen cultivas. There also exists over fifty-five elms with eight different species and there are also four rare trees of heaven.

The cemetery and its horticulture are all very well manicured by a large staff working to enhance the landscape everyday in an attempt to create the same feelings of horticulture that existed in the 1830's. The variety of colors given off by the different flowering plants, the creeping vines, and the questing thickets, making the park a magnificent place for city dwellers to visit. And emerging from the foliage are luminous sculptured stones. The landscape was designed with the idea

of creating the effect of a forest and still allows abundant sun through the canopy to nourish the plants and light the statuary within.

The three men to originally design Mount Auburn Cemetery were Dr. Jacob Bigelow, Henry A.S. Dearborn, and Joseph Brimmer, and these three complemented each other well. All had great knowledge of plant materials and from their travels, and were familiar with many European parks and gardens, which would prove to influence the cemetery greatly. At Mount Auburn the actual layout has not changed very much from the original. Bigelow wanted to preserve the natural canopy supplied by the oak, pine, beach and walnut trees. The only reason for grading was for some roads, waterworks, and any awkward depressions that existed. The committee of Bigelow, Dearborn, and Brimmer laid a network of twenty-three carriage roads and seventy-four paths. These roads and paths would be lined with picturesque foliage and would lead visitors across the landscape. General Dearborn became the leader and landscape designer at Mount Auburn when it was in its beginning stages.

Dearborn felt that "The general appearance of the whole grounds should be that of a well-managed park"[23] in the English fashion. He sketched his original plans of shrubs and flowers to be in large ten-foot wide border strips along major avenues. The flowers included new bulbous varieties, perennials and "wild" flowers. Presently, annuals are also planted and cared for by the Massachusetts Horticultural Society. Mount Auburn Cemetery is mainly acknowledged for its trees, and is the first United States landscaped burial ground.

Mount Auburn is a place to visit and retreat when relaxation and peace are needed. This rural cemetery is more than a resting-place for the deceased; it is a place to find comfort and beauty. The botany within Mount Auburn seems to give the feeling of being in the country or in the wild, and most importantly, out of the hustle and chaos of the Boston City life.

The Mount Auburn rural cemetery is visited every year by thousands of historians, bird watchers, artists, and Bostonians. The cemetery holds interest to many, not just for the famous that are buried, but also for the pure reason of visiting a park. To relax, and take in the nature that lives within its boundaries.

In the springtime, when the flowers are in bloom, and the birds have started to return North, Mount Auburn is known as one of the Northeast's leading birding hotspots. Upon arrival to the cemetery, the front office has maps and brochures for those interested in sighting the many different varieties of birds that fly through. For the artist, Mount Auburn is an amazing canvas in itself. It is said that the monuments are just a small part of the cemetery, it is her landscape and

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[23] Horticulture, "The Garden of Earthly Remains", Jerry Howard, V65, September 1987.

natural botanicals that add to her beauty and attraction. The footpaths, ponds, hills, and eye-catching architecture make the cemetery an enjoyable place to visit and walk through again and again.

2.6. Iconography

Mount Auburn is proud of its heritage and shows this in the upkeep of the memorials contained within its grounds. The field of study about the memorials in cemeteries is called iconography. This knowledge is relevant because one requires a working knowledge of these memorials in the cemetery in order to be able to categorize them and create a database. A detailed description of each memorial, with definitions and photographs, can be found in Section 2 of Appendix A.

The central family monument, usually placed in the central axis of the familial plot, commemorates the whole family that is interred in the lot. It is usually the largest monument on the lot and is inscribed with the family name. It may also contain the names of the family members usually with the patriarch's name inscribed most prominently.

The next type of memorial is the grave marker, which commemorates the life of an individual or two and usually bears the name of those buried there. They are most frequently smaller than the central lot monuments and are the most common memorials in a cemetery.

Both central lot monuments and grave markers can take on many forms that can have a different type of meaning to those who had it erected. Within this category, there are many design types. Headstones are commemorative markers for one person or two that is erected in honor of the deceased, placed on a stone base. A tablet is simply a headstone without a stone base, usually denoted by its slenderness. A footstone is similar to a headstone, but is placed at the foot of the grave. Another type of marker is a flush marker that is at the same grade as the ground, usually covering the grave. Ledger stones are similar to flush markers, but not flush with the ground and usually covers the entrance stairs to an underground grave. An obelisk is a four-sided memorial that tapers upwards to a pyramidal-shaft top. A pedestal is a four-sided, rectangular memorial that can sometimes hold other structures above it. A sarcophagus is a solid stone structure with burial underneath in the shape of a coffin. In ancient times, a sarcophagi was used as the actual coffin to bury the deceased. A column is a cylindrical shaft-like memorial. A cross is a typical religious symbol used for a grave marker. Many grave markers have carving, details within any marker that make a marker personalized for the family. A boulder is a geological object with some sort of commemorative marking such as a bronze plaque or inscription. Tables are short, four-legged structure topped with a flat surface. A canopy is a covering above any type of marker typically on raised columns to protect the memorial beneath it. Benches may also be used as a grave marker or as a type of lawn ornament.

The next type of memorial to be considered is the tomb. The tomb can be broken down into two types, mausolea and side hill tombs. The mausoleum is a freestanding structure that is designed with shelves to hold the remains of the departed. After these shelves are occupied they are sealed with inscribed stones. The other type of tomb is the side hill tomb and serves the same purpose as the mausoleum but is built into the side of a hill and therefore is not a freestanding structure.

3. METHODOLOGY

Mount Auburn Cemetery's memorial treasures are not fully known to the administration. This fact is a serious implication to the administration at Mount Auburn because if a memorial is stolen, broken, or deteriorating, and the cemetery has no record of what should be there, then the memorial will be lost without knowledge. The problem can be traced back to the consecration of the cemetery in 1831, when the lots were originally sold for $60. Families would erect memorials to honor the deceased in the lot bought. The cemetery kept track of who was buried in this lot, but would not maintain descriptive records as to what specific marker was built upon the grave. Therefore, our objective is to aid in the gathering of information to catalog what is not currently recorded. To address the situation, we propose a means of collecting and organizing information on the types of memorials within the assigned island, which was chosen for its central location and the prominence it holds within the cemetery's landscape. This system will help Mount Auburn in its efforts to preserve its historical resources and continue to be a cultural asset. In this chapter, there are five steps of the project that will be discussed: preliminary labor, field work, data entry, mapping, and analysis of the methodology.

3.1. Preliminaries

Before the team could begin any significant field work, two preliminary tasks were completed. One of the most important pieces to successful data collection in the field is the field form, which contains all the necessary data fields to be collected. The field form must be thorough and easy to understand in order to provide the surveyor with a complete list of tasks to be completed. To successfully organize the data collected in the field, a database was built. Further in Section 3.1, the process of field form refinement and database development will be discussed.

3.1.1. Field Form Refinement

Mount Auburn has already created field forms for this survey; therefore the primary goal was to refine them for the scope of this project. The refinement of the field forms was important to the project because it gave the team an initial point to begin field work and to become familiar with the forms and the items that may be present in the cemetery. Testing the preliminary field forms and consultation with the administration were the two steps in the refinement process. A thorough explanation of the field forms can be found in Section 3 of Appendix A.

There are several types of components located within Mount Auburn, which created the need for two types of field forms, memorial and curbing. An example of each field form is included in Appendix B. Each field form contains relevant and significant information pertaining to each memorial type or structure. As can be seen in the memorial field form, some of the informatio n contained includes the reference number of the memorial, date and time of record, lot number, address, reference name, source for reference name, date of death, basic condition assessments, type of memorial and other such descriptions, including materials and design elements. The lot survey field form contains information relevant to extraneous structures that may be found in the lot, such as fencing, curbing, lot markers, and landscaping furnishing. Once the set up for the field forms is fixed, the method for organizing the data collected from the field form can be developed.

3.1.2. Database Development

In this project, there were two main sources of information: the field forms that were completed, and the lot cards provided by Mount Auburn[24]. From the completed field forms, the team created an Access database to record and store all data collected in the field and information from the lot cards. Tables have been produced to reflect the information in the field forms. Several tables were made for each type of artifact to be cataloged. Different tables were designed for fixed information, such as dimensions and type of artifact, and changing information, such as condition assessments, including biological growth and the condition of joints between stones. I n the database, forms were created for easy entry of the data collected in the field survey. As refinement of the field forms continued, the database forms were altered to reflect the changes made in the forms.

A database structure was chosen as the media for data organization because it is the easiest and best mode for organizing large amounts of data. Therefore the biggest advantage of using a database for this project is that it can perform such tasks as searching for loose memorials or for the location of memorials in a specified lot. Once completed, the database structures were suitable for the data that was collected from the field work.

3.2. Field Work

Field work is the prime step in our methodology because the bulk of the information within the database came from the field work. To obtain accurate information about the cemetery's

[24] The cemetery provided the team with lot cards. Every time a lot is sold, a lot card is produced by the cemetery that includes a variety of information. The information on the lot card includes the proprietor, name of the interred, the date they were interred, the number and location of the memorials, address of the lot, and where true north faces within the lot. This information was entered into the database.

physical resources, it was crucial to be consistent in the data collection and filling out the field form. The method found most successful for the team was to break up into pairs to be able to consult with one another on obscurities, such as material or design type of a memorial. Also, it made data collection a more expedient process. The pair would begin field work by approaching a lot with its designated lot card, from which initial information would be obtained. The initial information on the lot card aided the team in locating the lot and giving a spatial representation.

The first step to the field work after obtaining the lot cards is to go into the field and start documenting all memorials in the lots. The collection of data through the use of field forms required knowledge of the types of memorials, which were described in Section 2.8 and Section 2 of Appendix A. To document as effectively as possible, the team performed several sweeps of the lots sequentially. The first sweep was to document all central lot monuments in the island. Each pair went from lot to lot, and determined whether a central lot monument was present. If so, all pertinent information was recorded. When all these memorials were cataloged, the second sweep was performed to document all grave markers within the lots. These grave markers include headstones, tablets, and any other commemorative markers to an individual. Once again, the lot card was a definite indicator for deciphering the difference between a central lot monument and a grave marker. The third sweep documented fences, curbing, paths, roads, and signs within the island. This sweep gave spatial representations that aided in the mapping component of the project. Digital photographs were taken in the fourth sweep of the island. Each memorial was photographed and recorded sequentially by its unique identifier to be later discussed. A final fifth sweep was made in case any information had been omitted from the previous sweeps. Once all data has been collected from the sweeps, it can then be entered into the database.

3.3. Data Entry

Data entry was another integral step within the methodology due to the fact that data must be entered correctly to avoid any mistakes. Data is important because once it is all entered, queries will be run on the information in the database. If any data was entered incorrectly, the information requested by the query will be incomplete. This may pose serious implications in the future; therefore, careful attention and time was given into each form entered.

Concurrently with the data collection, the group entered the data from the field forms into the database. Data from the lot cards, such as number of interred and number of monuments, was also included. The information collected from previously completed mausolea and cast-iron fence surveys were entered to have all data in one complete database. All data was entered into the forms produced. The forms in Access were made to be user-friendly by presenting the information in the same order in which it is given on the form.

A unique identifier was assigned to each memorial within a lot. Many perpetual care contracted lots already have a unique identifying letter for each memorial within a lot. If a perpetual care contract does not exist, the team designated a letter to signify a clockwise rotation within the lot. All central lot monuments were given the designation "A". Directly behind the central lot monument was designated 12 o'clock. Each grave marker then will be assigned its letter by the way it is located within the lot. To further identify each memorial, the unique identifier consists of the five-integer lot number, a three-letter code, and the clockwise letter system. An example of such a system would be 02673-GMK-C, meaning the memorial is in lot number 2673, it is a grave marker, and is second in the clockwise rotation from the central lot monument. The unique three-letter codes are:

Building – BLG	Monument – MON
Curbing – CRB	Outdoor Sculpture – OSC
Grave Marker – GMK	Path – PTH
Iron Fence – IRF	Road – RDS
Iron Path Sign – IPS	Tomb – TMB
Iron Road Sign – IRS	Utility - UTL

3.4. Mapping

Mapping was done concurrently with data collection and data entry as the lots were surveyed. The Access database provided a means of storing vast amounts of information and the use of maps helped to spatially represent that data. Each type of artifact has its own layer in MapInfo, along with any indication of loose or missing memorials, memorials with algae or biota growth, and the memorials out of plumb. Mapping was one of the most important deliverables for Mount Auburn. By utilizing the protocols between MapInfo and Access, we created a seamless joining of the two programs. This allowed for a visual representation of the information gathered that was user-friendlier than just the Access interface alone. These maps showed what data had been collected and why it may become useful for Mount Auburn. Please refer to Section Six in Appendix A for a more thorough explanation and development procedure.

3.5. Analysis

By integrating MapInfo and Access, trends have been seen from the data collected. By comparing two aspects of the data collected, such as conditions and proximity of memorials to one another, it was seen that memorials in the same lot have the same conditions, due to being subject to the same environmental conditions. By knowing other types of trends, preventative measures and

cleaning procedures may be taken into account for future procedures. All the information that has been collected, organized, and analyzed is an aid to Mount Auburn Cemetery for their development, maintenance and growth.

3.6. Training Manual

A complete analysis of the data collection and recording process was documented and a training manual was completed for the administration and for employees to be working on this project in the future. The manual includes all steps performed by the team in order to facilitate in future training of employees. It also includes the methods that worked well, and which did not so that the same mistakes would not be made twice. See Appendix A for the complete Training Manual.

4. RESULTS AND ANALYSIS

With an effective methodology established, several results have been produced. These results are direct products from the methods described previously, and are groundbreaking advancements for cemetery management. These innovative concepts can further aid Mount Auburn Cemetery in the stewardship of the memorials contained within it. Four main results have been produced and are representative of the effective methodology performed. The results discussed in this section are: effective cataloging methods, an Information Management System, an inventory and conditions assessment, and a Training Manual.

4.1. Effective Cataloging Methods

It is important to establish as efficient a means of surveying as possible. With over 40,000 memorials present any time not used efficiently in cataloging a memorial can become thousands of man-hours wasted in the field. There are two main steps that were executed in designing this efficient cataloging system that will be discussed in this section, the development of field forms and field surveying.

As previously stated in Section 3.1.1, original field forms were given to the team, and from these preliminary forms, developed field forms were produced. The forms were expanded upon to be an inclusive document containing all necessary data fields for the surveyor to complete. All integral portions that will aid in the inventory of each memorial were included in the field form.

In order to utilize the field forms that were developed, field surveys were performed. To ensure the time spent in Mount Auburn Cemetery was used as resourcefully as possible, we conducted five separate sweeps, or thorough run-throughs, as mentioned in Section 3.2. The purpose of separating data collection arose from the need to collect the data as efficiently as possible. The five-step method produced is a process that can be implemented throughout the cemetery; therefore, field surveying had a deep impact on the success of the cataloging system.

4.2. Information Management System

Two main results of this project compose the information management system made for the administration of Mount Auburn Cemetery: the completed database and maps produced from data collected in the field survey. These deliverables can greatly aid Mount Auburn in the management aspects of memorial maintenance. Prior to this project, Mount Auburn's records existed solely on paper, which made gathering information or searching for a specific record quite cumbersome. Through the incorporation of the information management system this project helps bring cemetery management into the age of technology.

4.2.1. Completed Database

The database, built in Access, consists of five main tables and forms that are used to store information. The "Memorial" table stores the fixed information collected in the field, such as design type, orientation and dimensions. "Memorial Conditions" contains the conditions information noted on the field form at the time of the survey. This table is separate from the "Memorial" table so that when a future survey is conducted on the conditions of memorials, it can be noted how the memorial has changed since last documented. The table named "Lot Cards" holds the information stored on the lot cards the cemetery had provided to the team. Such information includes the proprietor of the lot and the number of memorials in the lot. The "Interred" table records the names of the individuals buried within the lot, and is a continuous sub form of the "Lot Cards" table; therefore, the names of the interred are directly linked to the proper lot they are buried in. The curbing and fencing information is stored in the "Lot Survey" table. The complete database will be an aid to Mount Auburn Cemetery because it can store all the information easily, and it can be accessed for maintenance needs.

4.2.2. Mapping System

By using MapInfo, maps were produced as a tool for the administration of Mount Auburn. The mapping component aids in establishing spatial relations and providing a real-world outlook of the cemetery. MapInfo is interfaced to the he database to directly pinpoint the memorials with certain conditions. For example, the data concerning the loose memorials can be brought into MapInfo to show exactly which memorials are loose. This map, shown in Figure 4 can then be turned over to the maintenance crew, which can then fix the memorials to prevent any situations from occurring.

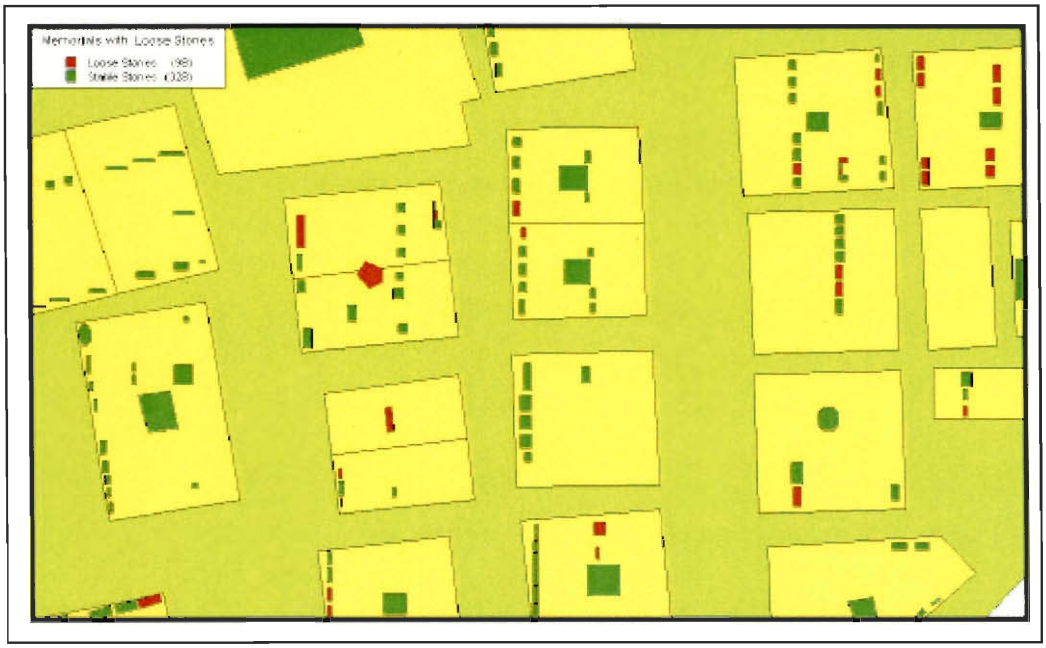

Figure4. Map of Loose Memorials in a Section of the Island.

The information containing the individual data about certain objects have been organized into separate "layers" in MapInfo. Ten different layers have been built to separate these types of information. These layers are: Islands, Lots, Buildings, Mausolea, Central Lot Monuments, Grave Markers, Iron and Granite Fences, Curbing, Path Signs, and Missing Memorials. With these layers, there is the option of "turning them on" or "turning them off". The purpose of developing separate layers within the mapping program is the option of being able to see separate groups of items or areas of interest at once. Seen in is the map with all layers except lots turned on. This map is representative of how the island would be viewed from above.

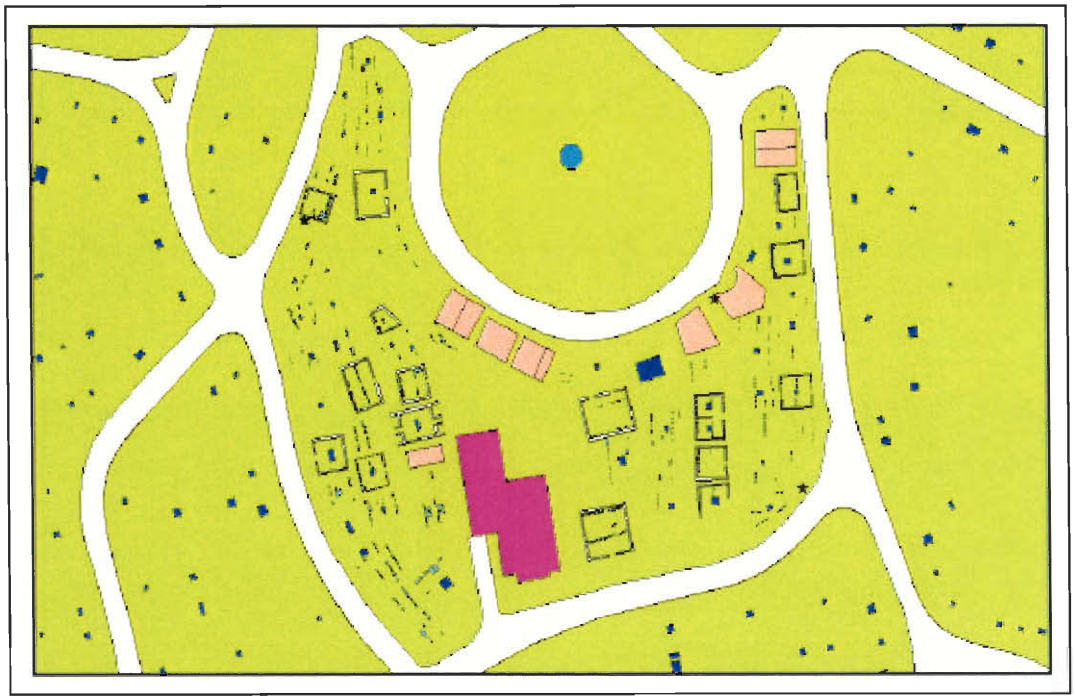

Figure5. Map with all Layers Except "Lots" Turned On.

4.3. Inventory and Conditions Assessment

The cataloging methodology and management system were seen in the documenting of the memorials contained in the island containing Bigelow's Chapel. A complete survey of all memorials, curbing, fencing, and path signs was completed using the field forms, field survey techniques, and then entering the collected information into the database developed. This information can now be viewed quantitatively for factual information of the island. This section covers the possibilities of assessable information once the survey of the remainder of the island is completed.

4.3.1. Inventoried Features

The data collected from the field survey included aspects of the memorials that served as simple inventories of what lies within the island surveyed. The features in this section include only the fixed information that was collected in the field. The results have been made quantifiable and are represented by charts and graphs in this section.

Eighty-eight percent of the memorials documented were grave markers, eleven percent were central monuments, and a mere one percent were tombs. A distribution like this was expected, and is apparent to most visitors to a cemetery that grave markers are the most prevalent memorials. Figure 6 shows the distribution of memorial types within the island surveyed.

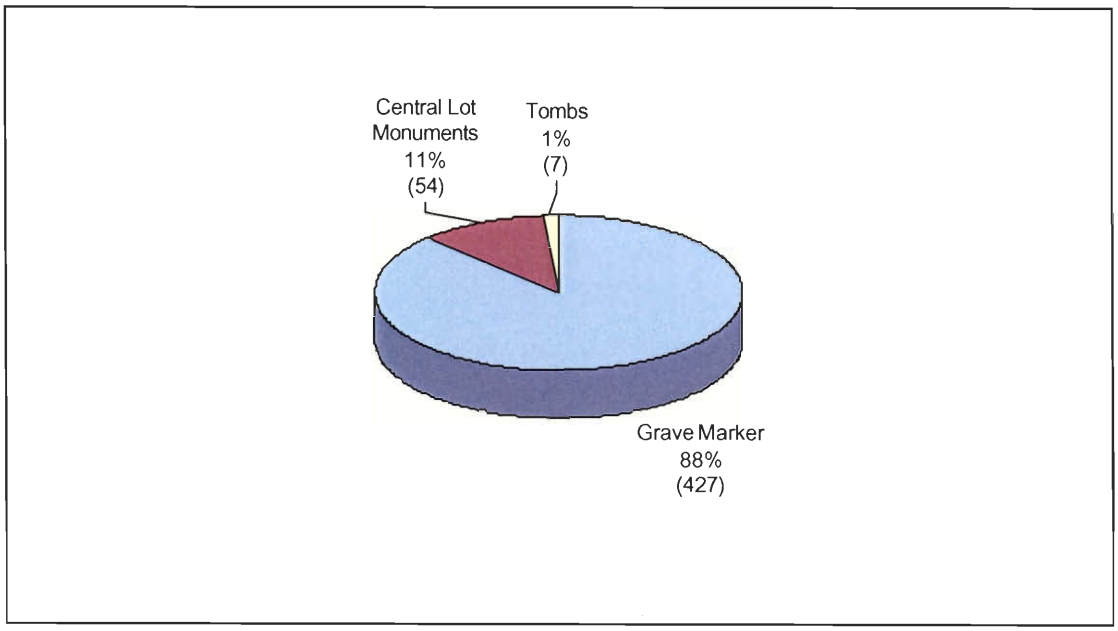

Figure6. Distribution of Memorial Types.

Overall, sixteen different design types are present throughout the Bigelow Chapel Island. Headstones were the most prevalent design type in the island, comprising 238 of the memorials. Markers and flush markers were the next largest categories with seventy-two and twenty-seven each, respectively. This result as shown in Figure 7 can be used to demonstrate an accurate cross-section of the design types observed in all of Mount Auburn Cemetery.

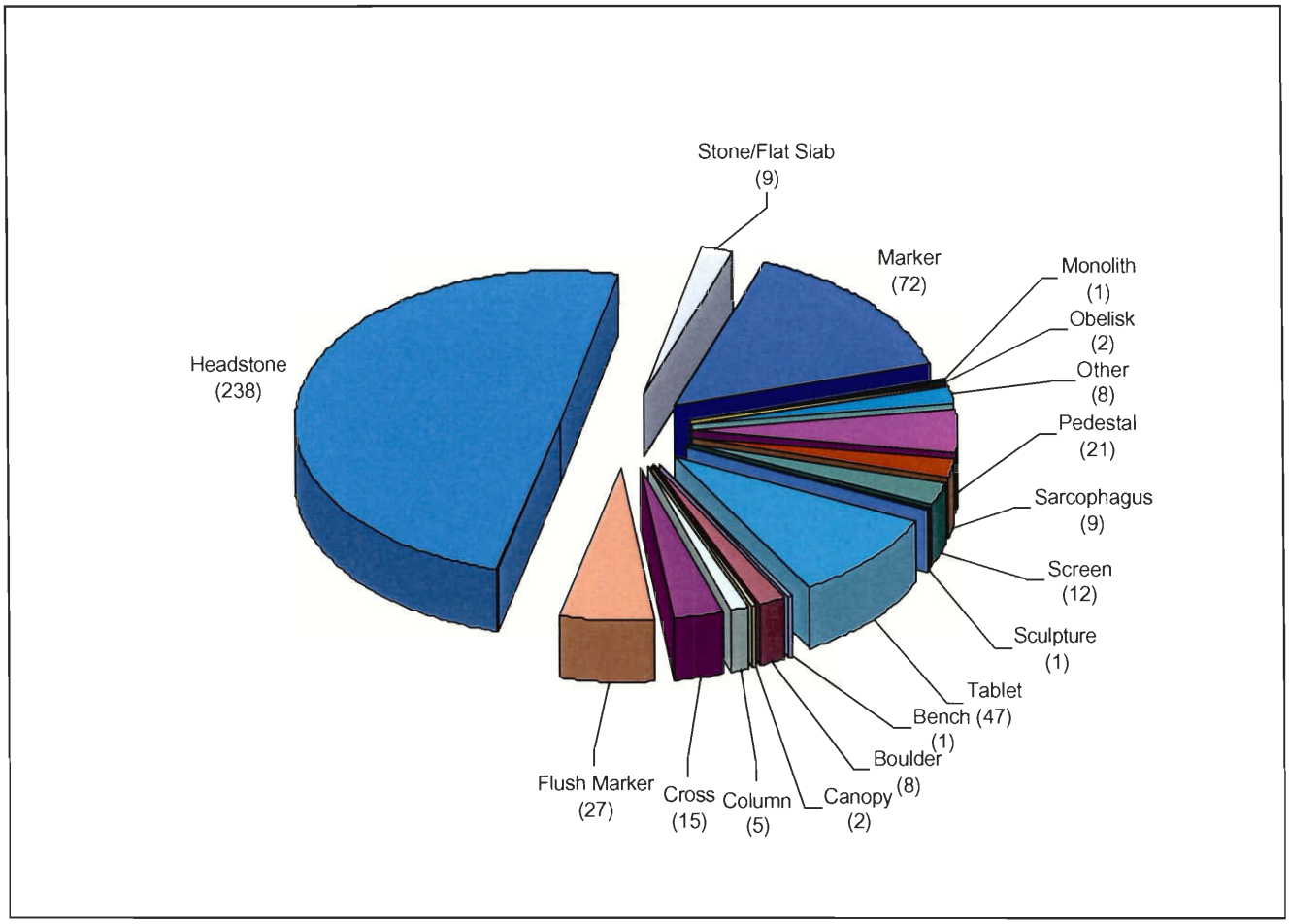

Figure7. Design Type Distribution.

Most memorials have two primary components: the base and the memorial itself. Frequently, on the surveyed, the two components were made of different materials. The two most frequently occurring materials were marble, composing 64% of the memorials, and granite, which made up 30% of the memorials, as seen in Figure 8. However, the distribution of base materials are much different, 248 of the bases are made of granite, while sandstone and marble are evenly distributed with approximately 30 memorials each, as seen in Figure 9.

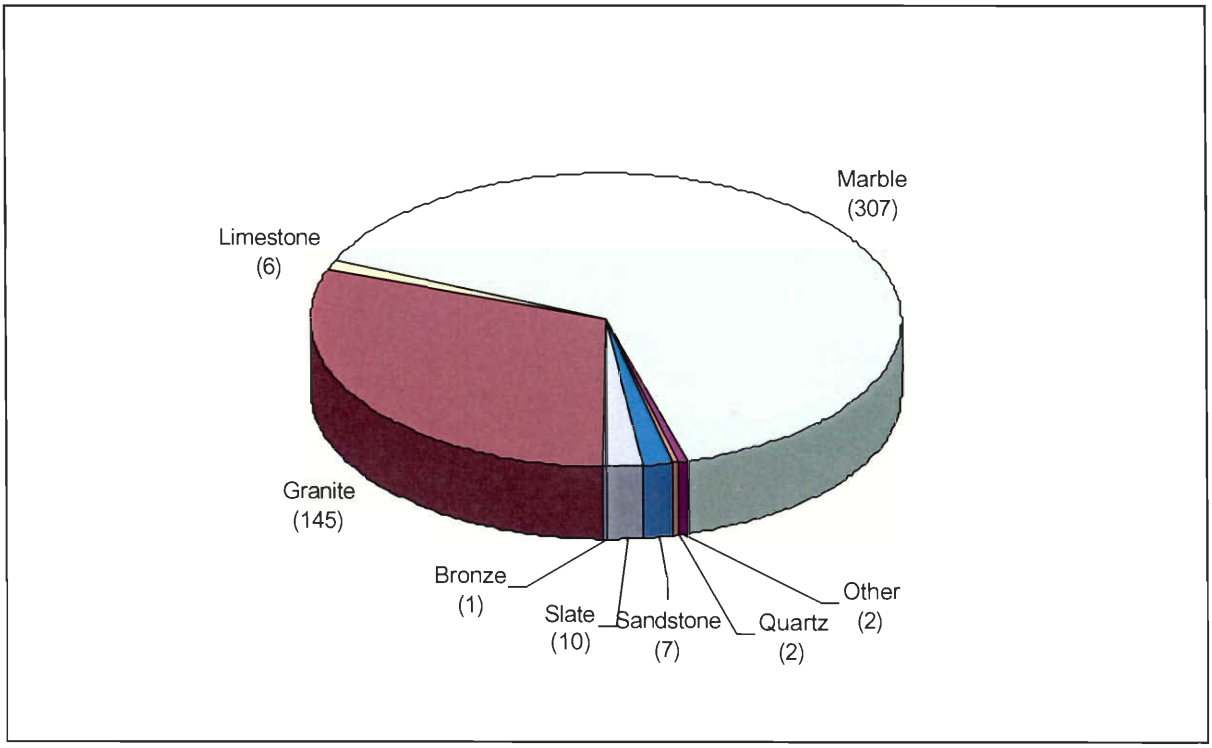

Figure8. Distribution of Memorial Primary Materials.

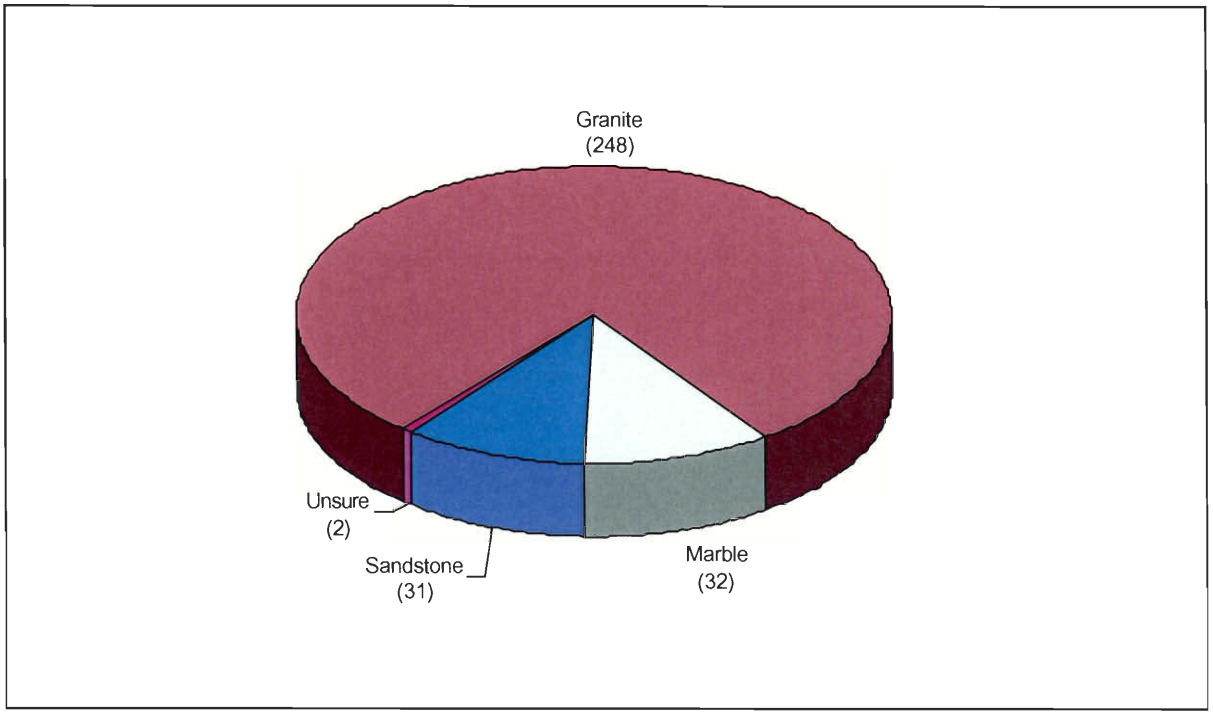

Figure9. Distrbution of Memorial Base Materials.

The majority of the memorials in the island surveyed are facing East, as seen in Figure 10. This fact is probably due to the orientation and layout of the lots in relation to the roads and paths in the island surveyed. Many of the roads and paths cataloged run North-South, and when approaching a lot, it was common for the lot to be perpendicular to the road, resulting in East-West orientation of the memorials. The other primary orientations of the memorials were mainly West and Northeast.

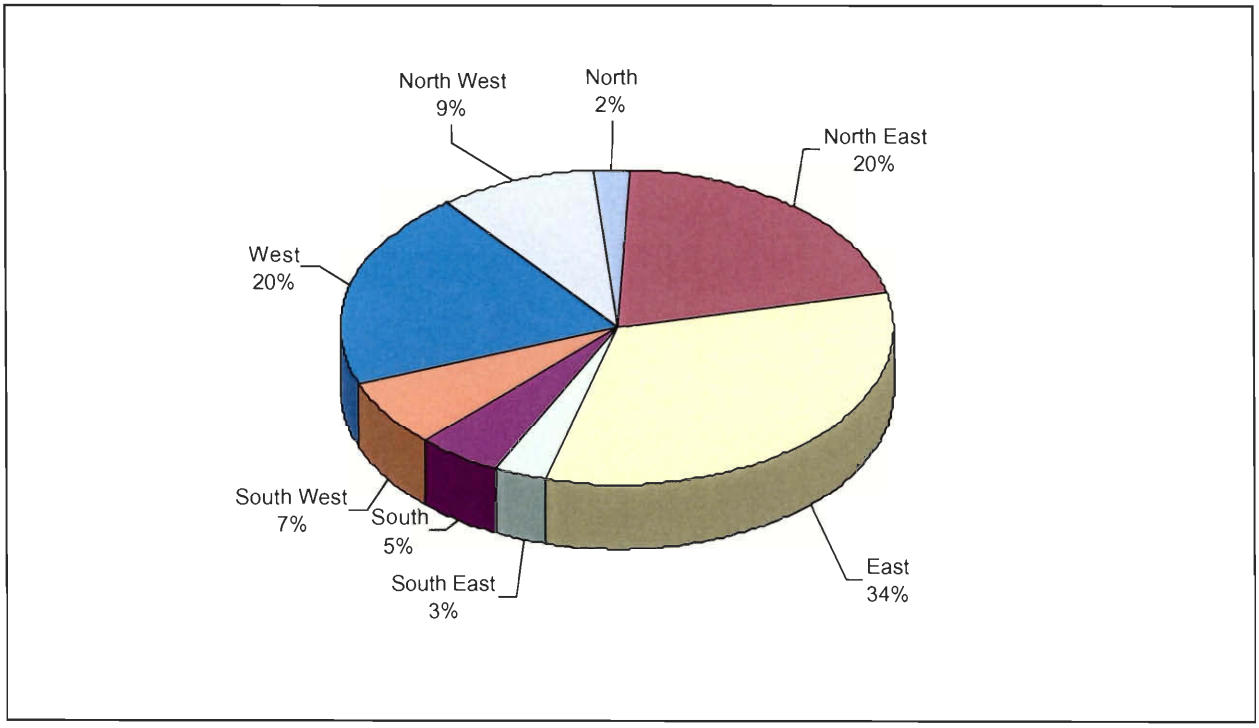

Figure10. Orientation of Memorials in the Island

The instances of joint materials were distributed fairly equal, as seen in Figure 11. Caulk was the most prevalent in the island, with 35% of the joints being held together by this material. Mortar was seen in 26% of the memorials, while lead held together 23% of the memorials. About 16% of the material was not known, because many joints were open spaces between the stones, making it difficult to discern what material the joints were originally made of.

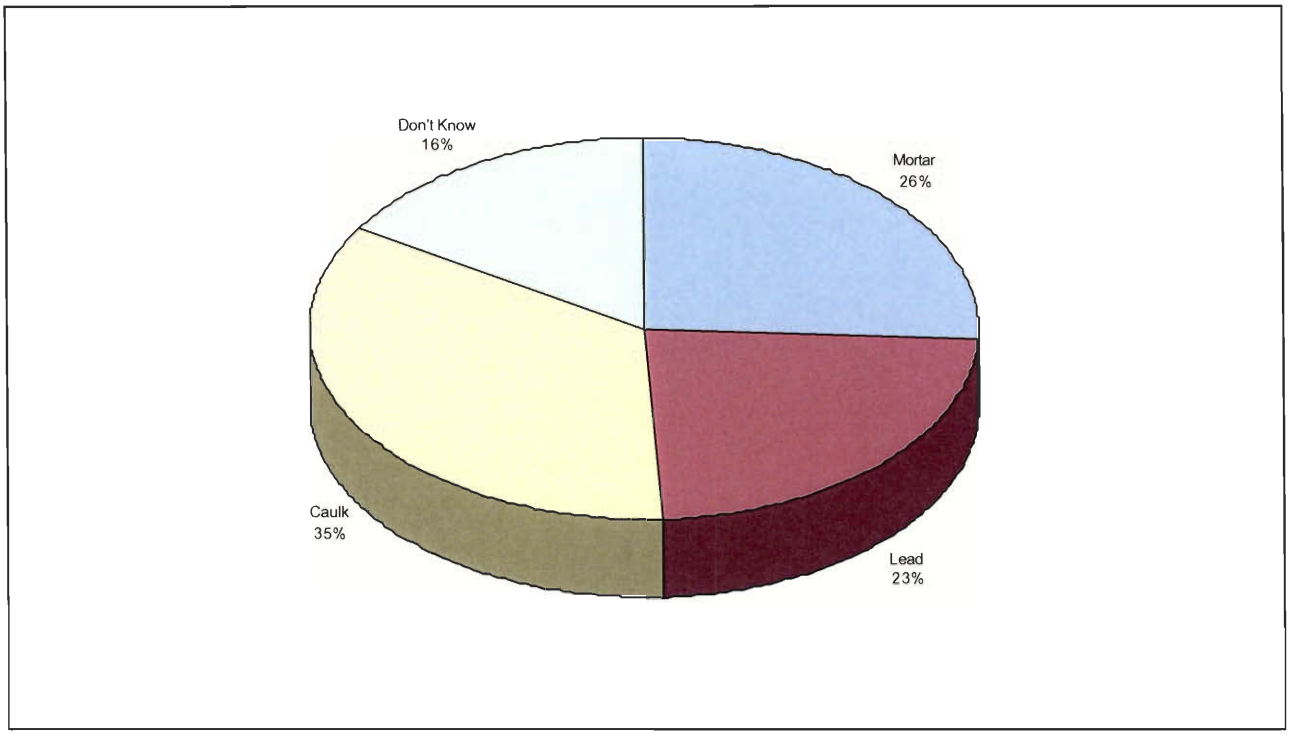

Figure11. Distribution of JoinMaterials.

4.3.2. Conditions Information

The field survey documented fifteen different conditions that occurred in the cataloged island. Condition assessment is not only important for scheduling maintenance but also provides feedback on the effects the maintenance is having on the memorials. This section will compare the instances of certain conditions due to the types of stone, and certain conditions occurring in lots with Perpetual Care and those without. This is in an effort to see if the maintenance techniques of Perpetual Care are helpful or actually harmful to the materials over a long period of time.

Most conditions are less prevalent in the memorials with PC than those without. For example, algeal growth, black biota, and sugaring are significantly less present on memorials with PC, as seen in Figure 12. However, certain conditions, such as encroaching plants, do not occur less in the memorials with PC. This may be due to the fact that a family has asked for plants to be maintained in proximity to the memorials as part of the Perpetual Care Contract. The overall findings from this chart were expected, for those memorials with PC are better maintained than those without contracts.

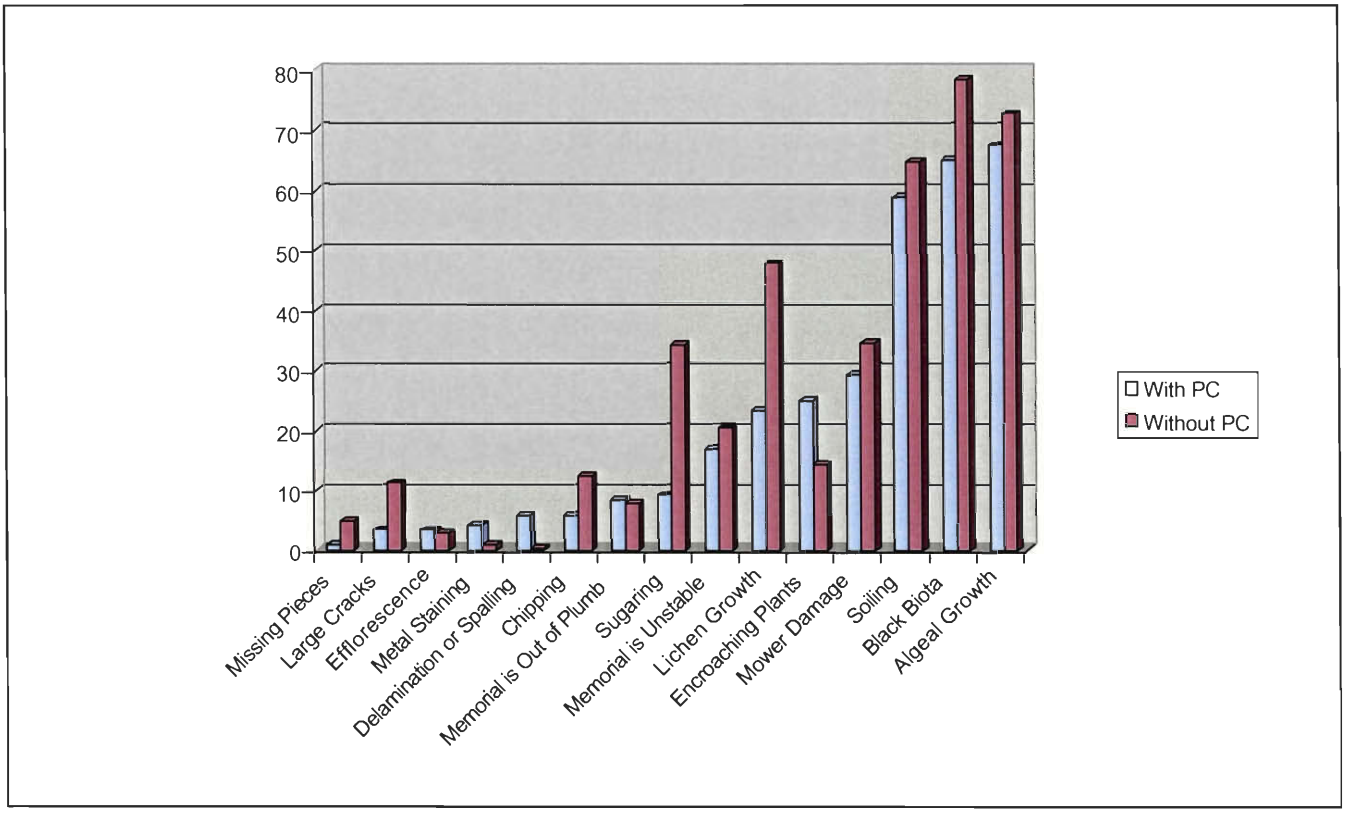

Figure12. Conditionsof Perpetual Care vs. Conditions without Perpetual Care.

In continuing with the theme of the effects of Perpetual Care, we now take a look at its affect on inscription legibility. Approximately 80% of the memorials with inscriptions that have PC are legible, opposed to the 60% of the memorials without PC, see Figure 13. This also lends itself to the observation that there are fewer memorials with PC that have inscriptions that are deteriorating or that are illegible. This observation is contrary to the initial belief that PC maintenance techniques in the past were later found to be harmful to the materials they were intended to preserve.

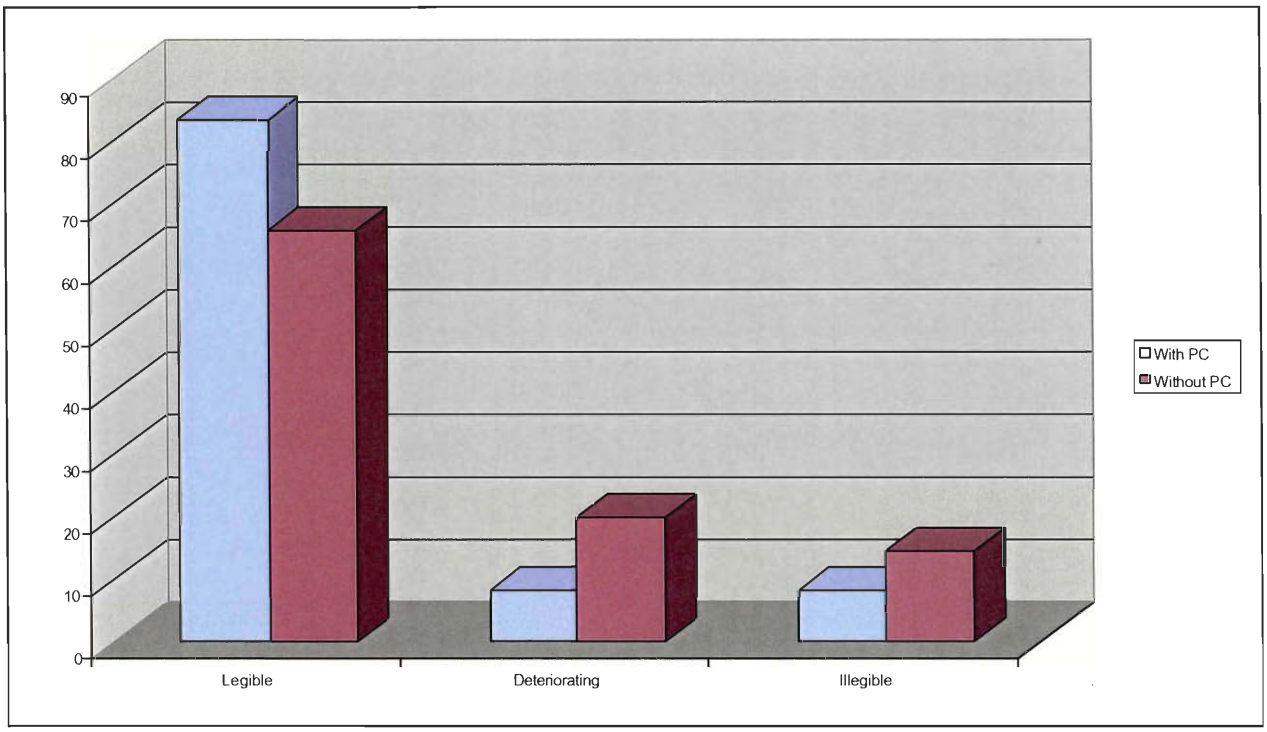

Figure13. Inscription Legibility of Memorials with PC vs. Those Without PC.

Another interesting comparison is clean memorials with Perpetual Care versus those without. Again, PC shows a significant difference in the overall maintenance of the memorial, as approximately 33% of the memorials with PC are clean, as opposed to only 15%of those without PC. However, the amount of dirty memorials is fairly equal in memorials with or without PC. In time, the memorials without PC will degrade, while the memorials with PC will be cared for on a regular basis and remain clean. Figure 14 shows a comparison of the cleanliness of memorial with PC versus those without.

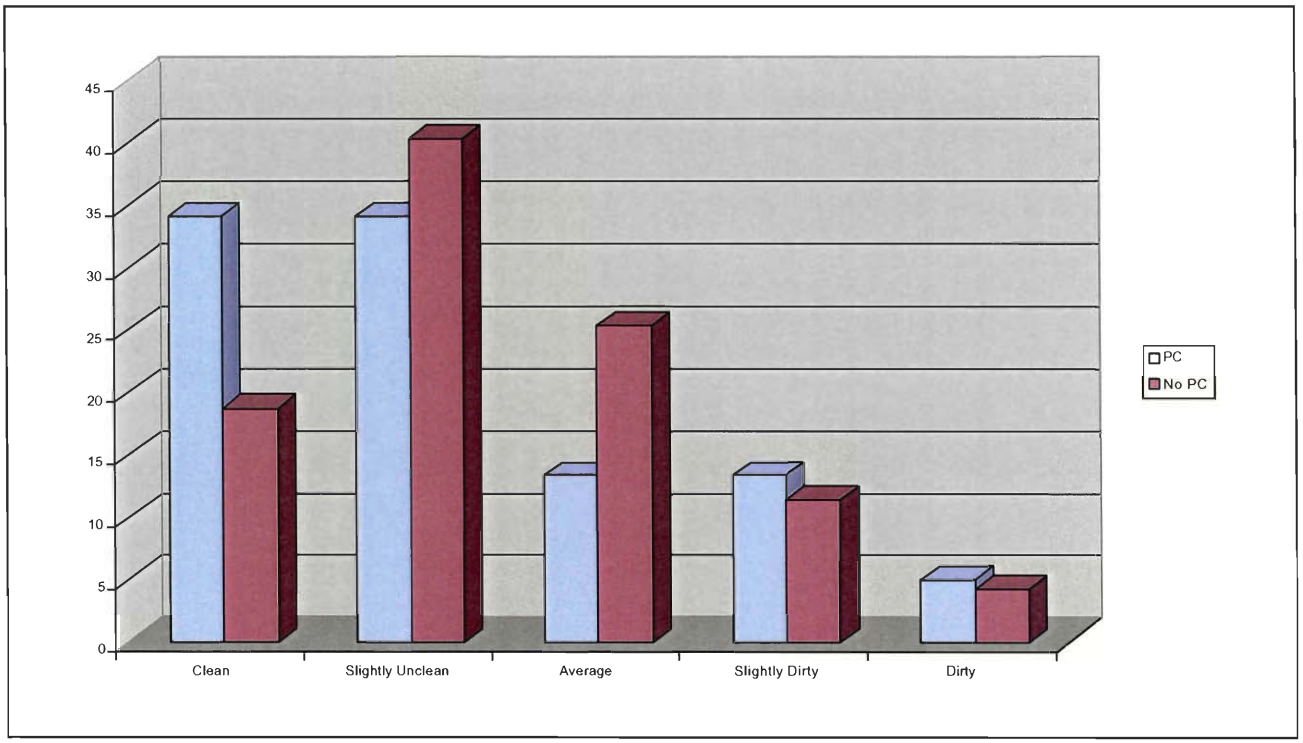

Figure14. Comparison of Clean Memorialswith Perpetual Care vs. Those Without.

The conditions of the joints can be broken down into 3 categories: cracked/loose, open, and sound/good. As anticipated, the memorials with PC have more instances of sound joints than those without. It is observed that 60% of the memorials have sound joints that are covered under PC. The degrading joints conditions are more prevalent in the memorials without PC contracts, as shown in Figure 15.

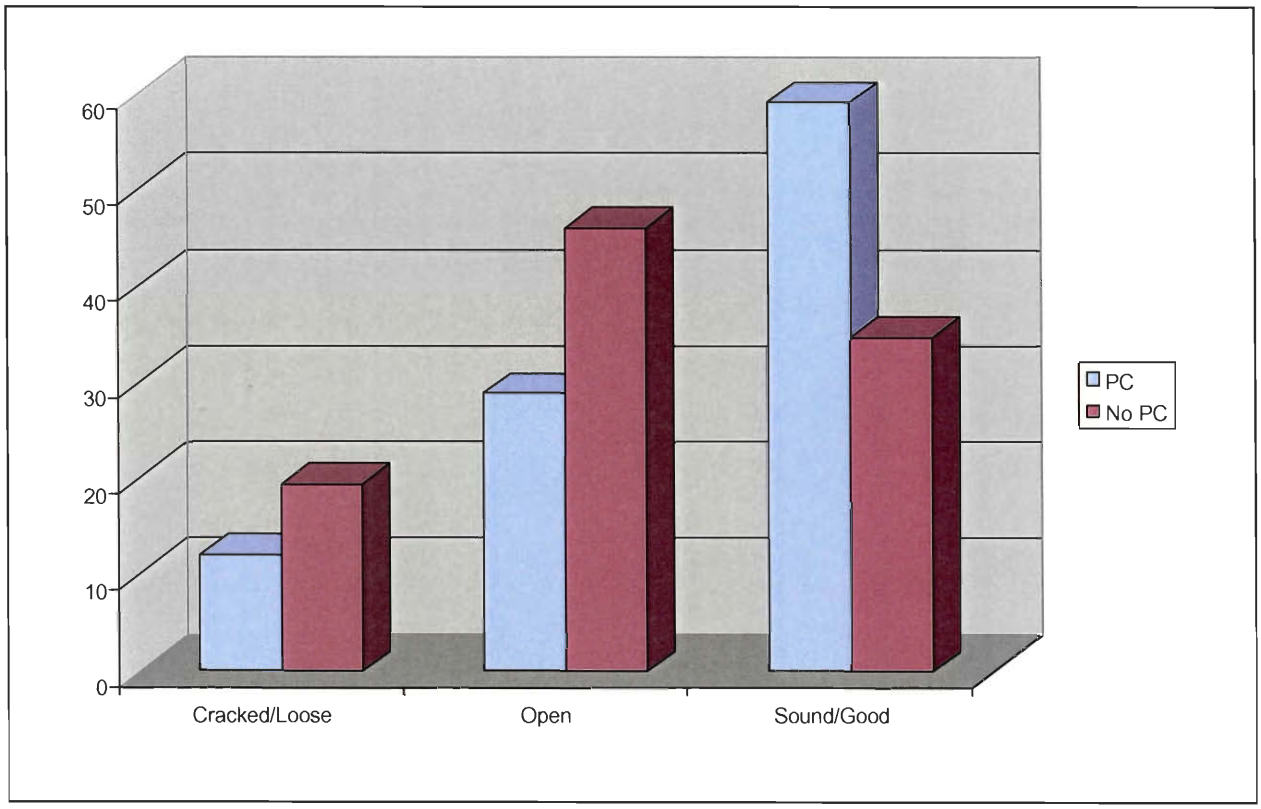

Figure15. Comparison of Joints Conditions vs. PC and without PC.

Once again, the positive effects of perpetual care can be seen in the comparison of the conditions of foundations. The memorials with PC have fewer instances of any type of foundation erosion. Twenty of the memorials without PC have significant erosion occurring around the foundation, while only 5 of those with PC have this same condition. Similarly, visible foundations occur much more often in memorials without PC. Thirty-five memorials have this condition, while two have a visible foundation, see Figure 16.

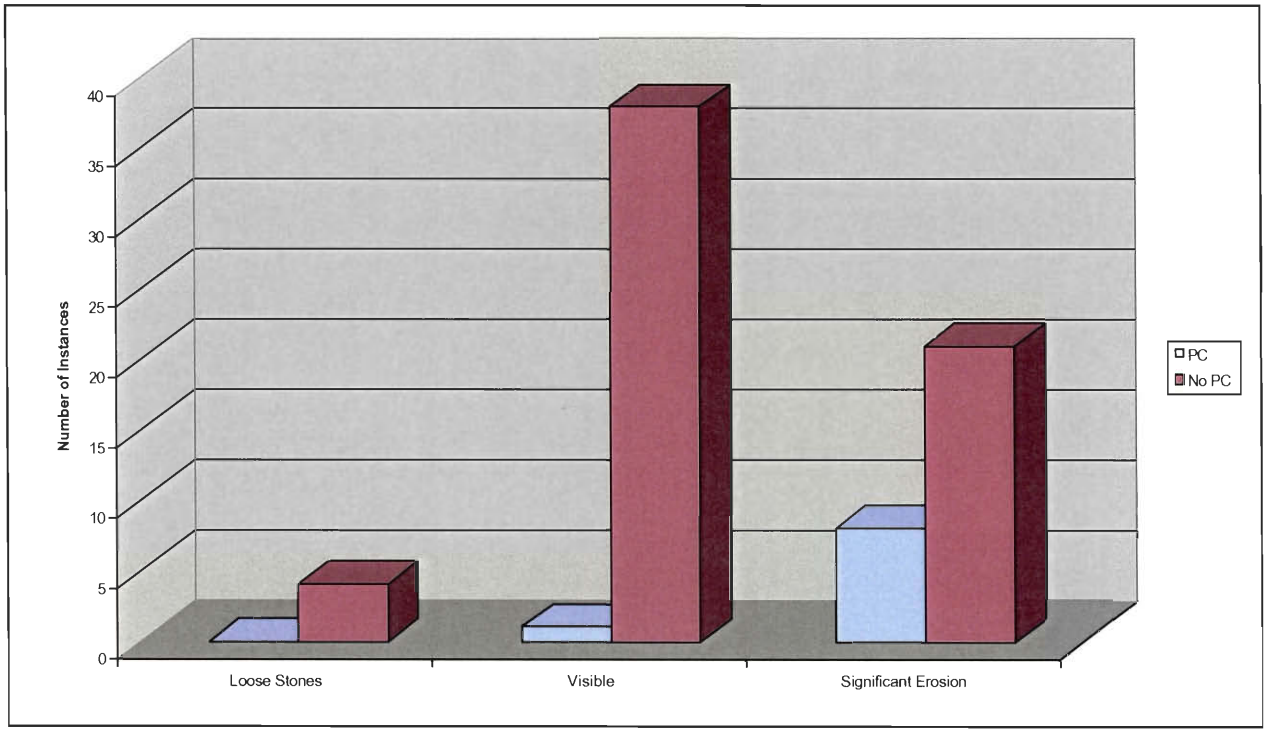

Figure16. Comparison of Foundation Conditions vs. Memorial With or Wit PC.

Having taken looks at the various conditions that were recorded in the field and comparing the affects of perpetual care on the memorials it can be seen that PC is playing a positive role in the preservation of the memorials. However, other factors need to be examined, such as the age of the stone versus the conditions. Perhaps a marble memorial has a higher tendency towards certain conditions when compared to a granite memorial of the same age.

4.4. Training Manual

A Training Manual has been produced to train any future employees or interns to use the cataloging system that has been developed throughout this project. The manual thoroughly describes all processes that were involved in the cataloging system. The sections of the manual are organized into sections corresponding to the major components of the cataloging system as well as any background information that is vital to know. With such a large amount of the cemetery left to be catalogued inconsistencies between future project teams will surely arise. The manual provides a level of consistency in the surveying as well as development of future tables and maps. Refer to Appendix A for the Training Manual.

There are five main sections of the manual that can be read to fully teach future users about the cataloging system beginning with a complete glossary and photographs of the built landscape and memorial design types present in the cemetery. Following this, both field forms used in this survey are described in detail, including explanations of how to correctly fill the form out, and the importance of each section. Third, a step-by-step process of the field work is described, documenting each sweep that will be performed in the future. Following this, the database component is discussed, including data entry, and the expandability of the database to incorporate other surveys. Finally, a complete overview of MapInfo and its capabilities is covered in the manual.

5. CONCLUSIONS AND RECOMMENDATIONS

The main goal of the project was to develop an effective methodology to efficiently catalog the physical resources within Mount Auburn Cemetery. A test island within the cemetery has been successfully cataloged, and all objectives have been met, with four main results stemming from the completion of the objectives. This chapter will cover four main topics: the results of the project, Statement of Goals for Mount Auburn Cemetery, recommendations for the administration for the complete cataloging of the entire cemetery, and suggestions for future projects

As stated previously, this project has accomplished four main results. First, a complete inventory of the island containing Bigelow's Chapel has been completed, including condition assessments of the memorials and an examination of the affect of perpetual care. Second, the team has set a solid foundation for the continuance of this project to be expanded upon to incorporate the entire cemetery. This one-of-a-kind system has not been implemented by another cemetery. The third result of this project was an information management system for the administration of Mount Auburn Cemetery. The database produced can hold all information that has been collected in the field. Mapping components can be used to pinpoint memorials with certain conditions, such as loose memorials in need of repair. Fourth, a Training Manual has been written to easily train any future interns that will continue this project. The manual covers all aspects of cataloging, from field work to database forms and data entry to mapping methods.

With the groundwork of this large project laid down, it can be furthered to include the entire cemetery. This is a monumental task and a large historical institution, like Mount Auburn envisions such a project requiring the investment of several years' worth of time and effort. To facilitate such future efforts a Statement of Goals has been produced for the long-term vision:

- **One-Year Goal:**
  - Understanding of computerized elements by administration
  - Several interns hired to continue surveying process during summer months
  - Completion of approximately 1,500 additional memorials in surrounding islands
  - Separate buildings survey completed based on this project's survey
- **Three-Year Goal:**
  - Completion of 5,000 additional memorials
  - Hiring of full-time employees to complete survey
  - Full training program for employees

- Maintenance performed on memorials that have been surveyed

- **Five-Year Goal:**
  - Depending on resources committed to project, completion of cemetery survey
  - Integration of arboricultural aspects for full topological survey
  - Continue trend setting tradition by having all above-ground aspects at finger-tips

If the cemetery plans on developing this project, many hours must be invested into making the cataloging a success. The average time spent on each memorial is 14 minutes. For 60,000 memorials within the cemetery, it will take approximately seven years for one person to catalog every memorial, curb, and path sign. This estimate comes under the assumption that the surveyor can work five days a week, fifty weeks a year, and that the weather will be satisfactory. Therefore, the recommendation is to hire several people for expedient completion of the overall goal. For further details see Appendix A Section 8.

The foundation has been set for future cataloging methods that can be expanded throughout the entire cemetery. Many elements that are currently present can be integrated with this system to further the technological advantages of this project, using MapInfo and Access. Some examples of this integration are:

- **Environmental Effects of Arboricultural Elements**

  Catalog all trees in an island at Mount Auburn, record the condition the memorials are in that exist beneath the canopy of the trees, and determine if any correlation exists. This data will be used as a stepping stool for future integration of the ongoing memorial survey and the arboricultural elements present.

- **Tracking the Spotted Salamander at Mount Auburn**

  One of the last vernal ponds in the Northeast exists in Mount Auburn Cemetery's Consecration Dell. The spotted salamanders come at specific times during the year to reproduce in this vernal pond. The tracking of the salamander would be done to better understand the vernal pond's existence at Mount Auburn.

- **Future Cataloging Projects**
  - Establish an effective methodology to catalog all buildings, objects, and structures located in Mount Auburn.

- Cataloging of underground elements in Mount Auburn, such as utilities and underground tombs.

A national historical location, such as Mount Auburn Cemetery, has a reputation to remain advanced in their management policies. The work that has been performed in this project is a prime example of the advances made in the cemetery's vision of upkeep and its trendsetting mentality. With the foundation set for future cataloging of various elements, Mount Auburn can take advantage of the system implemented. If the integration of all these elements are performed, it will enable Mount Auburn Cemetery to implement efficient and effective stewardship of their cultural resources.

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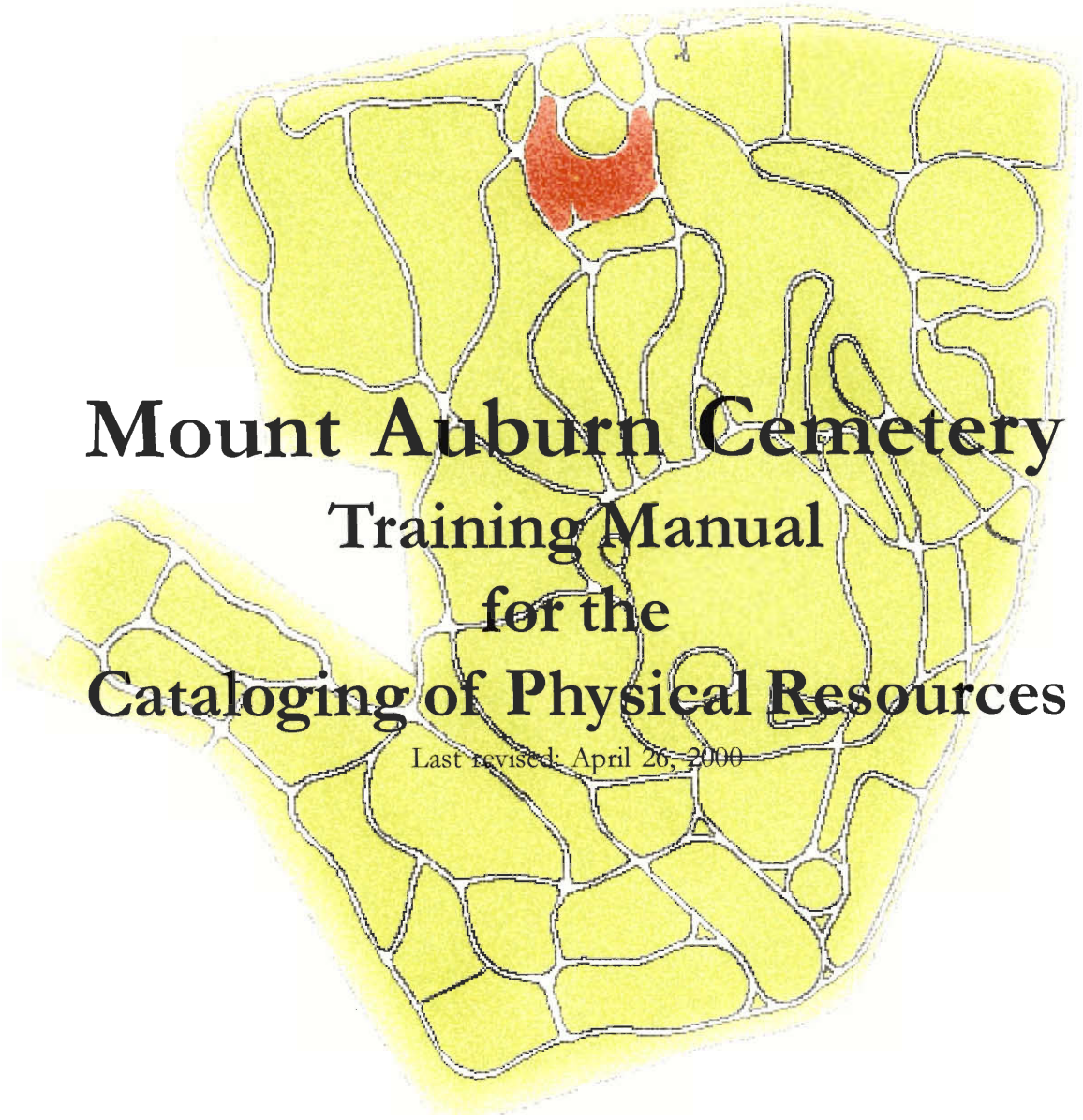
Appendices

Appendix A



Mount Auburn Cemetery
Training Manual for the Cataloging of Physical Resources

Last revised: April 26, 2000

Prepared for Mount Auburn Cemetery by:
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Courtney Estaphan
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1. INTRODUCTION

The consecration of Mount Auburn Cemetery in 1831 began a new trend of rural cemeteries throughout the United States. Mount Auburn Cemetery was the first large-scale designed landscape in North America opened to the public. Its picturesque landscape inspired many public parks, including the Emerald Necklace in Boston and Central Park in New York City. Along with this important fact, Mount Auburn also contains a vast selection of magnificent memorials. Over sixty thousand memorials are located throughout Mount Auburn, commemorating over 100,000 interred individuals. Unfortunately, no records were maintained on what types of memorials were erected. A cataloging system was recently designed to provide information on all the memorials to the administration. The main purpose of this Manual is to familiarize you with the techniques and methods of cataloging the memorials and physical resources that has been recently implemented.

The importance of this initial cataloging system will have great impacts on the built environment at Mount Auburn Cemetery. The entire cemetery's physical resources will be documented to give the administration knowledge of the treasures held within its confines. Once all memorials have been documented, the arboricultural aspects will be integrated to complete the topological survey of the cemetery. These facets of Mount Auburn will produce results to allow for more efficient in order to care for the memorials in perpetuity. This Training Manual will go through all steps of properly and efficiently cataloging the memorials and the physical aspects found within the cemetery. A thorough explanation of categorizing the memorials, the field survey process, the data entry and mapping component of the cataloging system will be discussed within this Manual.

2. DEFINITIONS/TYPOLOGY

To be able to properly distinguish one structure from another, it is necessary to have knowledge of the different types of memorials and landscape located in Mount Auburn Cemetery. It is also important to correctly name a memorial's design type to keep accurate records for the administration. If consistency is not maintained in the nomenclature of memorial type, the documentation will be incorrect. The section below will provide definitions of memorials and built landscape, and a photo example of each kind present.

2.1 Built Landscape Definitions

The components described in this section are those are the main built landscape features in Mount Auburn Cemetery. These components may include structural elements or unrelated items that are built for pure visual and aesthetic value throughout the cemetery. The term "memorial" is also inlcuded in this section because it is a blanket term for the commemorative items in Mount Auburn.

BUILDING A permanent structure to shelter human activity. A building has a roof and is enclosed by walls and is meant to be stationary[1].

CURBING Stones set in the ground and defining lot boundaries or borders. Curbing may be flush with, or rise above, grade and are often embellished with molded profiles and decorative details at the corners or at breaks for entrances or stairs[2].

FENCE Includes iron lot fences as well as the iron and chain link perimeter fencing. There are also a few instances of stone fencing.

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[1] Definitions for "building", "object", and "structure" adapted from the *Historic Properties Survey Manual*, Massachusetts Historical Commission, revised edition, 1995.

[2] All other definitions provided for by Mount Auburn Cemetery, April 2000.

LANDSCAPE FURNISHING Objects that are not commemorative objects and are easily moved are considered "landscape furnishings".

LOT MARKER A small, usually square stone set in the ground flush with grade and marking the corners of a lots. Usually the lot number will be inscribed on the top of at least one lot marker.

MEMORIAL All monuments, headstones, lawn markers, boulders, mausolea, tombs, columbaria, niches, benches, vases, or any other structure intended to commemorate the dead.

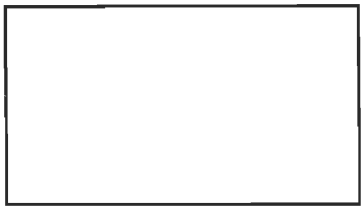
OBJECT Primarily artistic or commemorative structure, sculptures, memorial or monuments not associated with a particular grave or located on a particular lot and are not movable. Outdoor objects include the Sphinx and the Bowditch statue, in addition to the Azalea Path Wall and Vesper Path shared memorial.

PATH SIGN Signs marking the paved roads, graded walkways and earthen paths along which lots are laid out. The path signs are often of painted cast iron with raised lettering.

STRUCTURE Functional constructions such as bridges, towers, pumping stations, gates or walls that may support, but, unlike buildings, are not designed specifically for sheltering human activity.

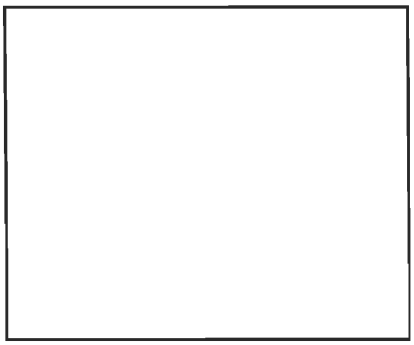
2.2 Memorial Definitions

All items intended to commemorate the dead are considered memorials. There are seven subtypes of memorials: cenotaph, central monument, columbarium, crypt garden, grave marker, mausoleum, side-hill tomb. Memorial, again, is any structure intended to commemorate the dead.

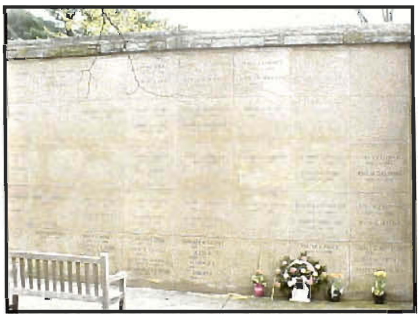


***CENOTAPH** A memorial erected to a person or persons buried elsewhere.

CENTRAL MONUMENT A memorial intended to commemorate all persons buried in the lot. At Mount Auburn, the central monument or "family memorial" is usually the biggest on the lot and is placed in the center or on the back line of the lot, serving as the focal point.



***COLUMBARIUM** A structure with niches in which to house urns or other containers or cremated remains.



***CRYPT GARDEN** A vault or chamber used for burial. Crypts may be located inside mausolea or side hill tombs, or they may be accessed through openings in a commemorative wall, such as the Auburn Court or Willow Court Crypts.

---

* Indicates memorial or design type that were not included in the survey performed

GRAVE MARKER Shall mean any physical object intended to mark one grave or two adjoining graves.

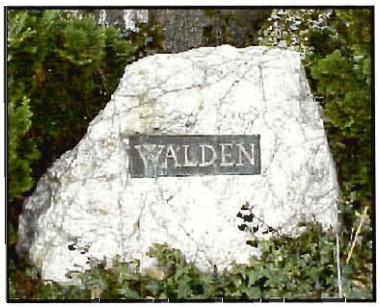
***MAUSOLEUM** A mausoleum is a large-above ground structure for burial. A mausolea will have a number of crypts in which coffins are placed. Mausolea have roofs, are fully enclosed by four walls and are entered through a door. Mausolea may also have niches for the placement of cremated remains.

***SIDE HILL TOMB** Similar to mausolea, with a front façade with an entrance, but engaged with a hill or earthen mound at the rear. A side hill tomb might have crypts for the burial of coffins or cremated remains. They may also have niches for the placement of cremated remains.

2.3 Design Types

As stated previously, central monuments and grave markers can have the same design type. For example, a cross may be a central monument, commemorating the family interred in the lot, or it may be a grave marker, erected for only one or two persons. Section 2.2.2 covers the different design types that exist throughout the cemetery.

BENCH A memorial in the form of a long, rectangular set for two or more people, with or without a back.



BOULDER A large stone in its rough form. Many boulder memorials at Mount Auburn are of Roxbury puddingstone with a bronze plaque commemorating a family or individual.

CANOPY An open, roof-like structure set on a base, Canopies sometimes shelter a smaller memorial or sculpture.

COLUMN A pillar with a cylindrical shaft, base and capital. A column may be fluted, wrapped with carved vine motif, draped with a stone shroud, and/or topped with an urn or other ornament. An incomplete of broken column was a popular nineteenth century image for a life cut short.

CROSS An upright post with a transverse piece near the top, a symbolic representation of the Christian cross upon which Jesus was crucified.

***EXEDRA** A curved outdoor bench with a high back. The form is named for the semicircular seat often found in ancient Greek or Roman temples.

FLUSH MARKER A flat marker, usually quite simple in design, set in the ground at grade and designed to mark one or two graves

FOOTSTONE Any upright memorial stone which marks the foot of a grave.

***HICKEY STONE** A beveled or slant faced headstone on a base.

LAWN MARKER see **flush marker**

LEDGER-STONE A large recumbent memorial stone parallel to the ground but not flush with it. Ledger-stones may be rectangular or cruciform on shape, and are sometimes used to cover the entrance to an underground tomb.

MARKER A low, thickset one-piece headstone without a base which marks one or two graves.

MONOLITH A single, solid piece of cut stone thicker than five inches. Monoliths are erect memorials with no base stone.

OBELISK A tall, four-sided shaft tapering to a pyramidal point. The design originated in Egypt. The Bunker Hill Monument and the Washington Monument are obelisks.

PEDESTAL Vertical stones, four-square in cross section. The neo-classical form is typical of the early monuments at Mount Auburn. Pedestals are often topped with urns or other ornamentation.

SARCOPHAGUS A large horizontal rectangular block resembling chests or coffins of antiquity, but without a body inside. Ancient sarcophagii were designed to hold human remains and constructed of a caustic stone from Assos in Asia Minor that caused rapid deterioration of the body. The name comes from Greek *sarkos* meaning "flesh" and *phagus* meaning "I eat" or "consume".

SCREEN A memorial characterized by an elongated erect horizontal slab or two elongated wings flanking a central vertical tablet. May be similar in height and width to a bench, only without the depth of a seat.

SCULPTURE A free-standing "picture in stone". Human figures, angels, cradles, empty beds, lambs, dogs or other figures may be rendered. The sculpture may be included as a component of a larger memorial.

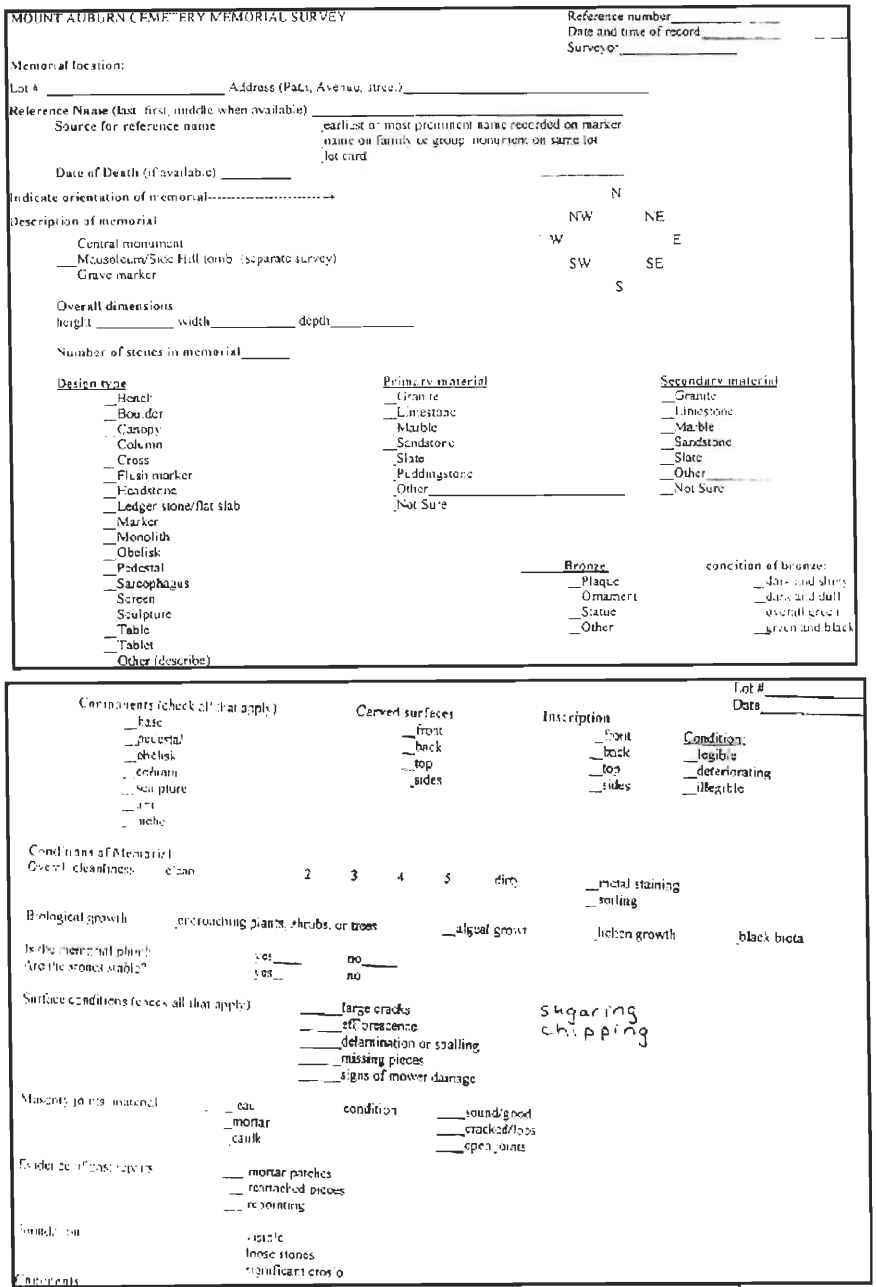
TABLE A stone slab resting on legs that stand on a base.

TABLET An erect memorial stone with a thickness of five inches or less, sometimes referred to as a slab-stone. May be set in or on a base, directly in the ground.

3. FIELD FORMS

To obtain information from the field, four main field forms were used. Two forms were developed and refined to fit our survey of memorials and curbing. within the cemetery lots. The other two field forms were not used in this survey, but in previous surveys. The data collected from the mausolea, side-hill tomb and cast iron-fence survey will simply be entered into the database. The field form is the main frame of information to enter into the database. Included within the field form is all pertinent data to aid Mount Auburn in cataloging their memorial information. This section will discuss the most effective and thorough way of filling out a survey field form. A brief overview of the two pages of the memorial field form are shown below, and will be discussed in further detail later in this chapter. A description of the lot survey field form will also be discussed.

3.1 Memorial Field Form



MOUNT AUBURN CEMETERY MEMORIAL SURVEY

Reference number_____
Date and time of record_____
Surveyor_____

Memorial location:

Lot # _____ Address (Path, Avenue, street)_____

Reference Name (last, first, middle when available) _____
Source for reference name _____ earliest or most prominent name recorded on marker
_____ name on family or group monument on same lot
_____ lot card

Date of Death (if available) _____

Indicate orientation of memorial----------→

Description of memorial

___ Central monument
___ Mausoleum/Side Hill tomb (separate survey)
___ Grave marker

Overall dimensions
height _____ width_____ depth_____

Number of stones in memorial_____

Design type
___ Bench
___ Boulder
___ Canopy
___ Column
___ Cross
___ Flush marker
___ Headstone
___ Ledger stone/flat slab
___ Marker
___ Monolith
___ Obelisk
___ Pedestal
___ Sarcophagus
___ Screen
___ Sculpture
___ Table
___ Tablet
___ Other (describe)

Primary material
___ Granite
___ Limestone
___ Marble
___ Sandstone
___ Slate
___ Puddingstone
___ Other_____
___ Not Sure

Secondary material
___ Granite
___ Limestone
___ Marble
___ Sandstone
___ Slate
___ Other_____
___ Not Sure

Bronze
___ Plaque
___ Ornament
___ Statue
___ Other

condition of bronze:
___ dark and shiny
___ dark and dull
___ overall green
___ green and black

Lot #_____
Date_____

Components (check all that apply)
___ base
___ pedestal
___ obelisk
___ column
___ sculpture
___ urn
___ niche

Carved surfaces
___ front
___ back
___ top
___ sides

Inscription
___ front
___ back
___ top
___ sides

Condition:
___ legible
___ deteriorating
___ illegible

Condition of Memorial
Overall cleanliness clean 2 3 4 5 dirty

___ metal staining
___ soiling

Biological growth ___ encroaching plants, shrubs, or trees ___ algal growth ___ lichen growth ___ black biota

Is the memorial plumb? yes___ no___
Are the stones stable? yes___ no___

Surface conditions (assess all that apply)
___ large cracks
___ efflorescence
___ delamination or spalling
___ missing pieces
___ signs of mower damage

sugaring
chipping

Masonry joint material
___ clay
___ mortar
___ caulk

condition
___ sound/good
___ cracked/loss
___ open joints

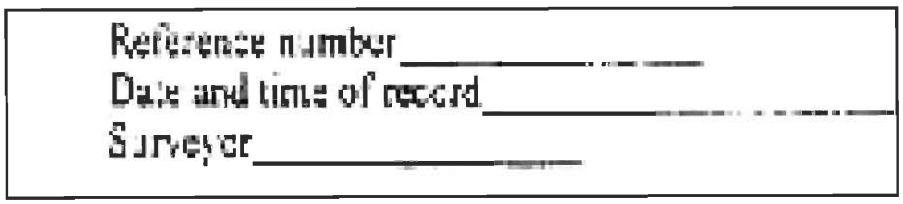
Evident repairs/previous repairs
___ mortar patches
___ reattached pieces
___ repointing

Stability
___ unstable
___ loose stones
___ significant erosio

Comments

Pages one and two of the memorial field form.

3.1.1 Initial Reference Information



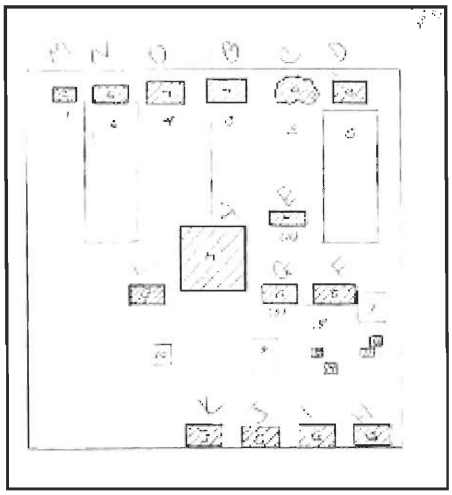
- **Reference Number**

  This number gives each memorial a unique identifier in the form ####-XXX-X. Beginning with the lot number, and followed by a three letter descriptive code, and a final letter designating where in the lot a memorial lies.

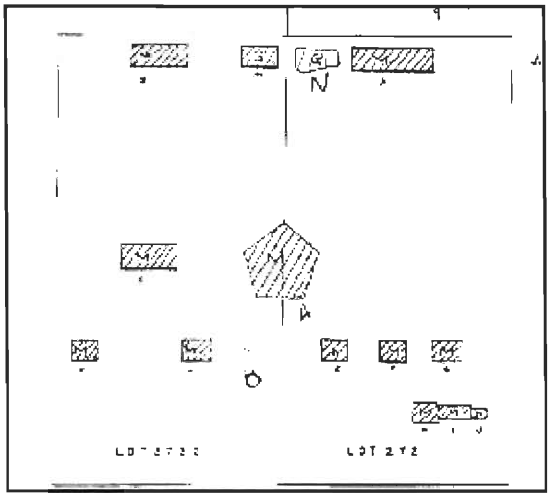
  - The three letter descriptive codes used are as follows:

    BLG - building
    CRB - curbing
    IPS - iron path signs
    IRF- iron-cast fence
    GMK- grave marker
    MON- central lot monument
    OSC - outdoor sculpture
    PTH - paths
    RDS - roads
    TMB - tomb
    UTL - utilities

  - The final letter is an indication of where in a clockwise rotation a memorial lies within the lot. For example, a central lot monument is given the designated letter A. It is also considered the twelve o'clock position on a clock. All the other memorials, from directly behind and clockwise around, are lettered accordingly. Note that the lots with perpetual care contracts are already given letter designations on the lot card.



This section from the lot card is a demonstration of the clockwise designation given to the memorials. The central monument is designated "A", the memorial directly behind it is designated "B" and so on.



This lot card demonstrates the perpetual care contract lettering system. This is a given system that comes with most PC lots. Any memorials without designation have been given the appropriate lettering.

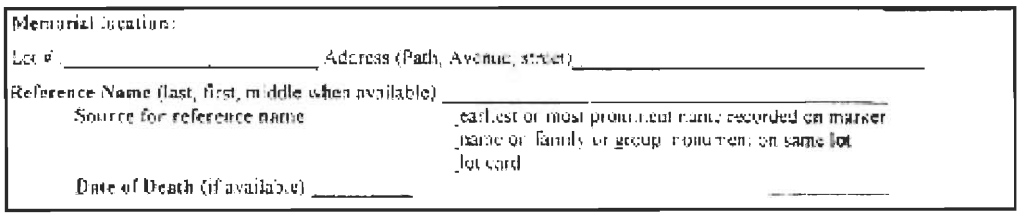
- **Date and time of record**

  The date and time of the survey being conducted is recorded. The date and time are important to give a representative time of when the survey was performed, and the year can serve as a comparative tool for future surveyors use.

- **Surveyor**

  The initials of the person performing the survey are recorded. The name of the person recording the data is helpful to the user if they need to consult the surveyor about any information on the field form.

3.1.2 Unique Memorial Identification


Memorial location:
Lot # _____ Address (Path, Avenue, street) _____
Reference Name (last, first, middle when available) _____
Source for reference name _earliest or most prominent name recorded on marker
_name on family or group monument on same lot
_lot card
Date of Death (if available) _____

- **Lot Number and Address**

  The number of the lot and the address within the cemetery is recorded for location purposes and for future database utilities. Both the lot number and the address can be found from the lot cards.

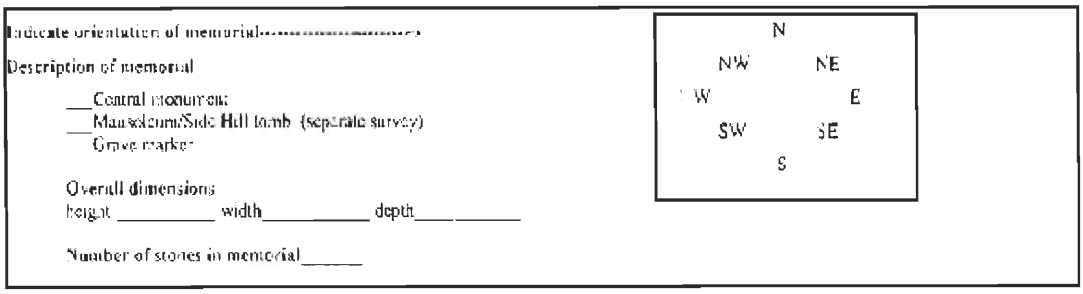
- **Reference Name and Source**

  The name of the person for which the memorial is erected is the reference name. There are three sources from which this information can be obtained: i) the earliest or most prominent name recorded on the marker; ii) the name on the family or group monument on same lot; iii) the lot card.

- **Date of Death**

  The date including month, day and year of death of the person referenced is recorded if available. The date of death can be obtained from the grave marker, the central lot monument, or the lot card.

3.1.3 Memorial Description



- **Orientation**

  The compass direction in which the memorial faces according to its address is recorded. The lot card shows true North, and from that the orientation of the memorial is determined. This is useful for possible future analysis of relationships between orientation and biological growth or inscription legibility.

- **Description of Memorial**

  According to the definitions provided earlier, a memorial is designated either as a central monument, a grave marker, or mausoleum/side hill tomb. The actual mausoleum/side hill tomb survey is separate from this survey. Describing the memorial is important for quantitative uses in results and analysis of the conditions present.

- **Overall Dimensions**

  The height, width and depth, in inches, are recorded on the field form. The dimensions are important for future maintenance purposes.

- **Number of stones in memorial**

  The number of individual stones that compose the memorial are counted and recorded. The joints between stones exist, this will help determine if there are separate entities.

3.1.4 Memorial Characteristics

Design type	Primary material	Secondary material
__Bench	__Granite	__Granite
__Boulder	__Limestone	__Limestone
__Canopy	__Marble	__Marble
__Column	__Sandstone	__Sandstone
__Cross	__Slate	__Slate
__Flush marker	__Puddingstone	__Other____
__Headstone	__Other____	__Not Sure
__Ledger stone/flat slab	__Not Sure	
__Marker		
__Monolith		
__Obelisk		
__Pedestal	**Bronze**	**condition of bronze:**
__Sarcophagus	__Plaque	__dark and shiny
__Screen	__Ornament	__dark and dull
__Sculpture	__Statue	__overall green
__Table	__Other	__green and black
__Tablet		
__Other (describe)		

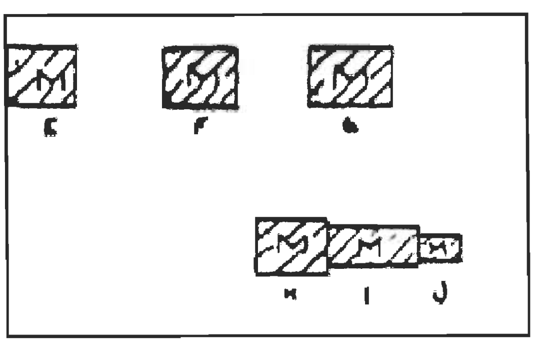
- **Design Type**

  Using the photograph examples and definitions from the previous section, the design type is recorded. There are 17 types and an "other" field for those memorials that do not fit easily into another category. This is important for a simple inventory of the types of memorials present.

- **Primary, Secondary, and Base Materials**

  The primary material of a memorial is what the memorial is primarily composed of. The secondary material (if applicable) is another material present in the memorial, while the base material is what the memorial is erected upon. The lot cards distinguish what primary material is used in the memorial by various letters:

  - "G" – Granite
  - "M" - Marble
  - "S" – Slate
  - "LS" – Limestone
  - "SS" – Sandstone



This section of a lot card shows how it can be helpful in determining what material a memorial is made of. The "M"s inside the shaded boxes indicate that the memorials are composed of marble.

There are various types of materials that exist in Mount Auburn:

Granite can have various colors such as gray or red. It is a speckled stone, and is the most durable.

Marble are typically white when they are first erected and usually turn black from biological growth. It is smooth, and usually sugary to the touch.

Slate is grayish-black and is used because it is soft and easy to carve.

Sandstone is brown in color and easy to spot. The different layers of the bedding planes can be seen. Brownstone is a type of sandstone.

- **Bronze and its condition**

  Some memorials have bronze elements, such as a plaque, ornament, statue, or other type of component.

  The condition of the bronze varies from dark and shiny, dark and dull, overall green, or green and black.

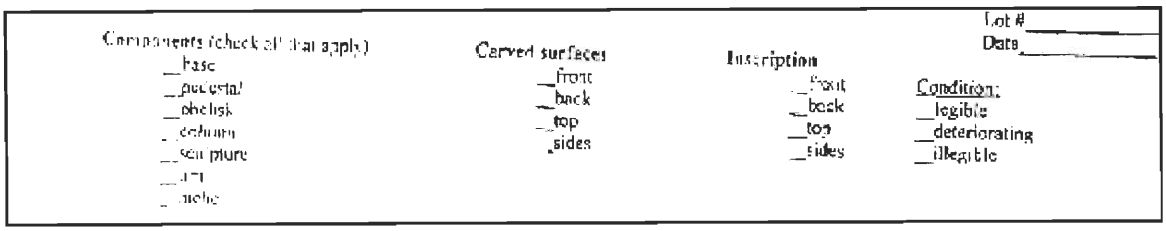
Dark and shiny bronze can be seen from the Bowditch Memorial. It is well-preserved and has no sign of deterioration.

Dark and dull bronze is shown in the bronze plaque to the right. The green pins in the corners show the deterioration of bronze that may soon be seen in the plaque.

Overall green bronze is the classification of the memorial to the left. It is a sign of the metal reacting to outside elements.

Green and black bronze is seen on the vase. It shows effects of weathering that have not covered the entire memorial yet.

3.1.5 Components and Exisiting Sculpted Elements



- **Components**

  Most memorials have different components that make up their design. It is important to take note of these to get a better understanding of what the memorial consists of.

- **Carved and Inscribed Surfaces**

  The surfaces that contain carvings and/or inscriptions are recorded. Also, the legibility of the inscription is rated on three levels: legible, deteriorating, and illegible. These aspects are important because the information on the stones may be in danger of being lost or may have already been lost. Therefore, close attention needs to be given to these stones to aid in preservation

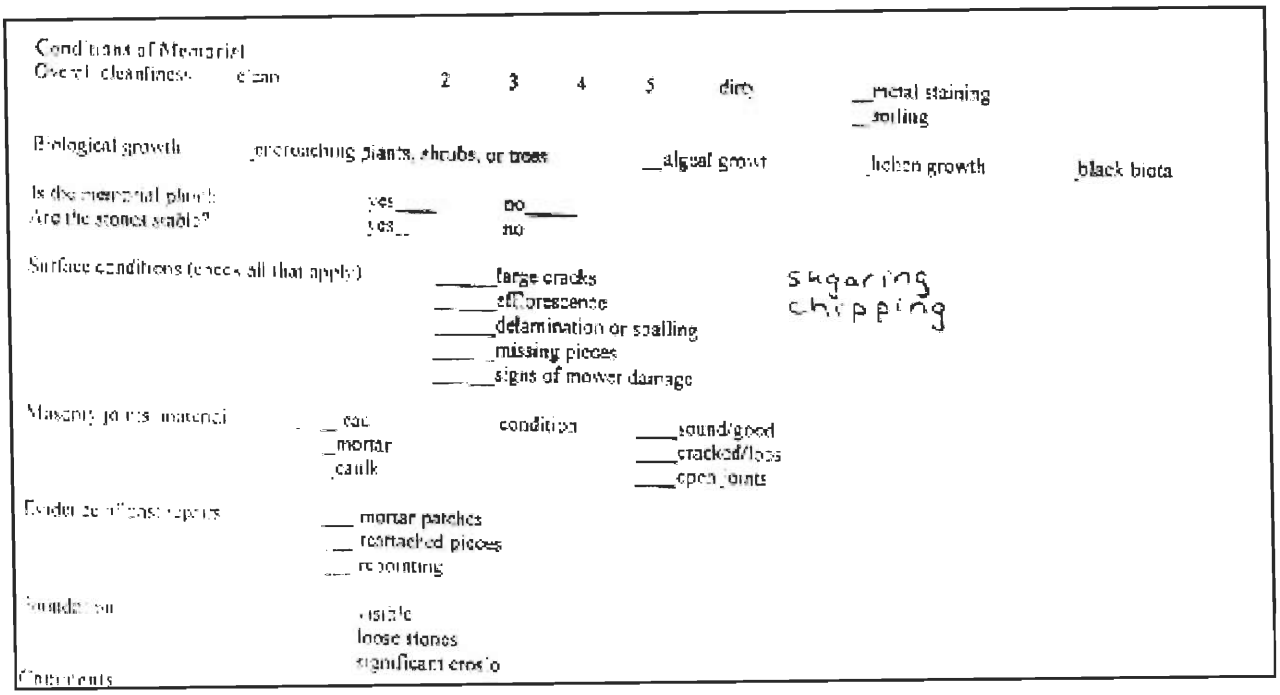
Carved surfaces are seen on the top, front, and sides of this memorial.

A legible inscription can be read on this memorial. All letters are clear and have no sign of deterioration.

Deteriorating Inscriptions are becoming difficult to read and may be impossible to read in a few years, such as the memorial to the left.

An illegible inscription is seen on this memorial. Due to weathering and other factors, the inscription can no longer be read.

3.1.6 Conditions Survey


Condition of Memorial
Overall cleanliness: clean 2 3 4 5 dirty
_metal staining
_soiling
Biological growth: _encroaching plants, shrubs, or trees _algae/ growth _lichen growth _black biota
Is the memorial plumb?: yes____ no____
Are the stones stable?: yes__ no
Surface conditions (circle all that apply): _____large cracks _____efflorescence _____delamination or spalling _____missing pieces _____signs of mower damage
sugaring
chipping
Masonry joints: material: _caulk _mortar
condition: ____sound/good ____cracked/loose ____open joints
Evidence of repairs: ____ mortar patches ____ reattached pieces ____ repointing
Foundation: visible loose stones significant erosio
Comments:

- **Cleanliness of Memorial**

  On a scale from one to five, the cleanliness of the memorial is rated. One is the cleanest rating, and five is the dirtiest. These ratings are based on inscription legibility, and the biological growth that is prevalent on the memorial. Also included are two important aspects of dirtiness: metal staining and soiling on the memorial. This rating system is of importance because those memorials that are very dirty and in danger of being lost can be cleaned and maintained.

Clean Memorials will be given a rating of 1. The inscription is completely legible and there is no biological growth or discoloration.

A Dirty Memorial is the result of years of weathering, and growth. The inscription is illegible and this memorial, made of marble, was once white. Therefore, it has been given a rating of 5.

Metal staining on this boulder is a result from the bronze plaque.

Soiling from the earth can be seen along the base of this memorial.

- **Biological Growth**

  There are four main types of biological growth included in the survey. These types are the most prominent and destructive to the memorials in Mount Auburn. It is important to take note of the types of growth present because the amount of growth can be an indicator of the condition the memorial is in. Most biological growth takes away nutrients from the stone itself, aiding to degrade the stone quicker than usual.

Encroaching plants, shrubs, or trees on a central monument. This memorial is surrounded by ivy, bushes, and tress, which can eventually break the stone and its joints.

Algeal growth prevalent on the memorial. The green colored growth on this memorial is a prime example of algeal growth.

Lichen growth is seen on the memorial to the left. Lichens can be white, red, blue, and a variety of other colors. Flowering lichens are serious problems for memorials because the nutrients they need to grow come directly from the stone, leading to degradation of the memorial.

Black Biota is the most common biological growth found. It is seen in this memorial halfway down the front, below the white marble on the top of the memorial..

- **Stability and Plumbness**

  By gently shaking a memorial, it is easy to tell if it is stable or not. If the memorial shakes from any joint or its foundation, the memorial is unstable. To determine if a memorial is plumb, look at its setting in the ground. If it is parallel and does not tip forward or back, then it is plumb. It is important to be consistent in this evaluation because an unstable memorial can easily tip over and injure people walking near it. If an unstable memorial is also not plumb, it is possible for the memorial to tip over without any other outside influence.

Unplumb memorials are a result of several factors, such as tree trunks or shifting of the earth beneath them. The memorial on the right is not plumb. It is easy to tell when it is near a completely plumb memorial, such as the one to the left of it.

- **Surface Conditions**

  The surface conditions of a memorial are looked at and recorded. There are seven distinct criteria used to analyze a memorial's surface conditions. It is important to know the surface conditions of the memorials to prevent further serious degradation from occurring, especially if a memorial has more than two of these conditions. There are seven main conditions that were recorded in this survey.

Large cracks are detrimental to the structure of the memorial. A large crack is seen towards the top of the memorial across the name inscribed on it.

Efflorescence is due to salt being absorbed thorough the stone and then drawn to the surface of the rock due to capillary action. The effect of this is similar to melting salt thrown on snow in the winter.

Delamination or spalling are most evident in sandstone and slate. Cracks are formed along the bedding planes, and then the stone falls off, as shown in the photograph to the left.

Missing pieces are seen in the picture to the left. There should be an additional component to this memorial on top of the peak, but it has fallen off due to weathering or some other effect.

Signs of mower damage is a prevalent condition seen in Mount Auburn. Due to weed wackers and mowers, the memorial at the left has been scratched and chipped.

Sugaring occurs mostly in marble after several years of degradation. When rubbed, the marble will fall away as if it was sugar.

Chipping can occur under many circumstances. Weathering is a prime cause of it and can seriously ruin the structure of the memorial. Chipping is seen in the corner of the base of this memorial.

- **Masonry Joints Materials and Condition**

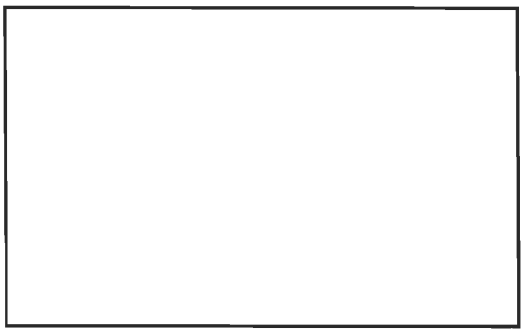
  All stones in the memorials are held together by masonry joints materials. There are three distinct materials used in memorials: lead, mortar and caulk. When recording the material types, attention must be given to the condition of the joint material as well. The material can be sound or good, cracked or loose, or have open joints. It is important to properly document the condition because if the material is wearing away, there may be a greater chance of the memorial becoming unstable.

- **Evidence of Past Repairs**

  If a memorial has been seriously damaged in the past, it may have already been repaired. There are several remedies to damaged pieces:

Mortar patches are applied if a piece of the base or actual memorial has fallen off or become extremely unstable.

Reattached pieces apply to sculptures or pieces of the memorial that have fallen off and have been reapplied.



Repointing is done when cracks are visible and are compromising the stability of the memorial.

- **Foundation**

  The foundation of the memorial is usually buried in the ground. Mount Auburn has stringent rules on the depth of its foundation to ensure stable and plumb memorials. Through erosion, however, some foundations become visible. It is important to document this condition because the foundation may become unstable if too much of the foundation has been exposed.

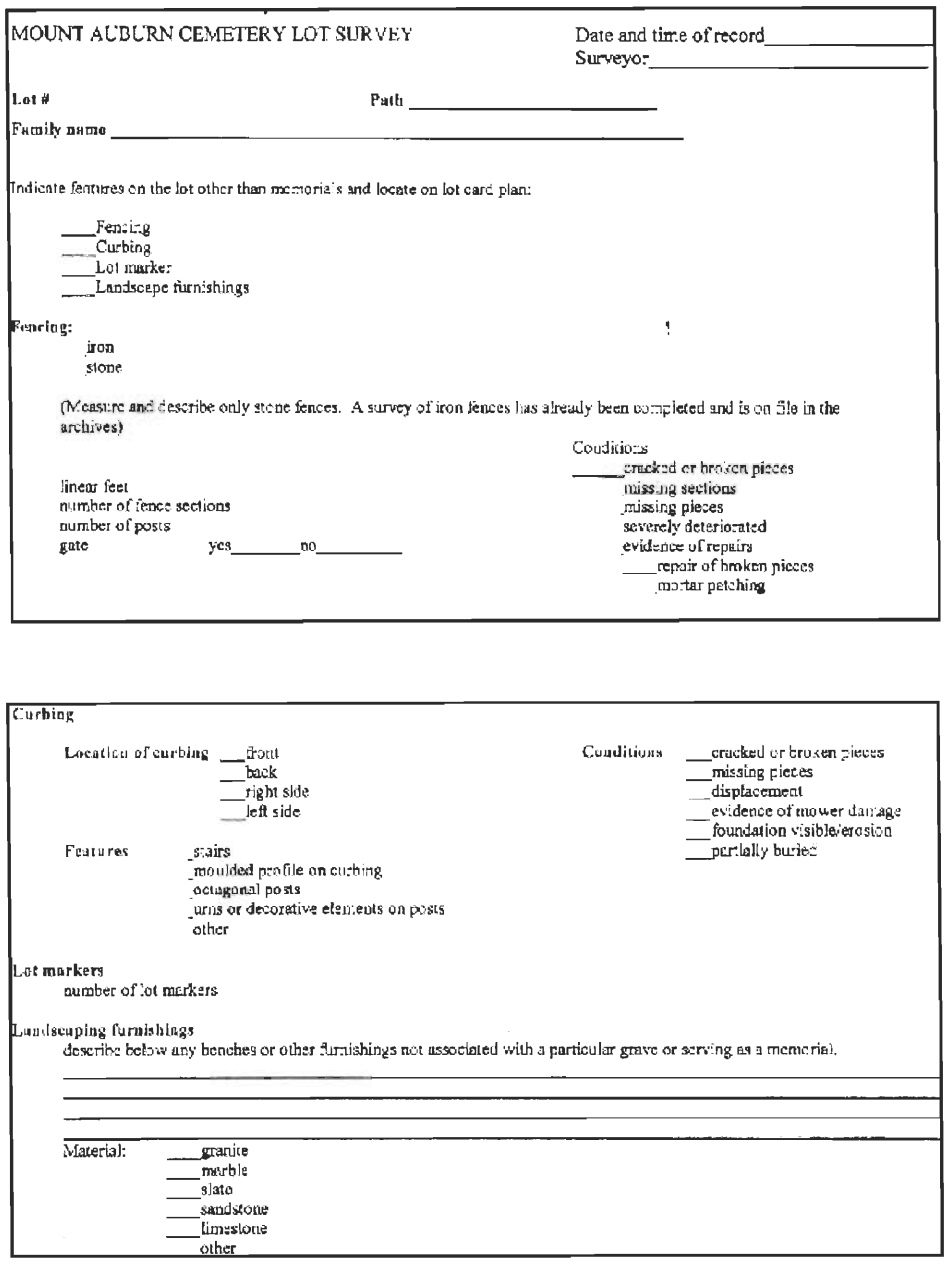
Visible foundation is shown in the picture to the left. Erosion has caused this foundation to be visible.

Loose stones are part of the visible foundation. Many times, the foundation is slate, and the stones may be

Significant erosion occurs through weathering issues in the cemetery, most times due to rain water. If it is noticed that the memorial should be buried deeper in the earth, erosion has probably occurred.

3.2 Lot Survey Field Form

The other field form used in the cataloging process is the lot survey field form. This field form documents the fencing, curbing, lot markers and landscape furnishings that may exist in the lot.The way in which it is filled out is similar to the memorial field form. This section will explain all components of the field form.



MOUNT AUBURN CEMETERY LOT SURVEY

Date and time of record_____
Surveyor:_____

Lot # **Path** _____

Family name _____

Indicate features on the lot other than memorials and locate on lot card plan:

____Fencing
____Curbing
____Lot marker
____Landscape furnishings

Fencing:

iron
stone

(Measure and describe only stone fences. A survey of iron fences has already been completed and is on file in the archives)

linear feet
number of fence sections
number of posts
gate yes_____no_____

Conditions
_____cracked or broken pieces
missing sections
missing pieces
severely deteriorated
evidence of repairs
____repair of broken pieces
mortar patching

Curbing

Location of curbing ___front
___back
___right side
___left side

Features _stairs
_moulded profile on curbing
_octagonal posts
_urns or decorative elements on posts
other

Conditions ___cracked or broken pieces
___missing pieces
___displacement
___evidence of mower damage
___foundation visible/erosion
___partially buried

Lot markers

number of lot markers

Landscaping furnishings

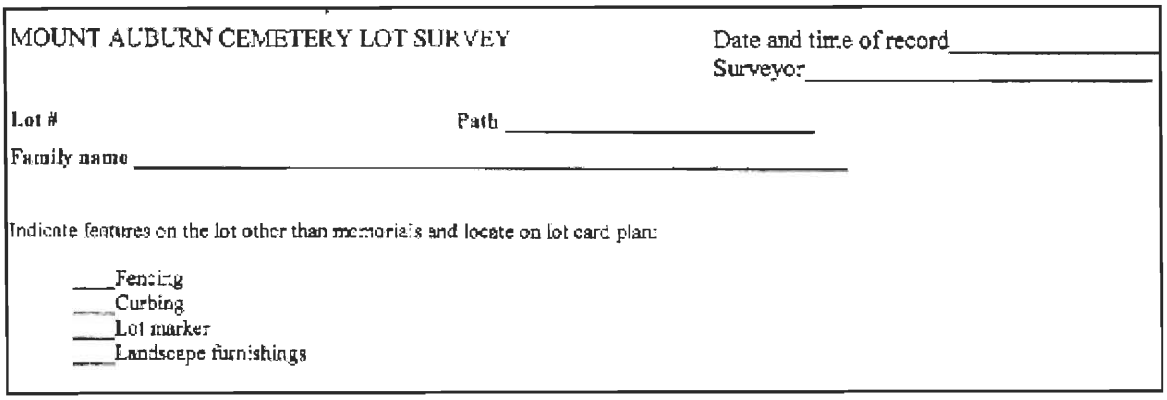
describe below any benches or other furnishings not associated with a particular grave or serving as a memorial).

_____
_____
_____
_____

Material: ____granite
____marble
____slate
____sandstone
____limestone
other

Pages one and two of the lot survey field form.

3.2.1 Initial Information



MOUNT AUBURN CEMETERY LOT SURVEY

Date and time of record_____
Surveyor:_____

Lot # Path _____

Family name _____

Indicate features on the lot other than memorials and locate on lot card plan:

____Fencing
____Curbing
____Lot marker
____Landscape furnishings

- **Date and time of record**

  The date and time of the survey being conducted is recorded. The date and time are important to give a representative time of when the survey was performed, and the year can serve as a comparative tool for future surveyors use.

- **Surveyor**

  The initials of the person performing the survey are recorded. The name of the person recording the data is helpful to the user if they need to consult the surveyor about any information on the field form.

- **Lot Number and Address**

  The number of the lot and the address within the cemetery is recorded for location purposes and for future database utilities.

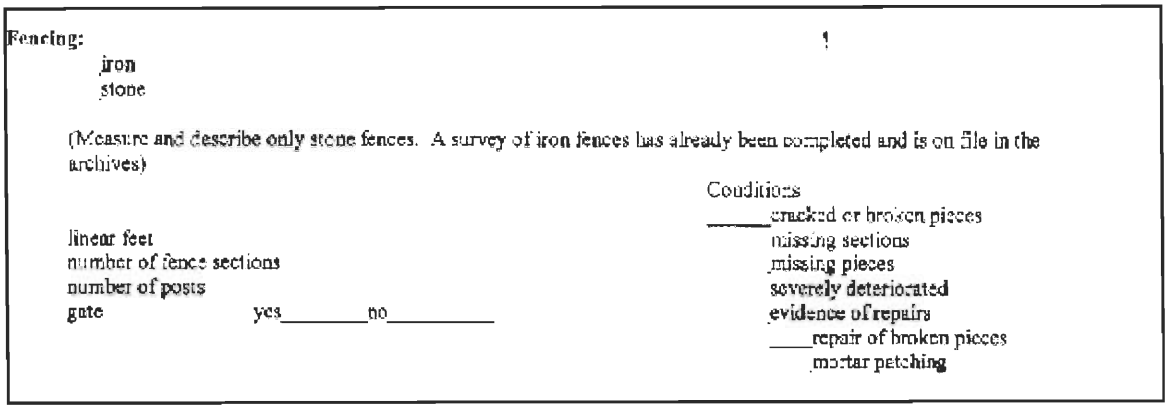
- **Family Name**

  The last name of the family interred within the lot corresponding to the lot number is recorded.

- **Indicative Features**

  Document the type of feature(s) present on the lot.

3.2.2 Fencing Component



Fencing:

_iron
_stone

(Measure and describe only stone fences. A survey of iron fences has already been completed and is on file in the archives)

linear feet
number of fence sections
number of posts
gate yes_____no_____

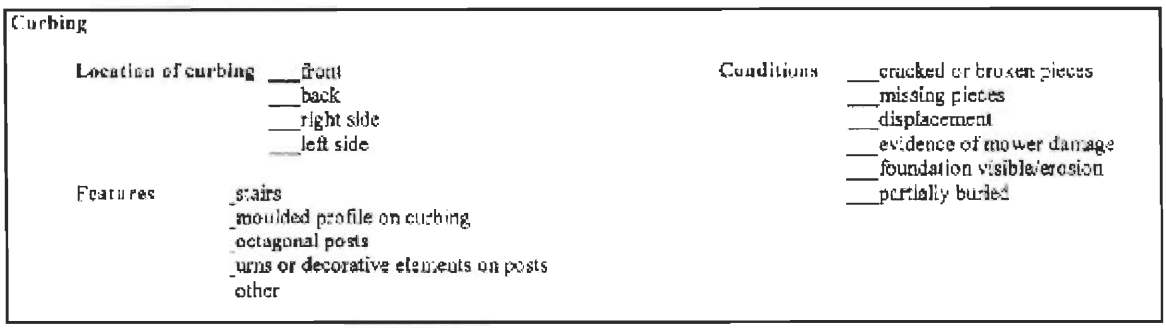
Conditions
_____cracked or broken pieces
_missing sections
_missing pieces
severely deteriorated
_evidence of repairs
____repair of broken pieces
_mortar patching

- **Fencing Features**

  The iron fencing survey has been previously completed; therefore documentation of just stone fences is necessary for this survey. Enter measured dimensions from the survey.

  Record any conditions that are listed on the field form.

3.2.3 Curbing Components



Curbing

Location of curbing ___front
___back
___right side
___left side

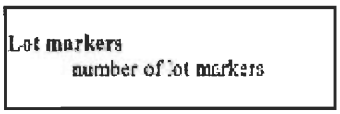
Features _stairs
_moulded profile on curbing
_octagonal posts
_urns or decorative elements on posts
_other

Conditions ___cracked or broken pieces
___missing pieces
___displacement
___evidence of mower damage
___foundation visible/erosion
___partially buried

- **Curbing Features**

  Upon approaching each stone curb record which sides of the lot the curb surrounds. Enter any mentioned features on the field form that exists on the curb being surveyed. The condition of the curbing is essential to enter for knowledge of the condition of the stone curb. Record all conditions that apply to surveyed curb.

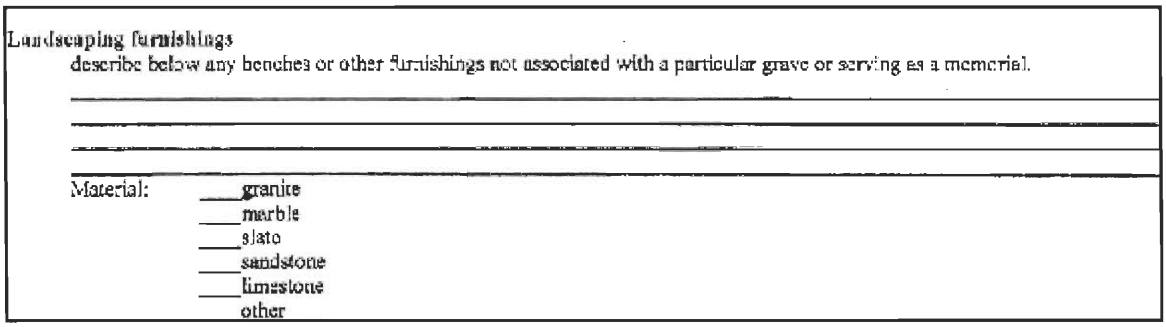
3.2.4 Lot Markers


Lot markers
number of lot markers

- **Lot Markers**

The lot markers are located at the corners of each lot and has the number of the lot inscribed on it

3.2.5 Landscaping Furnishings


Landscaping furnishings
describe below any benches or other furnishings not associated with a particular grave or serving as a memorial.

Material:
___granite
___marble
___slate
___sandstone
___limestone
other

- **Landscape Furnishings**

Contained in some lots are various types of land furnishings, the description of each is recorded to give the best idea of what type of furnishing actually rests in a particular lot. The stone material is recorded for consistency throughout the survey.

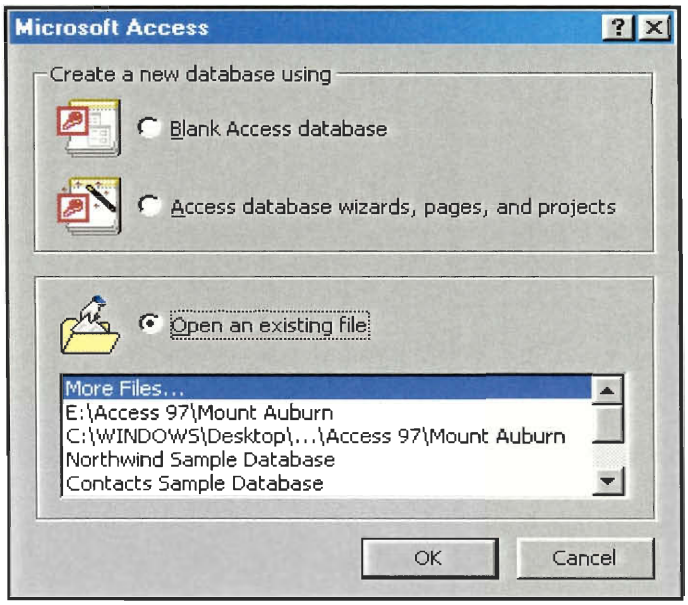
4. FIELD WORK

The key to successful field work is an efficient survey method. The steps involved in developing this process have been tested and have proven to be effective. Five thorough sweeps can successfully cover the island completely. A sweep refers to a total and complete survey of each component of the island. In this section, the sweeps will be discussed to provide sufficient detail of the steps that were followed in completing the survey.

- **Sweep One: Establishing Reference Number of Memorials**
  - As discussed previously, a reference number is assigned to each memorial in the island. By establishing this system before any work is done, the group will not encounter problems with inconsistency between teams. The group should discuss the lettering collectively to provide explanations to the suggestions at hand. Lot cards to all the islands will be provided, and as the lettering is established the reference letter should be marked on the lot card for documentation once in the field.
- **Sweep Two: Central Lot Monuments**
  - Teams will go from lot to lot and complete the a field form for each monument.
- **Sweep Three: Grave Markers**
  - Once the second sweep is complete, the grave marker sweep can begin.
- **Sweep Four: Path Signs, Curbing and Fences**
  - Noting on a general map where path signs are located within the island will be helpful for later inserting into MapInfo, an issue to be discussed later in this manual. Using the Lot Survey Field Form, complete the information requested.
- **Sweep Five: Photographs**
  - Photographs are helpful for the administration to look back upon for future uses. Taking individual photographs, and recording the time and date they are taken is a very useful tool. When taking photographs, take the photographs in reference number order (4353-MON-A, 4353-GMK-B, 4353-GMK-C and so on), and document the reference number to ensure proper labeling once entered into the computer.

5. DATABASE FORMS

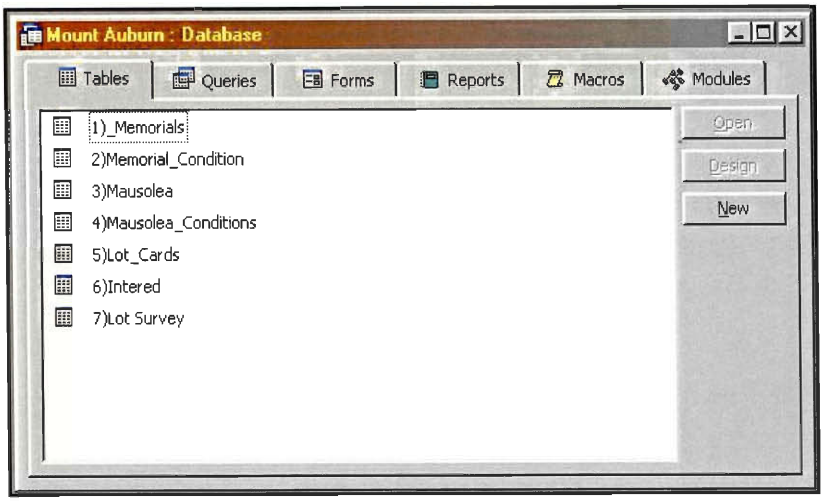
The database was formatted to facilitate easy entry of information. The dataentry forms follow a similar setup to the field forms allowing for simple translation of data between the two. A database is the most effective way to store large amounts of information and have the ability to easily manage and search that data.



- To open the database at the start screen for Access select the data base from the list of available databases.

5.1 Data Entry

When the database is opened this screen will appear. From here you can select the forms and tables that make up the database. You should not need to access the tables. To get to the forms click on the **Forms** tab.

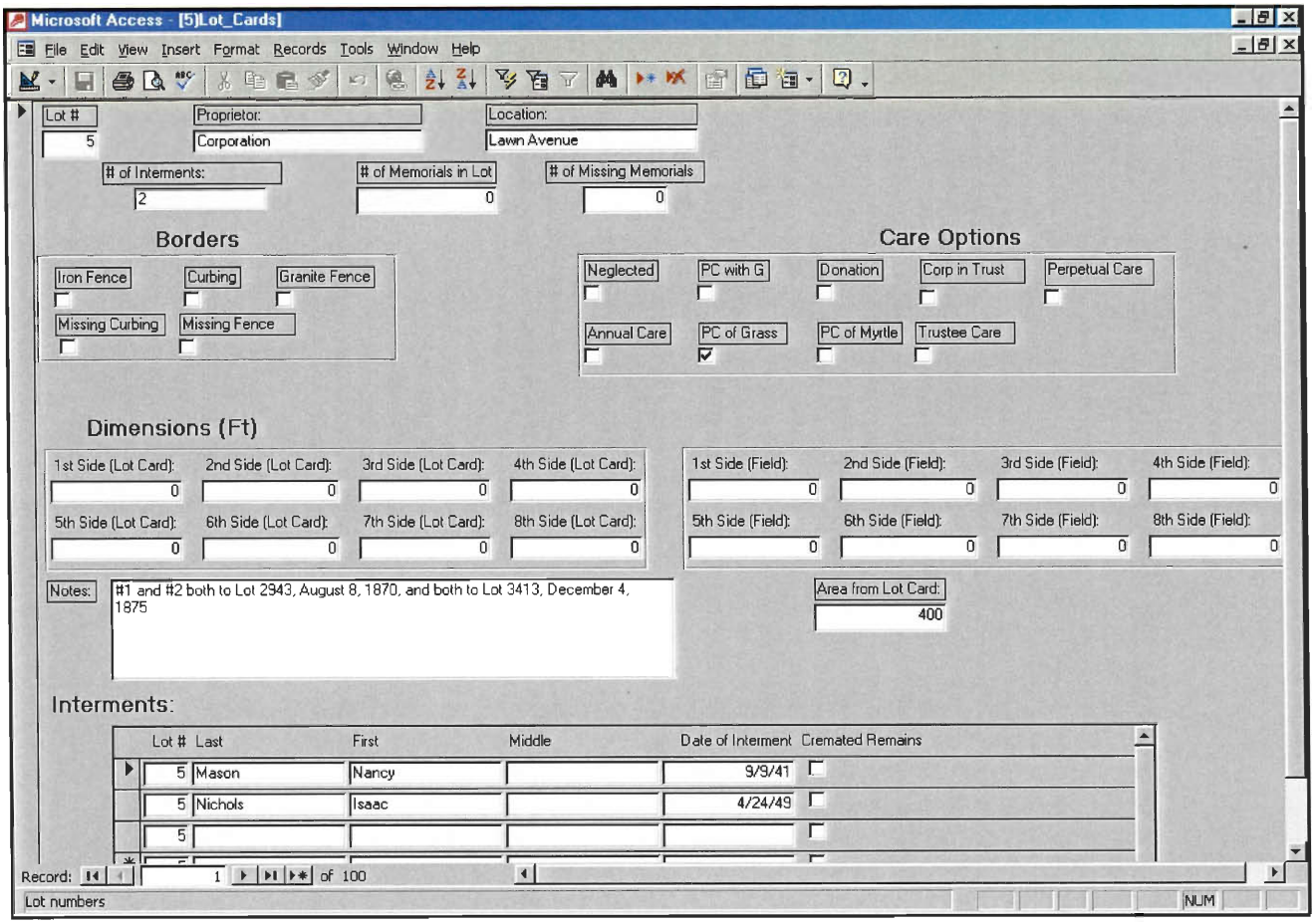


From this **Form**s tab you can select any of the forms in the database.

When you click on the Forms the following screen will appear.

Select the **5)Lots_Cards** form and click on the open button.

Now this form should be displayed on your screen.



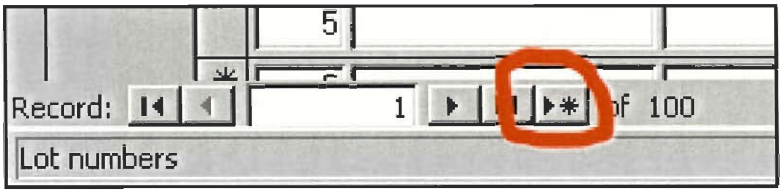
Now start filling in the information on the Lot card begining with the **Lot Number** and **Proprietor**.

Pressing the Tab key will advance you to the next field.

To select **Borders** and **Care Options** using the mouse simply click on the check box beneath your desired choice.

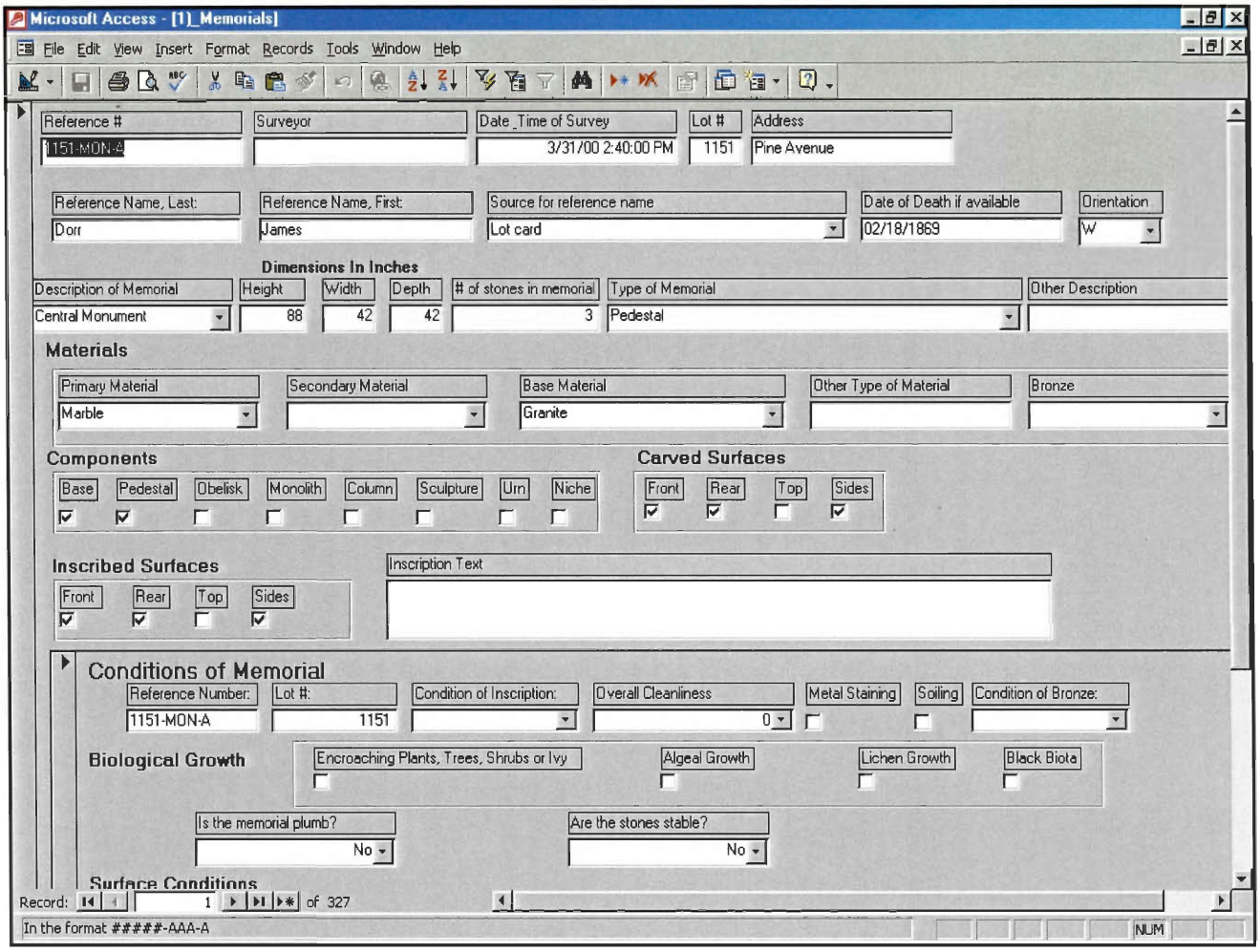
After all the Lot information is entered at the top of the form click on the **Last** field under **Interments** and then begin entering the information about the those interred on the lot. Press the Tab key to advance fields. The Lot number will be automatically entered for you. And a new line will be created for you automatically every time you type on a line.

To advance to a new form press the >* button on the bottom of the form. If you do not click on this button you will not advance to the next form.



5.2 Entry of Memorial Data

Select the **1)_Memorials** form from the forms tab of the start up screen.and click on the open button. This form should now be displayed on your screen.



The information can now be entered off of the completed field form in the corresponding data fields. Be sure to use CAPITAL LETTERS for the **Reference #** field.

Use the tab key to advance to the next data field. Use the mouse to select the proper item from the drop down lists and check the appropriate boxes.

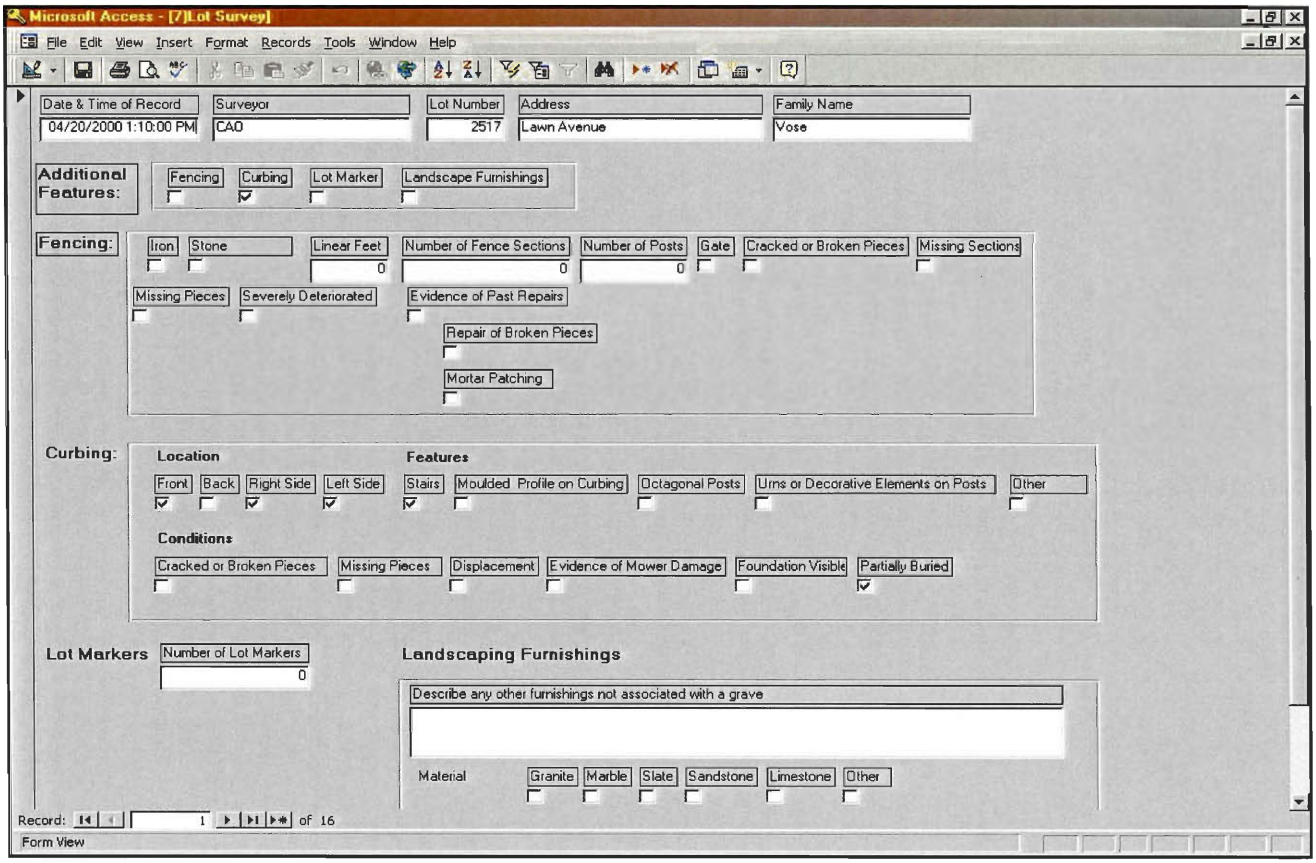
The **Reference Number** and **Lot #** fields in the **Conditions of Memorial** section will be automatically updated.

Once all information has been entered use the >* icon at the bottom of the form to create and advance to a new record.

5.3 Entry of Lot Survey Information Data

Select the **7)Lot_Survey** form and click on the open button.

This form should now be displayed on your screen.



This form can be filled out in a similar fashion to the other forms previously discussed.

5.4 Database Structures

The database was structured during its design. These structures are contained within the table design views and describe the contents and format of the columns within the database. The documentation is contained here for the reference of those who will modify and update the database in the future.

The first structure shown here is the memorials table.

Field Name	Data Type	Description
Reference #	Text	In the format #####-AAA-A
Lot #	Number	The number of the lot
Date & Time of Survey	Date/Time	In the form MM/DD/YYYY HH:MM AM/PM
Surveyor	Text	The person who recorded the information on the field form
Address	Text	Path or avenue where the memorial is located
Reference Name, Last	Text	Last when available
Reference Name, First	Text	First and Middle when available
Source for reference name	Text	Where the reference name was taken from
Date of Death if available	Text	Enter the Date in the form MM/DD/YYYY
Orientation	Text	What direction is the memorial facing?
Description of Memorial	Text	Which class of memorial is this?
Height	Text	Height of the stone
Width	Text	Width of the stone
Depth	Text	Depth of the stone
# of stones in memorial	Number	The number of stones contained within in the mememorial
Type of Memorial	Text	Classification of the memorial
Other Description	Text	If other type of monument please describe
Primary Material	Text	What is the memorial primarily made of?
Secondary Material	Text	What else is the memorial made of?
Base Material	Text	What is the memorial's base made of?
Other Type of Material	Text	Other materials
Bronze	Text	Type of bronze features
Front	Yes/No	Is the front carved
Sides	Yes/No	Are the sides carved
Rear	Yes/No	Is the rear carved
Top	Yes/No	Is the top carved
Ifront	Yes/No	Is the front inscribed
Isides	Yes/No	Are the sides inscribed
Irear	Yes/No	Is the back inscribed
Itop	Yes/No	Is the top inscribed
Base	Yes/No	Is this feature contained on the memorial?
Monolith	Yes/No	Is this feature contained on the memorial?
Pedestal	Yes/No	Is this feature contained on the memorial?
Obelisk	Yes/No	Is this feature contained on the memorial?
Column	Yes/No	Is this feature contained on the memorial?
Sculpture	Yes/No	Is this feature contained on the memorial?
Urn	Yes/No	Is this feature contained on the memorial?
Niche	Yes/No	Is this feature contained on the memorial?
Inscription	Memo	Type the full inscription here
MAPINFO_ID	AutoNumber	

The following table structure is of the **Memorial Conditions** table.

Field Name	Data Type	Description
Reference Number	Text	In the form #####-AAA-A
Lot #	Number	Type the lot number here
Condition of Inscription	Text	What s thecondition of the inscription.
Overall Cleanliness	Number	Overall cleanliness 1(clean)-5(dirty)
Metal Staining	Yes/No	
Soiling	Yes/No	
Encroaching Plants, Trees, Sh	Yes/No	Are any plants growing on or close to the stones
Algeal Growth	Yes/No	Is this present
Lichen Growth	Yes/No	Is this present
Black Biota	Yes/No	Is this present
The memorial is plumb	Yes/No	
The stones are stable	Yes/No	
Large Cracks	Yes/No	
Efflorescence	Yes/No	
Delamination or spalling	Yes/No	
Missing Pieces	Yes/No	
Signs of mower damage	Yes/No	
Chipping	Yes/No	
Sugaring	Yes/No	
Material (masonry joints)	Text	What are the joints made of
Condition (masonry joints)	Text	What is the condition of the masonry joints
Evidence of past repairs	Text	
Foundation	Text	
Evidence of Vandalism	Yes/No	
MAPINFO_ID	AutoNumber	
Notes	Memo	
Condition of Bronze	Text	

The structure for the Lot Cards table is shown here.

Field Name	Data Type	Description
Lot #	Number	Lot numbers
Location	Text	Path or avenue where the lot is located
Proprietor	Text	The name taken for the lot card
# of Memorials in Lot	Number	The total number of memorials contained in the lot
# of Interments	Text	The total number of interment on the specified lot
# of Missing Memorials	Number	The number of memorial s indicated on the lot card that were not present during the field survey.
Iron Fence	Yes/No	Is there an Iron fence present
Granite Fence	Yes/No	Is there a granite fence present
Curbing	Yes/No	Is there curbing present around the lot
Missing Fence	Yes/No	
Missing Curbing	Yes/No	
1st Side (Lot Card)	Number	
2nd Side (Lot Card)	Number	
3rd Side (Lot Card)	Number	
4th Side (Lot Card)	Number	
5th Side (Lot Card)	Number	
6th Side (Lot Card)	Number	
7th Side (Lot Card)	Number	
8th Side (Lot Card)	Number	
Area from Lot Card	Number	Area listed on the lot card
1st Side (Field)	Number	
2nd Side (Field)	Number	
3rd Side (Field)	Number	
4th Side (Field)	Number	
5th Side (Field)	Number	
6th Side (Field)	Number	
7th Side (Field)	Number	
8th Side (Field)	Number	
PC with G	Yes/No	
Donation	Yes/No	
PC of Grass	Yes/No	
PC of Myrtle	Yes/No	
Annual Care	Yes/No	
Neglected	Yes/No	
Corp in Trust	Yes/No	
Trustee Care	Yes/No	
Perpetual Care	Yes/No	
Date Interred	Date/Time	
Notes	Memo	
MAPINFO_ID	AutoNumber	

The structure for the interred table is demonstrated below.

Field Name	Data Type	Description
Lot #	Number	Lot # of where the interred are located
Last	Text	Last name of interred
First	Text	First name of interred
Middle	Text	Middle name of interred
Date of Interment	Date/Time	Date of interment
Cremated Remains	Yes/No	Are the remains cremated?

The structure for the Lot Survey table is shown here.

Field Name	Data Type	Description
Date & Time of Record	Date/Time	Record the date and time that the information was recorded.
Surveyor	Text	The name of the person who surveyed the lot.
Lot Number	Number	The number of the lot the survey was conducted for
Address	Text	The path or street on which the lot is located.
Family Name	Text	The last name of the family commemorated by the lot.
Fencing	Yes/No	Is there fencing around the lot?
Curbing	Yes/No	Is there curbing around the lot?
Lot Marker	Yes/No	Are there lot markers around the lot?
Landscape Furnishings	Yes/No	Are there any landscape furnishings present on the lot?
Iron	Yes/No	Is the fence iron?
Stone	Yes/No	Is the fence stone?
Linear Feet	Number	What is the perimeter of the fence?
Number of Fence Sections	Number	How many sections of fence are there?
Number of Posts	Number	How many posts are there?
Gate	Yes/No	is there a gate on the fence?
Cracked or Broken Pieces	Yes/No	Are any fence section cracked or broken?
Missing Sections	Yes/No	Are any sections of fence missing?
Missing Pieces	Yes/No	Are any pieces of the fence missing?
Severely Deteriorated	Yes/No	is the fence severly deteriorated?
Evidence of Past Repairs	Yes/No	Is there evidence of past repairs?
Repair of Broken Pieces	Yes/No	Where broken pieces repaired?
Mortar Patching	Yes/No	Was mortar used to patch the fence?
Front	Yes/No	Is there curbing present on the front?
Back	Yes/No	Is there curbing present on the back?
Right Side	Yes/No	Is there curbing present on the left?
Left Side	Yes/No	Is there curbing present on the right?
Stairs	Yes/No	Does the curbing have stairs?
Moulded Profile on Curbing	Yes/No	Is there a shaped profile on the curbing?
Octagonal Posts	Yes/No	Are there octagonal posts?
Urns or Decorative Elements	Yes/No	Are there any any urns or other decorative elements?
Other	Yes/No	Other decorative effects.
Describe	Memo	Describe other effects here.
Cracked or Broken Pieces2	Yes/No	Are any curb sections cracked or broken?
Missing Pieces2	Yes/No	Are any pieces of the curb missing?
Displacement	Yes/No	Is the curb displaced from it's intended location?
Evidence of Mower Damage	Yes/No	Is there mower damage on the curb?
Foundation Visible/Erosion	Yes/No	Is the foundation visible/eroded?
Partially Buried	Yes/No	Is the curb partially buried?
Number of Lot Markers	Number	How many lot markers are present?
Describe any other furnishinc	Memo	Describe the furnishings on the lot.
Granite	Yes/No	Is the curb granite?
Marble	Yes/No	Is the curb marble?
Slate	Yes/No	Is the curb slate?
Sandstone	Yes/No	Is the curb sandstone?
Limestone	Yes/No	Is the curb limestone?
Other2	Yes/No	Write in any other materials used.

6. MAPINFO

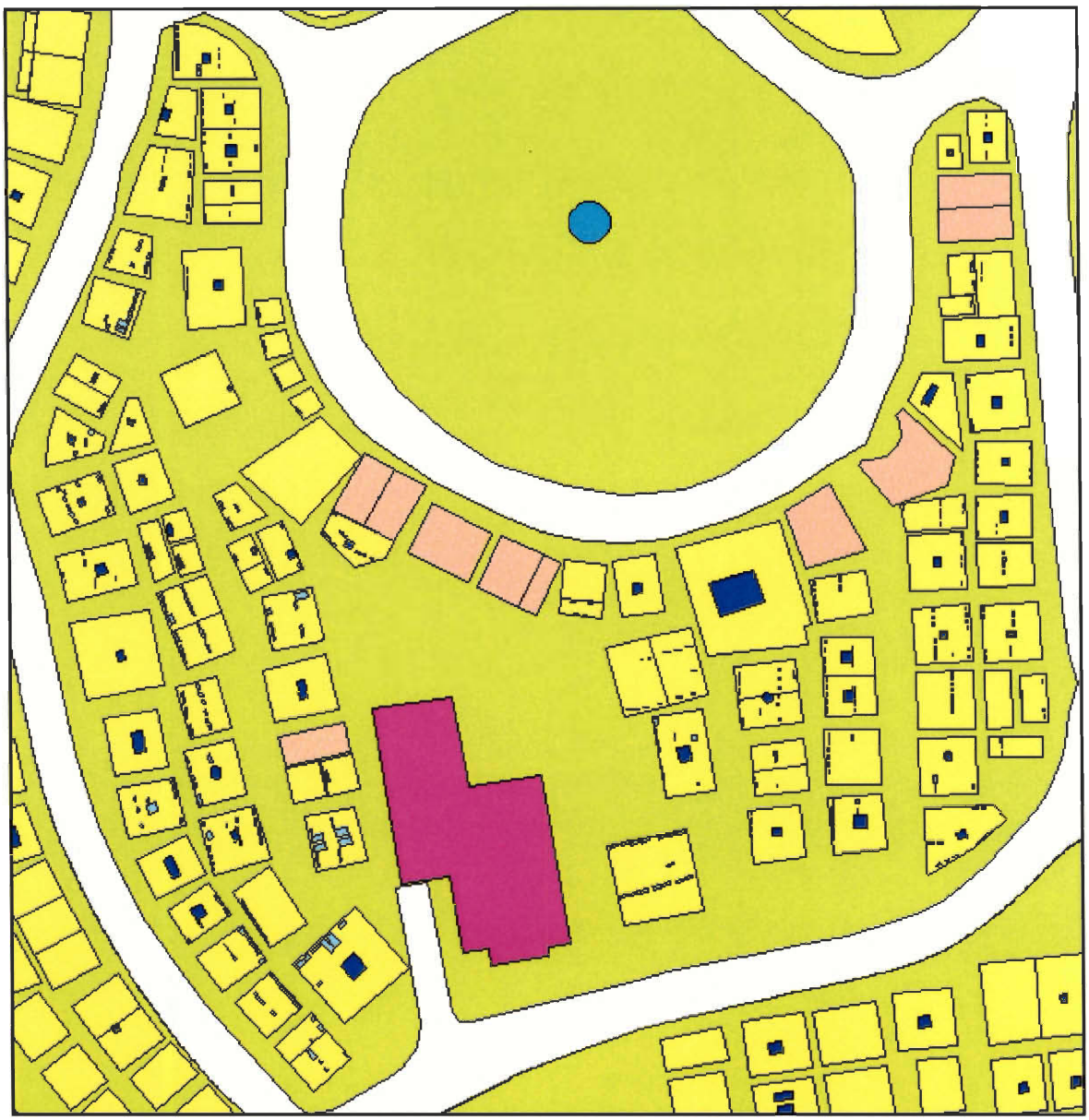
MapInfo is the mapping program that is used in the cataloging system. The program is also capable of interfacing with Access to get information to for its tables. The basic structures of what each table/layer contains and how to modify them will are contained within this section. A layer is simply the group of all data that is stored in one table. A layer can consist of both graphical and non-graphical data, but does not require both. The tutorial will include how to add any objects necessary to the layer as well as how to update the tables and create thematic maps.

6.1. MapInfo Structures

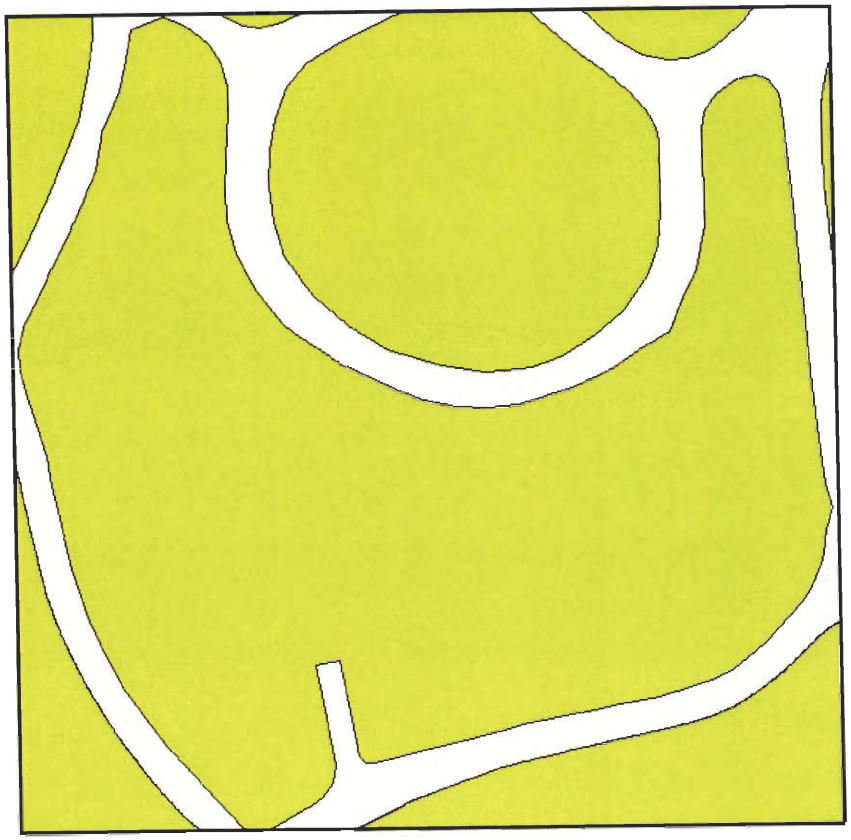
The first MapInfo structure contains all layers that wer used to create the overall map. All structures shown will focus on the Bigelow's Chapel island to show what each layer looks like at the most relevant detail level.

Layer: All

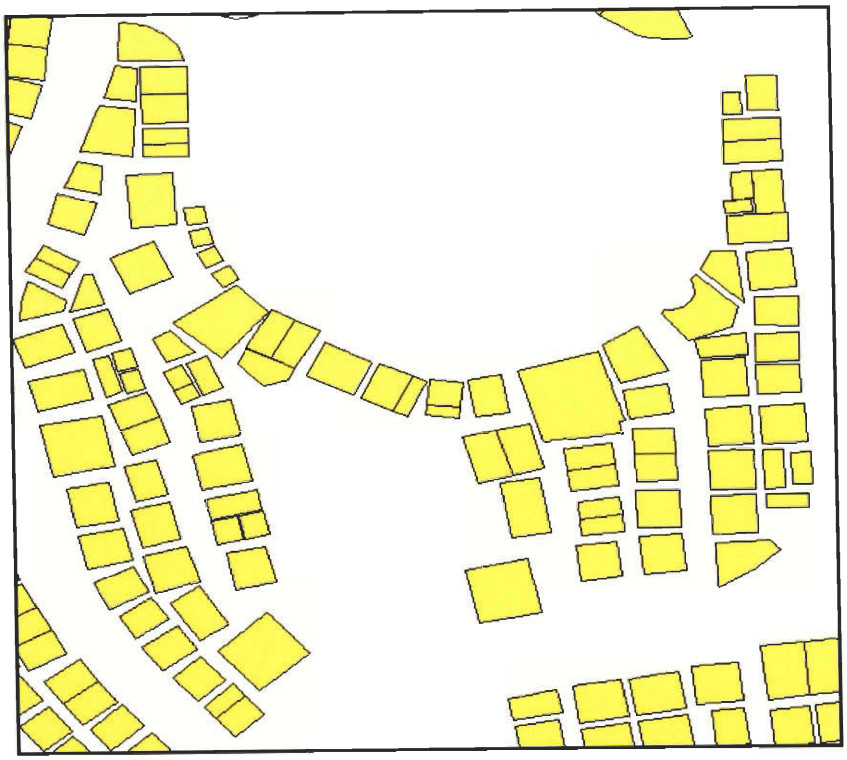
Contents: All objects mapped in the island.



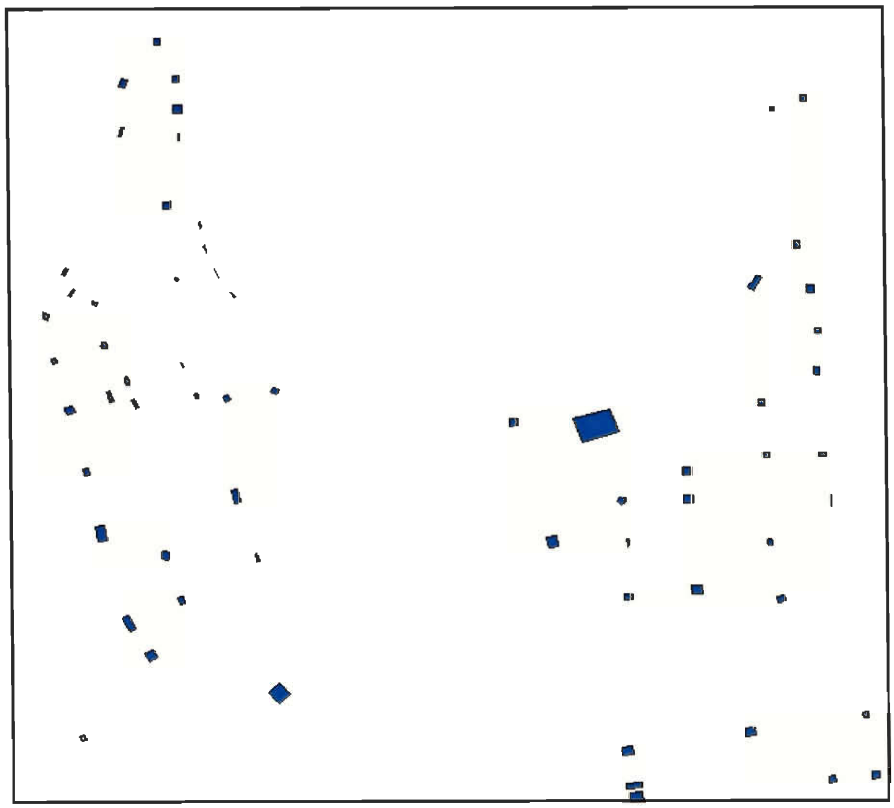
Layer: Islands
Contents: The land contained between the roads within the cemetery



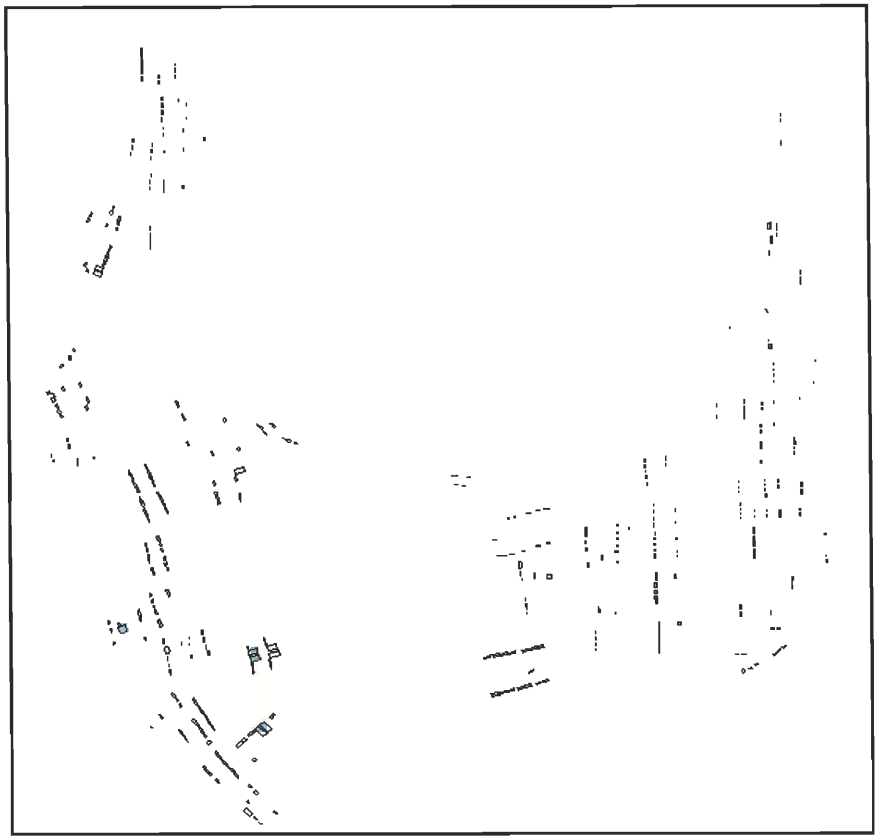
Layer: Lots
Contents: The burial lots contained within Mount Auburn



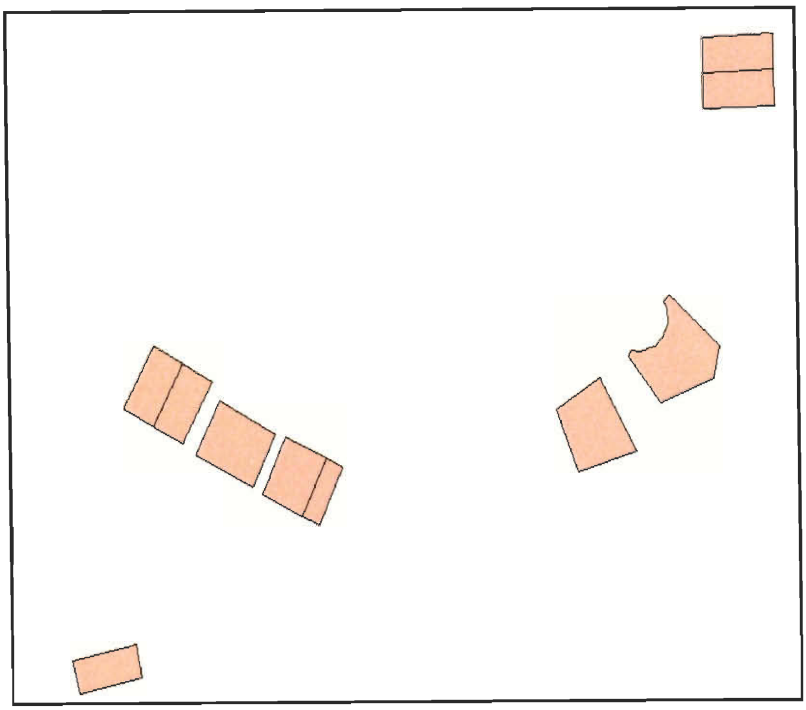
Layer: Central Lot Monuments
Contents: The Central Lot Monuments in the cataloged island.



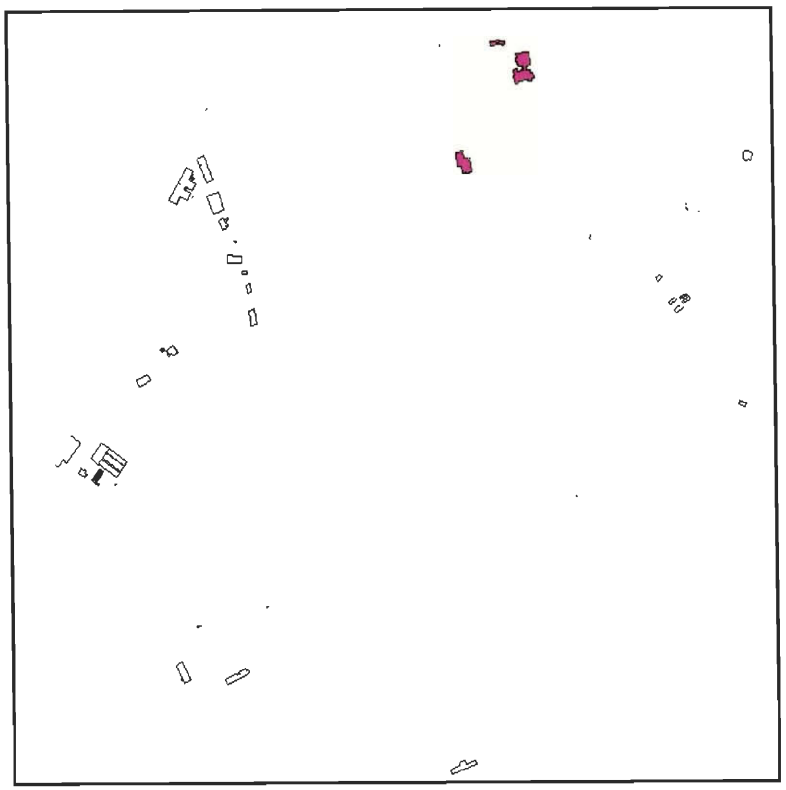
Layer: Grave Markers
Contents: This layer contains the foot prints of all grave markers in catalogued island



Layer: Mauselea
Contents: The mausolea contained within the surveyed island.



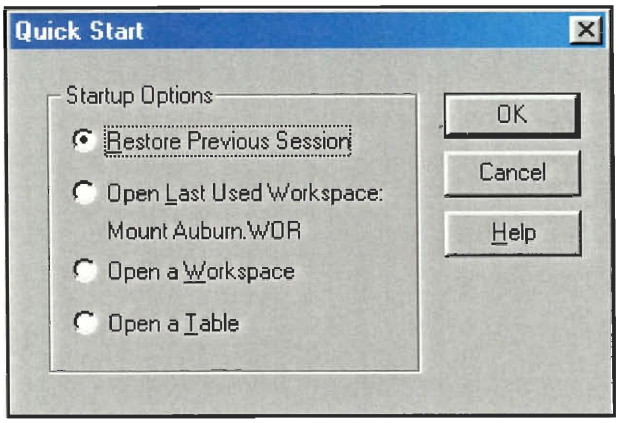
Layer: Buildings
Contents: All the building contained within Mount Auburn.



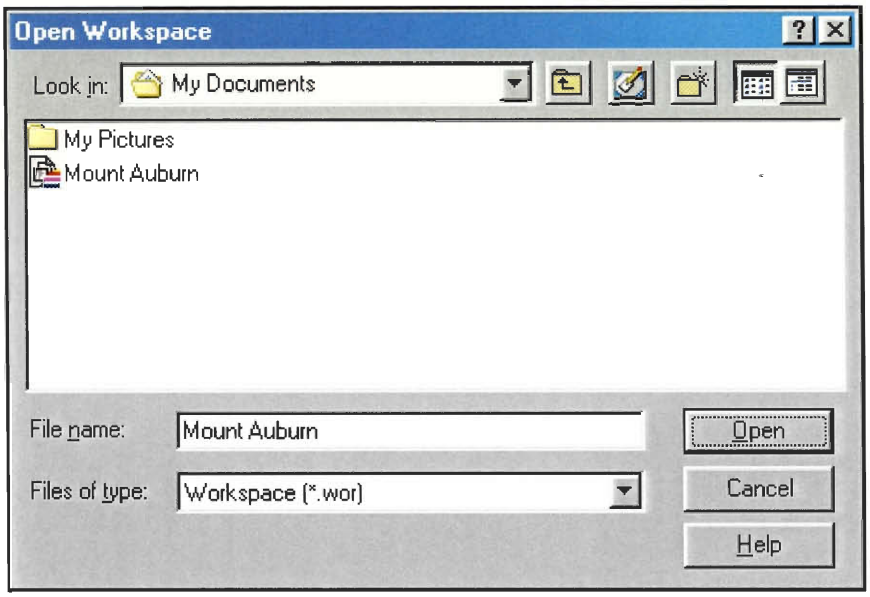
6.2. Expansion and Modification of Layers

To start working with MapInfo, first open the program.

Next at the following screen choose the **Open workspace** option.

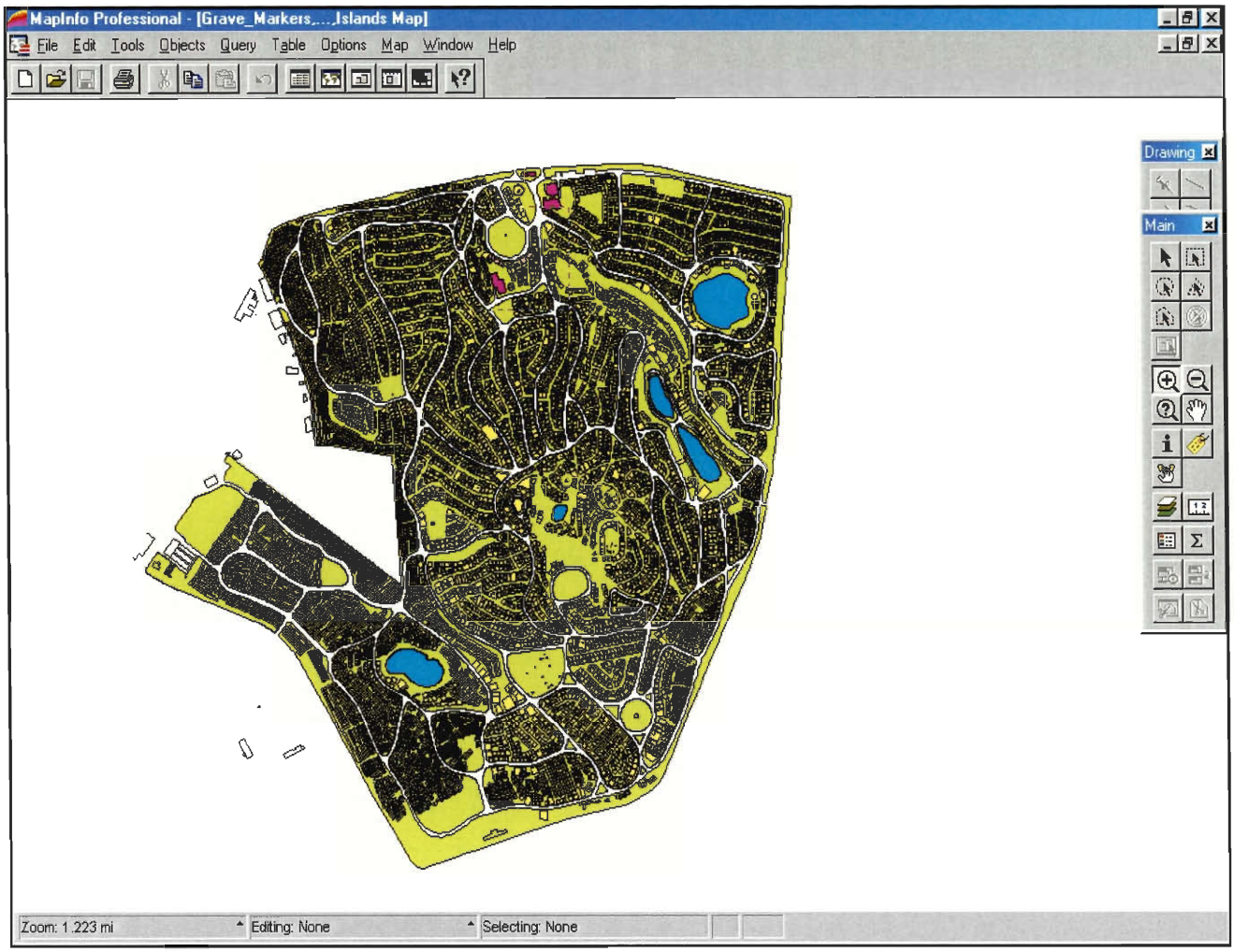


Select the **Mount Auburn** workspace



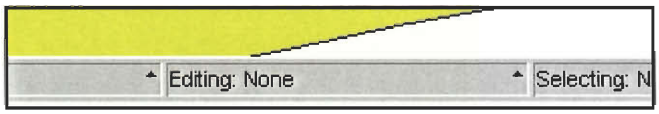
Click on the **Open** button.

Use the **Magnifying Glass** tool to select the area you wish to work on.



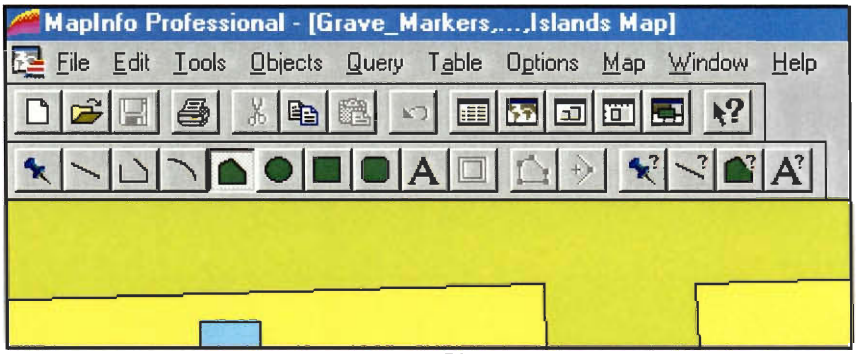
6.2.1 Drawing an Object in an Editable Layer

Select the layer you wish to edit from the **Editing** menu on the task bar. located at the bottom of the screen. Click on the up arrow in the editing box to select a layer.

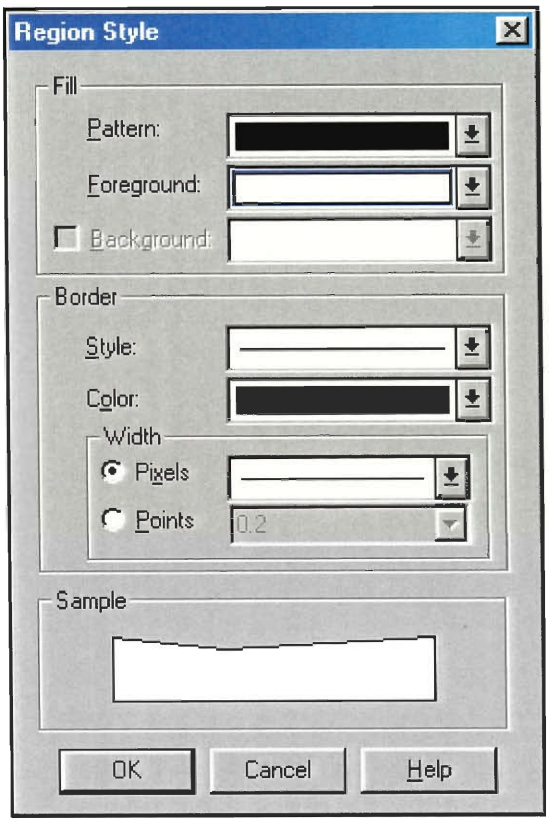


Now that you have made a layer editable we will discuss how to add objects into that layer and to connect those objects with the MS Access database.

First to add a new object you must select a drawing tool from the drawing taskbar, for this example, **Polygon Tool** was used.

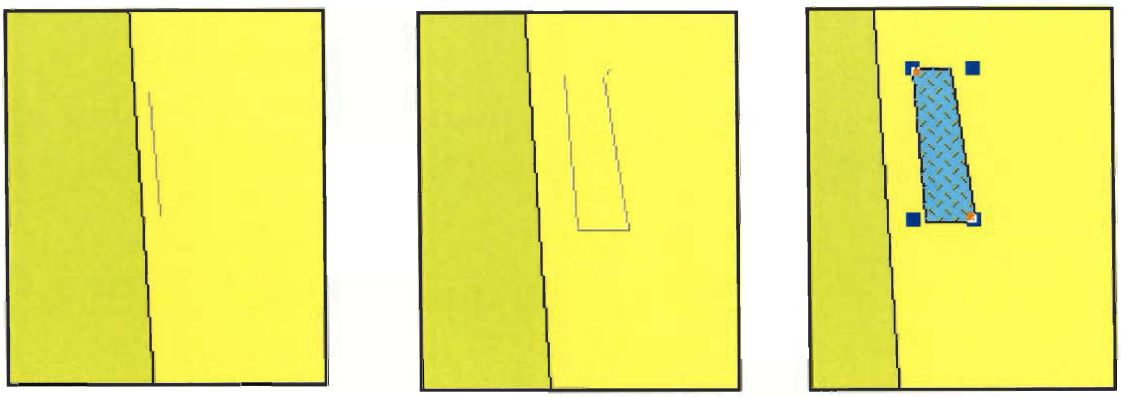


Now select the **Region Sytle** from the drawing menu. This button is indentical to the polygon tool but has a question mark on it. The following menu will appear on your screen.

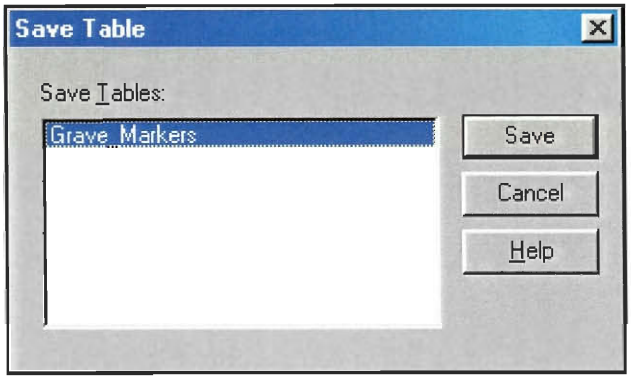


From the above menu click on the arrow next to foreground to change the color of the objects you draw. Colors should be matched with the layer that you are editing. After selecting your color click OK.

To draw an object using the **Polygon Tool** click where you want the four corners to be. To close the polygon press the **S** key to activate the Snap feature of MapInfo. Bring the pointer near the first point and that point will be hilighted by a crosshair. Click, the polygon will close and will fill with color.

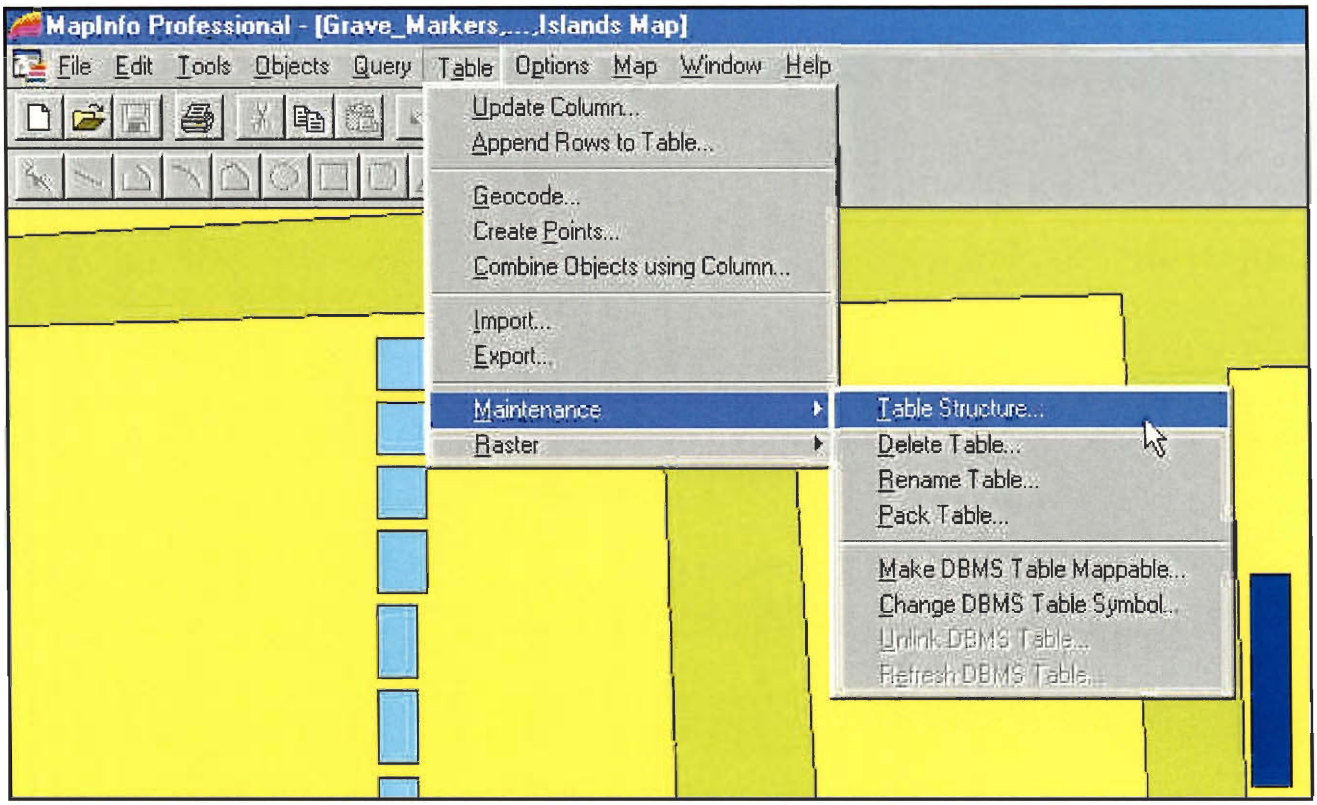


To save the changes that you made you must first click the file menu. The file menu is located on the left side of the upper menu bar. Next select **Save Table** off the menu and the following menu will appear listing all modified tables.

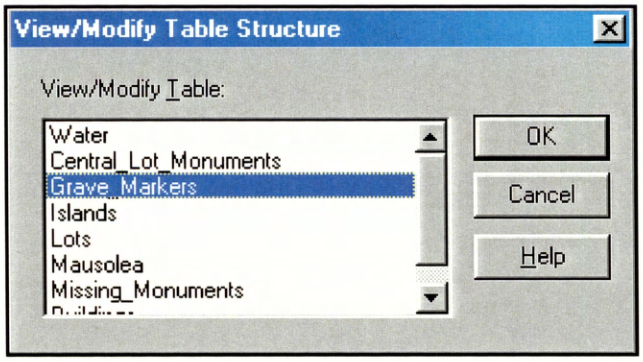


6.2.2 Modifying Table Structure

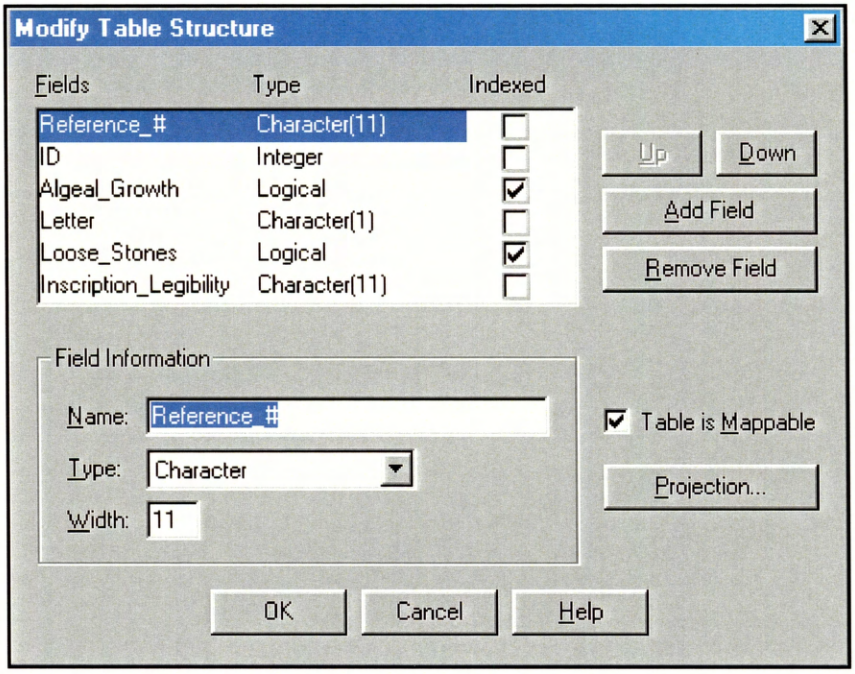
In order to add information fields to an object within a layer there must be a field for that data within that layer's table. To create a new field in a table first click on the table menu in the upper taskbar and then go down to the table maintenence submenu. Select table structure as shown in the following picture.



This will bring up the View/Modify Table Structure menu. Here you need to select the table corresponding to the layer you want to add a new field into.

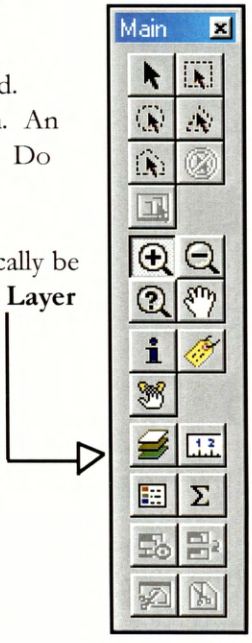


After you select the table you want to maodify and click ok the following screen will appear.

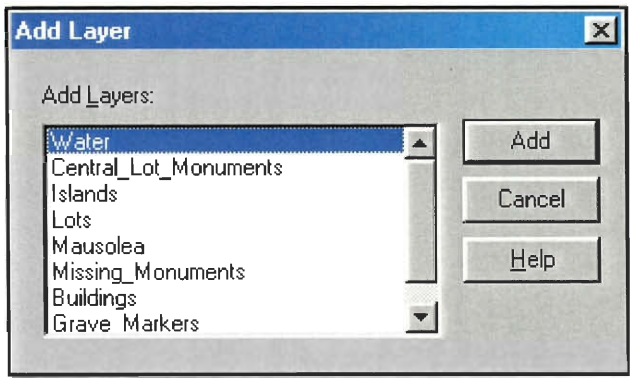


To add a field click on the **Add Field** button. Then select the attributes for the field. Attributes include the **Width, Type** and **Name.** Field Names may not have spaces in them. An underscore (_)is an acceptable alternative. Fields may be reordered if you wish. **Warning:** Do not change the **ID** column. That will affect MapInfo ability to properly display objects.

After all table modifications are made click the **OK** button. Changes will automatically be saved and the map layer will no longer be visible. To view the layer once again click on the **Layer Control** button on the **Main** menu bar.



Next click on the **Add** button to add the layer to the viewable layers.



When this screen comes up selct the layer modified and click **OK**. Then when the layer control screen comes up again click okay and the layer will be visible again.

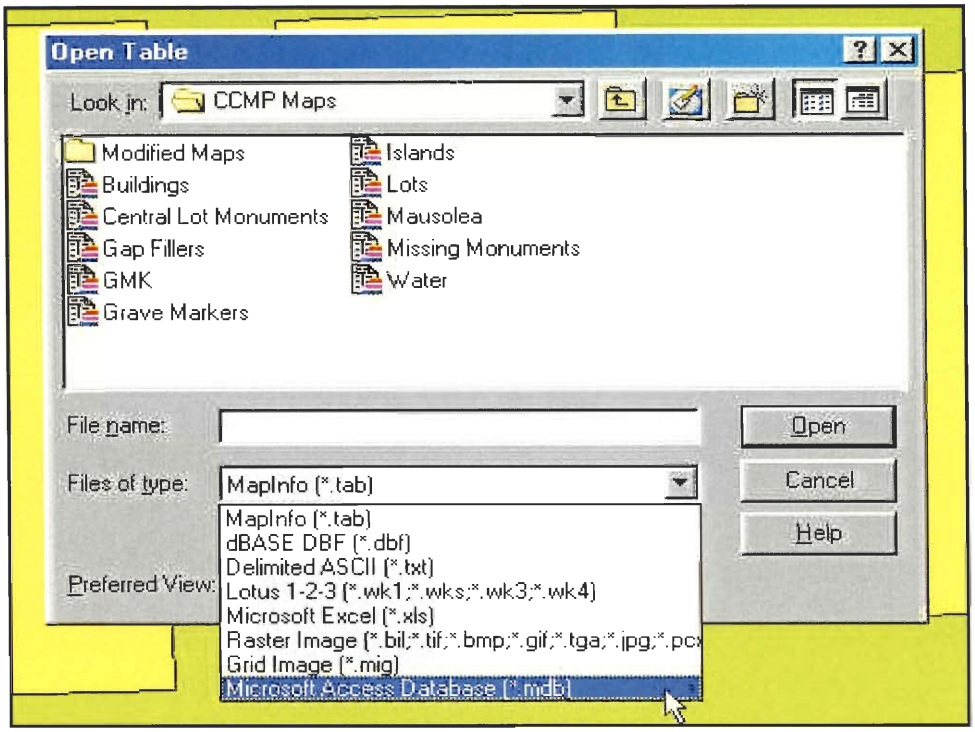
In order to fill in the information for the field you added or edit any other existing fields for an object you need to select the **InformationTtool**. This is the icon on the **Main** toolbar that has an i on it.

Once you have the information tool selected you need to select the object that you want to edit the information corresponding to by clicking on it with the cursor. This will bring up a dialog box. In that box will be all the layers containing objects in the location selected. Select the layer that corresponds to the table you want to edit.

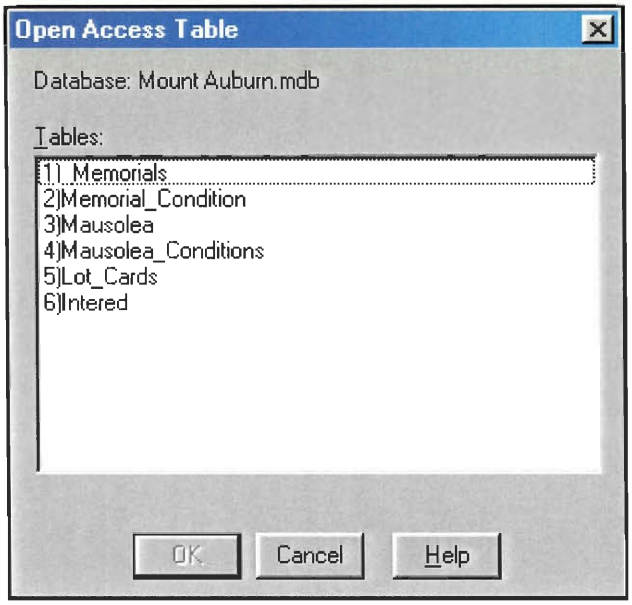
Once you have selected the table you want to edit, click in the field you wish to change the information in.

6.2.3 Integrating Access and MapInfo

A handy feature of MapInfo is its ability to incorporate tables from MS Access. In order to do this the Access table you wish to take data from must be opened in MapInfo. To accomplish this you need to select the **Open Table** command under the **File** menu.

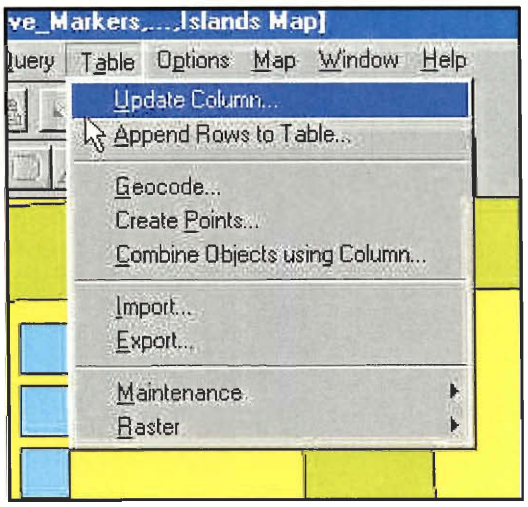


With the Open Table menu open select the file type Microsoft Access Database [*.mdb]. Once the file type is selected then select the Mount Auburn database from the location it was saved in. The following menu will appear once the **OK** button is clicked. Now select the table you need to get the information from.



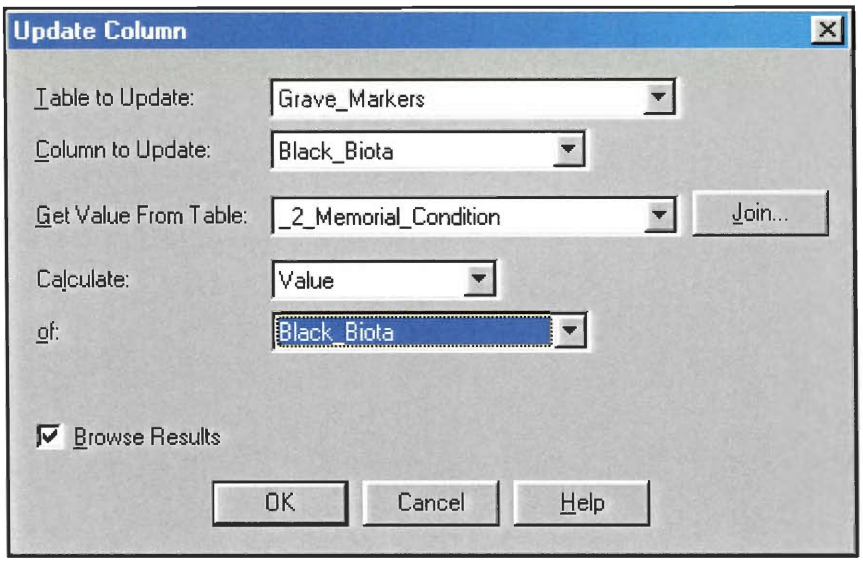
Hilight the table you need and click **OK**. The table will be opened and viewable in MapInfo. Close the table so that the map is again visible.

Now to update the columns in MapInfo with the information from Access you must select **Update Column** from the **Table** menu.



Once the following menu appears select the table that you need to modify. Now select where the information comes from with the **Get Values From Table** field. Next you must go up a field and select what column to update. **Warning:** If you select the the **Column to update** before selecting the source of the update information the **Column to update** field will automatically revert to **Add new temporary column**.

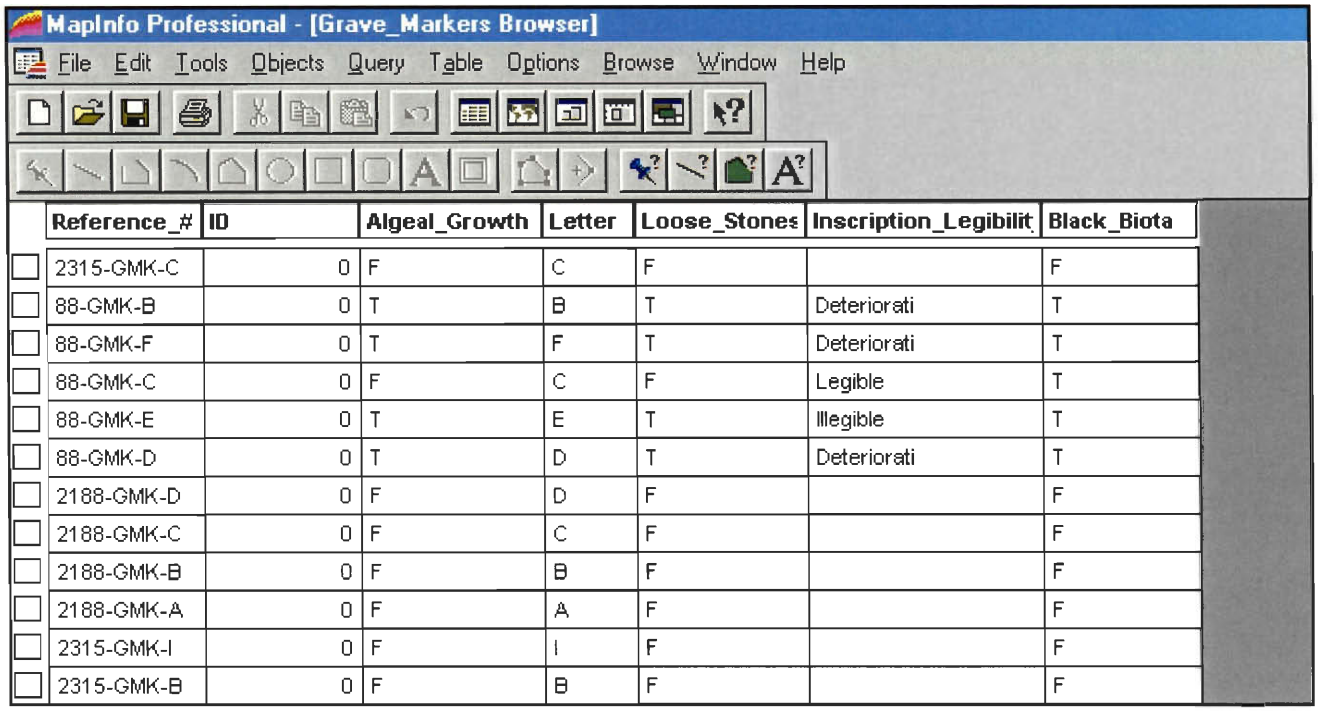
Now for the calculate field make sure it reads value. And lastly select the of column to be the updated again in the **of** field.



Now click **Join** to link the two tables. This will then bring up a window asking you to specify the fields to be used to join the information. The fields that must match in this case are the Reference_# field and the Reference Number field. In other cases it can also be Lot number or other fields that you link.

Once you have selected the fields to compare in order to update the field you specified, click **OK**. This will bring you back to the **Update Column** menu, you have now set up the fields properly, click **OK** here as well. MapInfo will now update the field you selected with the value of the field in the database you selected where the two fields you selected to do the join match.

If you have the **Browse Results** box checked then MapInfo will bring up a table showing the updated information. To get back to the map view simply close the table there should be two grey x icons located one right above the other, you want to select the lower of the two.

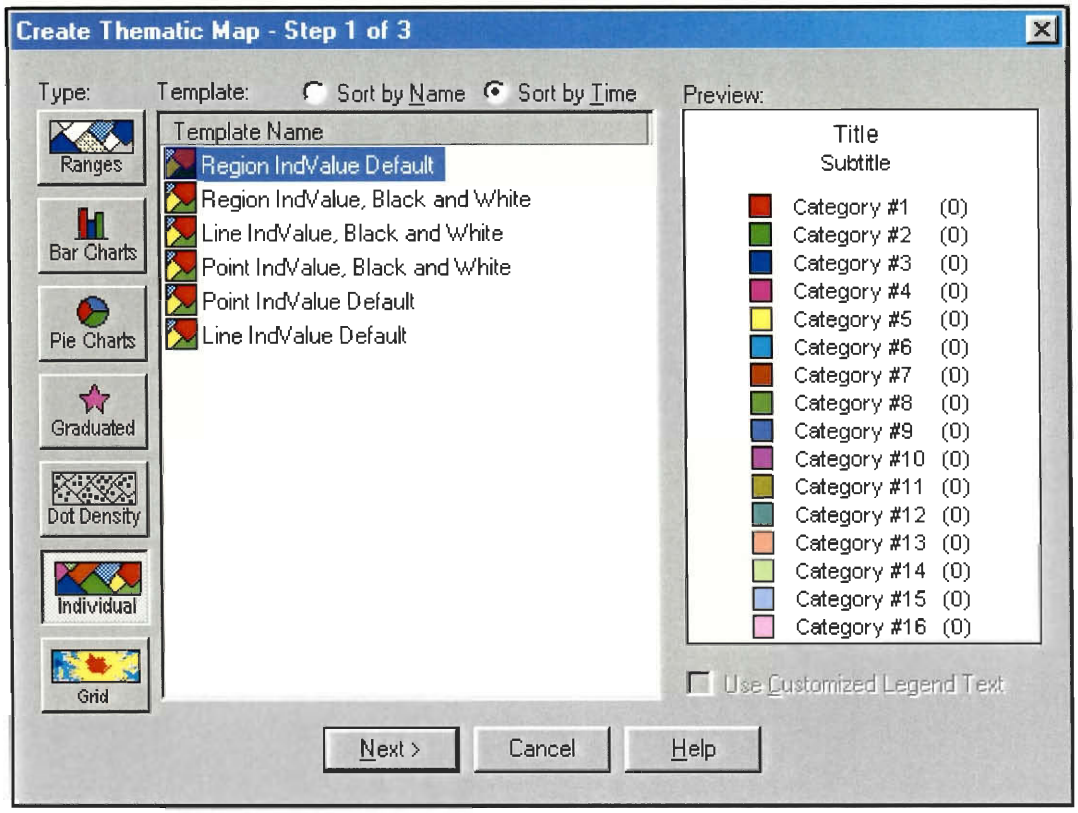


Reference_#	ID	Algeal_Growth	Letter	Loose_Stones	Inscription_Legibilit	Black_Biota
2315-GMK-C	0	F	C	F		F
88-GMK-B	0	T	B	T	Deteriorati	T
88-GMK-F	0	T	F	T	Deteriorati	T
88-GMK-C	0	F	C	F	Legible	T
88-GMK-E	0	T	E	T	Illegible	T
88-GMK-D	0	T	D	T	Deteriorati	T
2188-GMK-D	0	F	D	F		F
2188-GMK-C	0	F	C	F		F
2188-GMK-B	0	F	B	F		F
2188-GMK-A	0	F	A	F		F
2315-GMK-I	0	F	I	F		F
2315-GMK-B	0	F	B	F		F

At this point it would be â good idea to save the data.

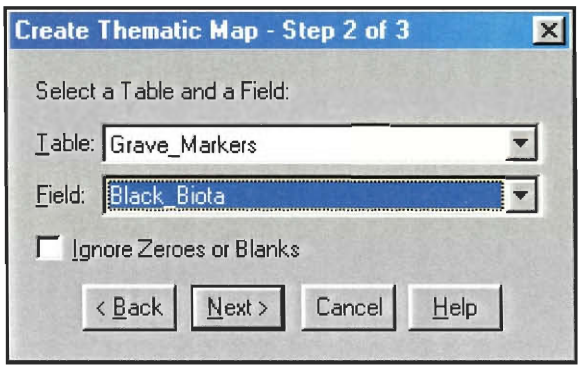
6.2.4 Thematic Maps

One of MapInfo's special features is the ability to produce thematic maps. These maps are used to alter the appearance of the layers to match the data contained within the tables. They can make ceratin types data stand out. To create these thematic maps select **Create Thematic Map** on the **Maps** menu. The following screen will appear.



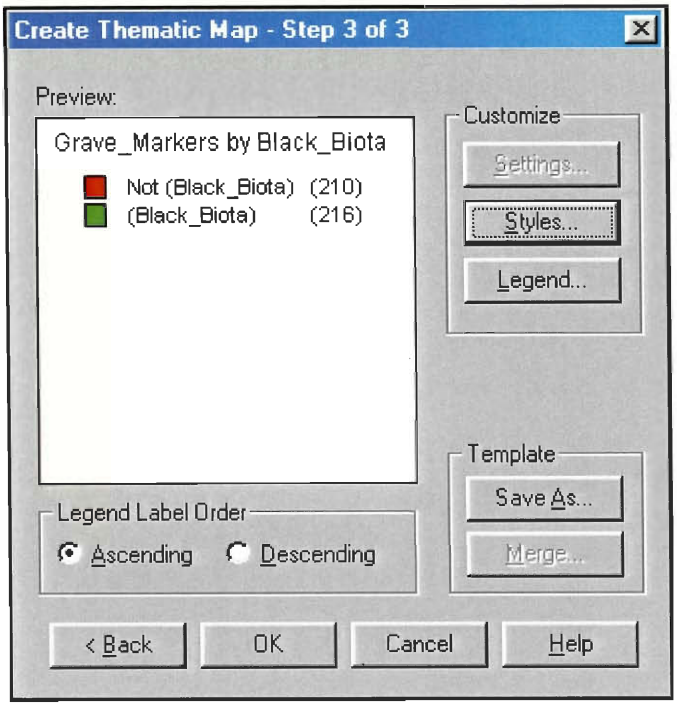
Make sure the **Individual** button is selected on the left of the screen. Then higlight **Region IndValue Default** and click **Next**.

Select the **Table** and **Field** you wish to use in your thematic map. On the following pop-up window.

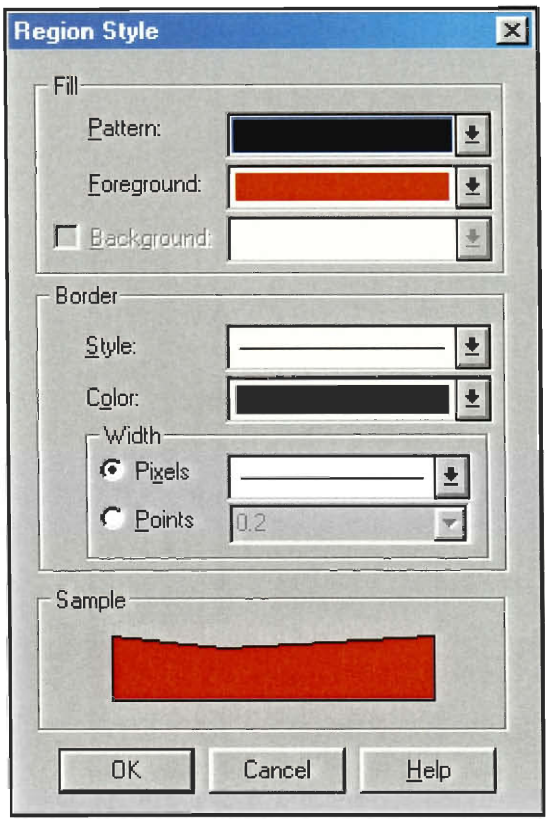


After these two items are selected click the **Next** button to get to the final step in creating the thematic map.

From this screen you can make any final adjustments that you want to in thematic map. By clicking on **Styles** you can change the appearance color of each category in the thematic map.

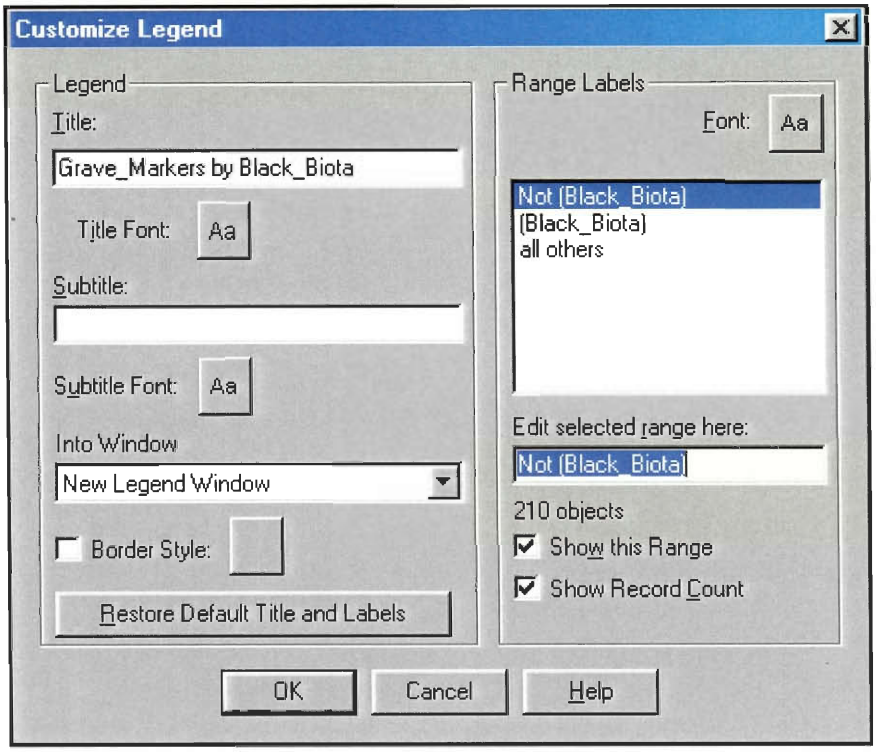


Once in the **Styles** menu select the category that needs to be adjusted , click on the **Styles** button and the following screen will appear.



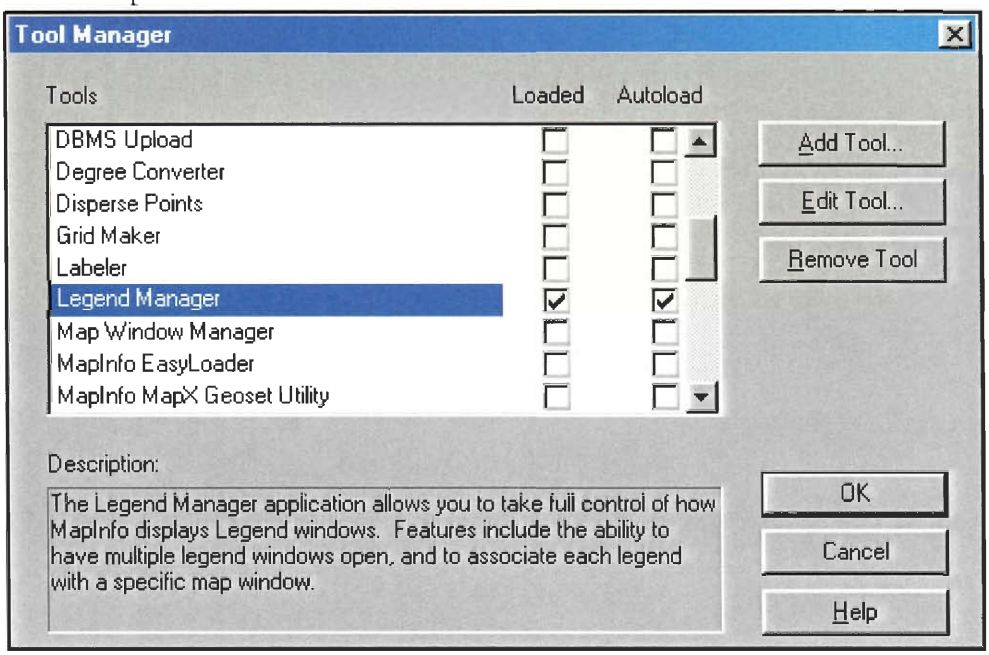
From this screen you can select a pattern or color for the chosen category to display.

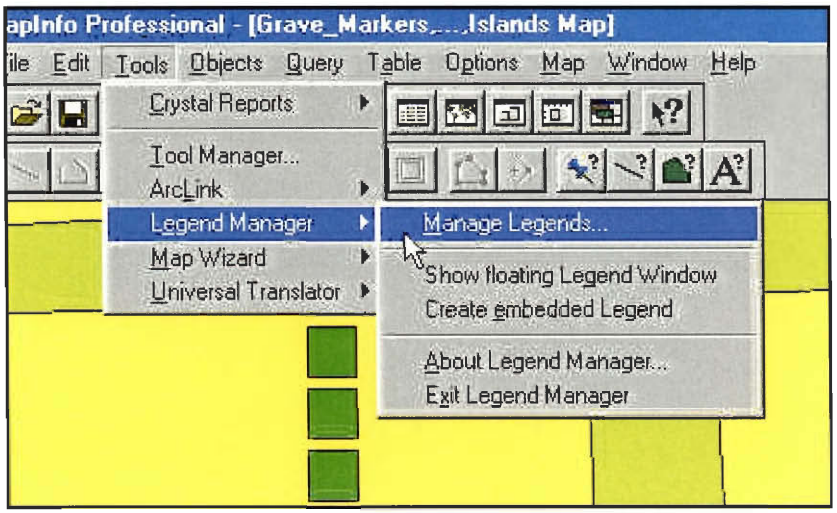
Clicking on the **Legend** button for the **Step 3 of 3** screen will give you the ability to adjust the legend of your Thematic Map.



From this screen you can adjust each part of the legend. Select the description you wish to change and then type the new name in the **Edit** field. Changing the **Title** field will change the title of the legend and so on. After clicking **OK** on the **Step 3 of 3** screen the legend will be created.

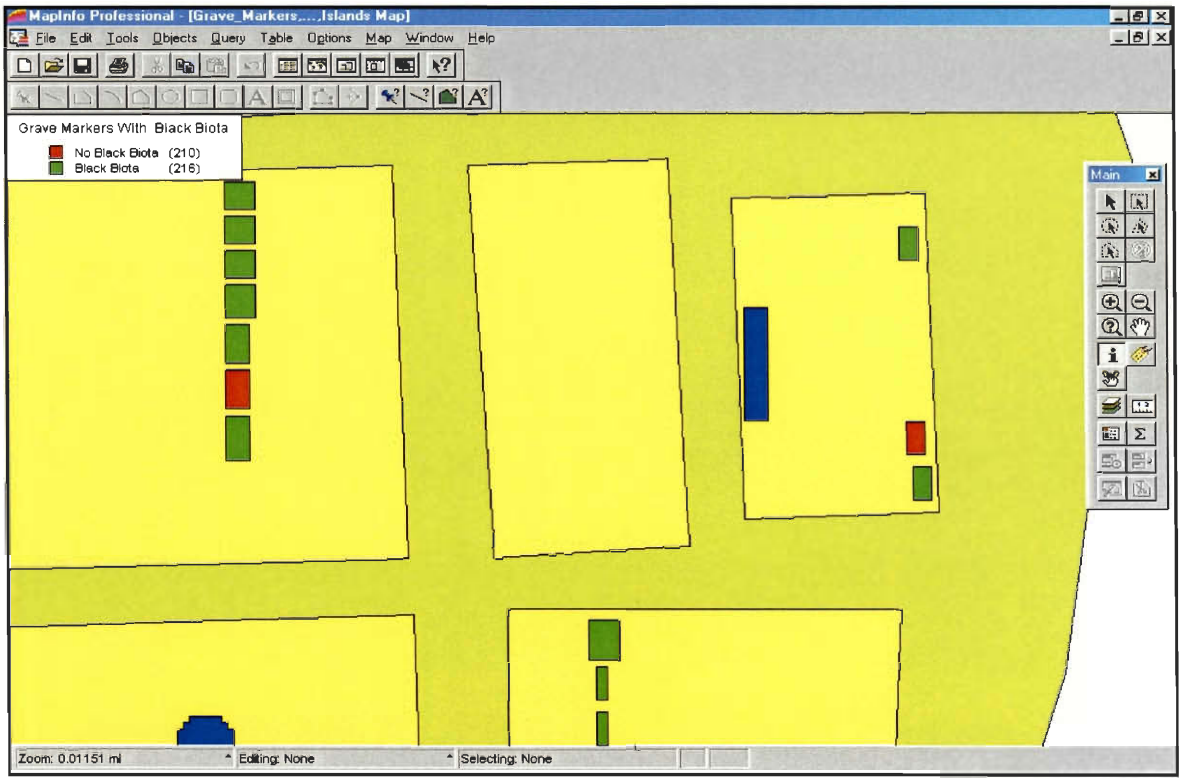
To make the legend appear you must use the **Legend Manager** from the **Tools** menu. **Note:** If the legend manager does not appear on the tools list you must go into the Tool Manager and select the Legend Manager to load as an option.





After the Legend Manager is selected from the above menu the following screen will appear.

Check the box for **Show embedded Legend in map/graph** then click **OK**. The legend will appear in the map and can then be moved by clicking on it and dragging it to the desired location.



7. ANALYSIS

All information collected and entered into Microsoft Access and MapInfo can be manipulated in various ways to produce an insight to analysis. Queries can be run in Access and Thematic Maps can be produced to identify trends that may exist in the island being surveyed. For example, inscription legibility can be compared against where in the island the memorial is located. Analysis of this could conclude that the north side of the island has more inscriptions that are illegible than the east side. Once this analysis is presented to someone of authority, further investigation can be put into action to find a deeper trend that may contribute to this general topological survey of the cemetery. With the two main aspects mapped, thematic maps can be produced, areas of general disrepair and cleanliness can be pinpointed, and possible trends can be seen. It may be possible that memorials under maple trees are in generally worse condition than those under cedar trees. This sort of analysis will contribute to future cleaning and maintenance procedures. Finding trends and patterns throughout the analysis of the entered data will aid Mount Auburn administrators and employees to enhance their work and productivity.

8. RECOMMENDATIONS

With the foundation of this large project set, it can then be expanded to include the entire cemetery. Several recommendations for the completion of the project and future projects will be discussed further in this section. In order to visualize what can be completed, a Statement of Goals has been produced for the long-term vision.

- One-Year Goal:
  - Understanding of computerized elements by administration
  - Several interns hired to continue surveying process during summer months
  - Completion of approximately 1,500 additional memorials in surrounding islands
  - Separate buildings survey completed based on this project's survey
- Three-Year Goal
  - Completion of 5,000 additional memorials
  - Hiring of full-time employees to complete survey
  - Full training program for employees
  - Maintenance performed on memorials that have been surveyed
- Five-Year Goal
  - Depending on resources committed to project, completion of cemetery survey
  - Integration of arboriculture aspects for full topological survey
  - Continue trend setting tradition by having all above-ground aspects at finger-tips

To calculate approximate completion time of this project, the following calculations have been done:

Average time spent on memorials:

Surveying:	5 mins
Data Entry:	3 mins
Mapping:	4 mins
Integration of Access and MapInfo:	1 min
Random Organization:	1 min
	14 minutes per memorial

The average time spent on each memorial is 14 minutes. The high estimate of memorials in the cemetery is 60,000. Therefore, 14 minutes x 60,000 memorials equals 840,000 minutes, equivalent to 14,000 hours. If an average person can work 2,000 hours per year (40 hours x 50 weeks), it will take approximately 7 years to complete thisproject. Therefore, the recommendation is to hire several employees for the expedient completion of the overall goal.

Students at Worcester Polytechnic Institute started this project as an Interactive Qualifying Project (IQP). The foundation has been set for future cataloging methods that can be expanded throughout the entire cemetery. Some examples are:

- **Environmental Effects of Arboriculture Elements**
  - Catalog all trees in an island at Mount Auburn, record the condition the memorials are in that exist beneath the canopy of the trees, and determine if any correlation exists. This data will be used as a stepping stool for future integration of the ongoing memorial survey and the arboricultural elements present.
- **Tracking the Spotted Salamander at Mount Auburn**
  - One of the last vernal ponds in the Northeast exists in Mount Auburn Cemetery's Consecration Dell. The spotted salamander come at specific times during the year to reproduce in this vernal pond. The tracking of the salamander would be done to better understand verrnal pond's existence at Mount Auburn.
- **Future Cataloging Projects**
  - Establish an effective methodology to catalog all buildings, objects, and structures located in Mount Auburn.
  - Cataloging of underground elements in Mount Auburn such as utilities and underground tombs.

Many steps can be taken from the initial cataloging system already implemented. Hopefully the integration of all these elements will enable Mount Auburn Cemetery to implement efficient and effective stewardship of their cultural resources.

MOUNT AUBURN CEMETERY MEMORIAL SURVEY

Reference number ____
Date and time of record ____
Surveyor _____

Memorial location:

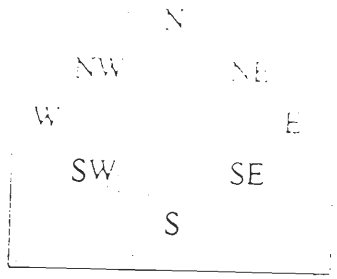
Lot # _____ Address (Path, Avenue, street) _____

Reference Name (last, first, middle when available) _____

Source for reference name
_____earliest or most prominent name recorded on marker
_____name on family or group monument on same lot
_____lot card

Date of Death (if available) _____

Indicate orientation of memorial----------→



Description of memorial

___Central monument
___Mausoleum/Side Hill tomb (separate survey)
___Grave marker

Overall dimensions
height _____ width_____ depth_____

Number of stones in memorial_____

Design type
__Bench
__Boulder
__Canopy
__Column
__Cross
__Flush marker
__Headstone
__Ledger stone/flat slab
__Marker
__Monolith
__Obelisk
__Pedestal
__Sarcophagus
__Screen
__Sculpture
__Table
__Tablet
__Other (describe)_____

Primary material
__Granite
__Limestone
__Marble
__Sandstone
__Slate
__Puddingstone
__Other_____
__Not Sure

Secondary material
__Granite
__Limestone
__Marble
__Sandstone
__Slate
__Other_____
__Not Sure

_____Bronze
__Plaque
__Ornament
__Statue
__Other

condition of bronze
[illegible]

Lot #_____
Date_____

Components (check all that apply)
__base
__pedestal
__obelisk
__column
__sculpture
__urn
__niche

Carved surfaces
__front
__back
__top
__sides

Inscription
__front
__back
__top
__sides

Condition:
__legible
__deteriorating
__illegible

Conditions of Memorial

Overall cleanliness clean 1 2 3 4 5 dirty

__metal staining
__soiling

Biological growth __encroaching plants, shrubs, or trees __algeal growth __lichen growth __black biota

Is the memorial plumb? yes____ no_____
Are the stones stable? yes____ no_____

Surface conditions (check all that apply)
_____large cracks
_____efflorescence
_____delamination or spalling
_____missing pieces
_____signs of mower damage

Masonry joints material
___lead
__mortar
___caulk

condition
____sound/good
____cracked/loose
____open joints

Evidence of past repairs
____ mortar patches
____ reattached pieces
____ repointing

Foundation
___ visible
___ loose stones
____ significant erosion

Comments:

MOUNT AUBURN CEMETERY LOT SURVEY

Date and time of record_____
Surveyor_____

Lot # _____ **Path** _____

Family name _____

Indicate features on the lot other than memorials and locate on lot card plan:

____Fencing
____Curbing
____Lot marker
____Landscape furnishings

Fencing:

___iron
___stone

(Measure and describe only stone fences. A survey of iron fences has already been completed and is on file in the archives)

linear feet _____
number of fence sections _____
number of posts _____
gate yes_____no_____

Conditions
_____cracked or broken pieces
_____missing sections
_____missing pieces
_____severely deteriorated
_____evidence of repairs
____repair of broken pieces
____mortar patching

Curbing

Location of curbing
___front
___back
___right side
___left side

Conditions
___cracked or broken pieces
___missing pieces
___displacement
___evidence of mower damage
___foundation visible/erosion
___partially buried

Features
___stairs
___moulded profile on curbing
___octagonal posts
___urns or decorative elements on posts
___other

Lot markers

number of lot markers ___

Landscaping furnishings

describe below any benches or other furnishings not associated with a particular grave or serving as a memorial.

_____

_____

_____

_____

Material:
____granite
____marble
____slate
____sandstone
____limestone
____other