

A MASTER PLAN  
FOR  
WALNUT HILLS CEMETERY  
BROOKLINE, MASSACHUSETTS



BRONZE MEMORIAL TABLET AT DANE FAMILY PLOT

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FOR  
WALNUT HILLS CEMETERY  
BROOKLINE, MASSACHUSETTS

JANUARY 2004

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**ACKNOWLEDGMENTS**

We wish to express our appreciation to the following individuals who reviewed materials or attended meetings to discuss the concepts presented in this master plan. Their contributions were invaluable.

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**Note:**

All photographs of Walnut Hills Cemetery and other contemporary images are by Walker-Kluesing Design Group unless otherwise noted.

*View of the cemetery  
from inside the historic main entrance, 2003*



In the June 29, 1892 issue of *Garden and Forest*, editor Charles Sprague Sargent commented on the visual qualities of Brookline's Walnut Hills Cemetery. His editorial bears directly on the relevant issues and attitudes of today and provides a guiding spirit for this master plan. Mr. Sargent was also Director of the Arnold Arboretum and Trustee of Walnut Hills Cemetery.

## EXECUTIVE SUMMARY

*... burial grounds ... that there be a certain unity of design in their arrangement, and to make their parts subordinate to an agreeable whole ... where the attention is not distracted by decorations inappropriate to the scene. ... The education of taste goes on imperceptibly ... remember the ... natural advantages of hill and dale, of the wide outlook, or shadowy recess, ... only here and there interrupted by grave-stones. ... A burial ground ought to be endeared to us, not only by the memory of those who sleep there, but to the grand groups of trees, the well-considered arrangements of shrubs ... appropriate to the scene, which would give to the whole ground a dignity and impressiveness forever to be associated in people's minds with those they have loved and lost. ... No individual desire to plant a rose-bush here, a willow there, should be permitted to interfere with a design which is not for the one but for the many. ... Rather let some quiet gray stone indicate our resting-place, and evergreen ivy drape it with its somber leaflets, while over all may arch the boughs of ancient trees that shall bestrew it in spring with blossoms, and in autumn with the soft covering of its falling leaves.*

### MISSION STATEMENT

The vision of the Trustees of the Walnut Hills Cemetery is to commemorate the dead in surroundings of beauty and tranquility that provide comfort and inspiration to the bereaved and the public, and to offer comprehensive cemetery services to all faiths.

The challenge of the future is to satisfy the various demands of today and to prepare for the future. The Trustees recognize the importance of presenting innovative alternatives to the traditional burial and memorialization and advocate cremation as a land conservation measure.

### PURPOSE AND GOALS

A primary catalyst for this master plan is recognition of the need for future availability of internment space and understanding that these decisions can impact the overall landscape character of this historic cemetery. The balance between the natural landscape and built elements must be maintained to insure that the overall landscape character, including the layout and treatment of gravesites, is reinforced and maintained.

The purpose of this master plan is to develop cemetery wide recommendations with an implementation plan for the entire property and its relationship to adjacent lands that can be used as a guide for both long and short term planning for protection and reinforcement of the sense of place, user needs, cemetery development, and horticultural and maintenance improvements.

The purpose of this publication is to document the historic background of this cemetery, evaluate the current conditions, including structural elements, and to offer a compendium of information directly related to the development, preservation, restoration, rehabilitation, reconstruction, management and care of this historic cemetery landscape. It also provides recommendations reflecting current preservation techniques, technologies and approaches. Recommendations and prioritized cost projections are presented for work that needs to be accomplished as well as recommendations for ongoing maintenance and management.

General goals include restoration and rehabilitation of this historic resource where possible in a contemporary context, reinforcement of an overall image that is compatible with existing natural and historic assets, expansion of internment possibilities, improvement of accessibility, and increasing educational and passive recreation opportunities.

This master plan sets the parameters necessary to meet the town cemetery needs of the future while maintaining the visual and other qualities that make Walnut Hills Cemetery such a valuable historic cultural resource for the town.

#### **METHODOLOGY**

Finalization of this master plan began early in 2003 with on site investigations and a review of available historic and current materials found in the files of the Brookline Public Library, Brookline Public Works Department and Frederick Law Olmsted National Historic Site. Files at other repositories likely to house historic information have not been examined.

Building upon a preliminary internal master plan prepared in 2001, a number of meetings have been held with the Trustees of Walnut Hills Cemetery and Brookline's Parks and Open Space division of the Department of Public Works to develop and refine the concepts presented here. A public meeting was also held to impart the findings of this plan and solicit public input.

#### **ORGANIZATION OF THE MASTER PLAN DOCUMENT**

The Master Plan is organized for easy reference by the Trustees of Walnut Hills Cemetery, Department of Public Works and others who may participate in completing components of the expansion, rehabilitation, restoration, preservation and maintenance efforts.

General information is presented first with some historic background on cemetery development with specific background on the development and evolution of Walnut Hills Cemetery. This is followed by a site specific Master Plan for the cemetery including an assessment of existing conditions and specific recommendations. It includes general recommendations for expansion and the restoration and rehabilitation of historic and other cemetery components, prioritized cost estimates for work at the cemetery, and maintenance/management issues and recommendations. The appendix contains a selected chronology for Walnut Hills Cemetery and a selected bibliography for further reading.

### **PRESERVATION STANDARDS**

Listed on the National and State Registers of Historic Places in 1985, improvements to Walnut Hills Cemetery should follow the 1996 Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes.

These standards provide guidance in decision making about historic properties, setting forth options to be considered depending on the current condition of a space and the availability of historic documentation. The standards address four treatments: preservation; rehabilitation; restoration; and reconstruction. "Of the four, Preservation standards require retention of the greatest amount of historic fabric, including the landscape's historic form, features and details as they evolved over time. Rehabilitation standards acknowledge the need to alter or add to a cultural landscape to meet continuing or new uses while retaining the landscape's historic character. Restoration standards allow for the depiction of a landscape at a particular time in its history by preserving materials from the period of significance and removing materials from other periods. Reconstruction standards establish a framework for recreating a vanished or non-surviving landscape with new materials, primarily for interpretive purposes."

### **SUMMARY RECOMMENDATIONS**

The following is a summary of the primary recommendations. Because this property is listed on the National and State Registers of Historic Places, specific improvements are subject to review and approval by the Massachusetts Historical Commission.

The broad period of significance is between 1875, when the cemetery opened, and 1951 when development of the expansion area was completed. Many of the natural site features remain including the general terrain. The site elements remaining from that era include cultural features like grave markers, circulation systems, perimeter walls and woodlands. Some important elements have been modified during and since that time like buildings, and others have deteriorated like overall landscape character.

The overall goal is to maintain the historic integrity of the site within the context of "rehabilitation," recreating the image of the historic cemetery in as much as possible, with the current loss of historic fabric, while adapting selected areas to accommodate existing and proposed changed needs and conditions.

While "restoration" is applicable to the grave markers, "rehabilitation" is applicable to structural elements, drives, fences and gates, site amenities and vegetation because of maintenance and use considerations, as well as societal expectations in regard to safety and security.

The primary focus of recommendations for improvement is expansion of interment opportunities as well as the protection, stabilization and preservation of historic artifacts and walls. These efforts will prevent significant deterioration of these valuable resources and reduce risk to visitors. Clean up needs to continue, removing the detrimental effects of volunteer growth, and generally making it a more desirable place to visit. Additional improvements need to be made related to landscape issues [pruning, planting and removals] and making improvements for visitors [accessible path systems, site amenities, fences and gates, and an identification, regulatory, informational and interpretive sign system].

Achievement of the overall concept will require restoration of the historic character of the period of emphasis with removal of incongruent elements, vegetative work and site improvements, and restoring/reconstructing critical components.

### **Cemetery Development**

Develop new areas for interments to serve Brookline for the next 30 to 40 years by allocating 25% of the new space for cremated remains and 75% of the new space for in ground interments in traditional lots.

Develop a free standing columbarium at the crest of the hill on Chapel Avenue.

Develop areas for the in ground interment of cremated remains.

Develop the 1926 expansion area for additional single and double lots, maintaining flush markers in the area between Willow and Beech Avenues, and allowing upright markers in perimeter areas.

Convert the Receiving tomb into a crypt for full body interments or a reception building for the cemetery.

Provide family lots in selected infill areas in the older historic areas of the cemetery.

Fill in low lying areas to improve drainage and aesthetic characteristics as well as preparing space for the long range development of future lots and areas for cremated remains.

### **Landscape Character**

This historic cemetery contains a vast storehouse of visual imagery that should be supported by landscape imagery. The primary thrust for vegetative treatment is to regain and maintain a level of landscape character that is supportive of the original intent and appropriate to the romantic era in which the cemetery developed.

Maintain the interior portions of the older historic area of the cemetery with an overall green bucolic impression with horticultural diversity

Maintain the interior portions of the 1926 expansion area with open lawns and large deciduous shade trees lining the drives. Maintain the central rock outcrop as a natural woodland element.

Provide vegetative screening at the perimeter edges to visually separate intrusive elements like buildings and vehicular traffic from the experience of cemetery visitors.

Reinforce woodland edges with appropriate understory plantings in conjunction with the removal of invasive vegetation and detrimental volunteer growth.

Restore lawn areas where necessary.

### **Access**

Maintain the historic vehicular access and egress points. Improve turning radii at the Grove Street entrance to better accommodate large service vehicles. Create a more appropriate parking area near the office for visitors. Provide an accessible walk from the Grove Street entrance to the office.

### **Circulation Systems and Materials**

Maintain the historic vehicular circulation system. Widen a portion of Bow Avenue and provide a means for maintenance vehicles to turn around. Provide handrails at the steps on Bow Avenue. Increase paved turning radii at entrances and intersections where necessary. Resurface the drives, reconstructing poor areas as necessary.

### **Grave Markers and Monuments**

General conservation recommendations should be taken into consideration once a cemetery wide or individual stone restoration program is undertaken. Initial work should include resetting toppled and leaning markers.

### **Buildings**

Make the minor repairs required for each of the buildings. Make the cemetery office universally accessible. Provide an enclosure for the yard at the Caretakers Cottage. Expand the area for exterior storage at the service buildings to allow relocation of the soil storage area on Maintenance Road.

**Perimeter Walls**

General restoration recommendations should be followed for perimeter walls. Extend the stone wall along Grove Street.

**Perimeter Fences and Gates**

Repair and paint the iron gates on Allandale Road. Over the long term, consider replacing the gates with a style of gate that is more appropriate to the landscape character of the cemetery. Replace the existing chain link fence on the south and west sides.

**Security and Vandalism**

Maintain security by retaining a fenced perimeter. Although vandalism is not a significant issue at this time, continue to monitor these detrimental activities.

**Site Amenities and Furnishings**

Provide a consistent sign system for the cemetery including identification, regulatory, orientation, informational and interpretive signs that is visually compatible with the character of the grounds.

Provide a limited number of opportunities for memorial benches in non burial areas where they do not obstruct access or views to grave markers.

**Focal points**

Allow the opportunity for the development of a unique focal point in both the older historic part of the cemetery and in the 1926 expansion area.

**Storm Water Management**

Maintain the existing catch basins. Eliminate ponding in the older part of the cemetery.

**Utilities**

Upgrade the water supply system for lawn restoration, plant establishment, and the maintenance and cleaning of various elements. As a long term goal, work with the appropriate utility companies to place internal and adjacent overhead wires underground.

**Maintenance Management**

Follow the guidelines recommended for the maintenance of the various components that make up Walnut Hills Cemetery.

**Rules and Regulations**

Update and consolidate rules and regulations.

**Future Needs**

Sites that are taken care of tend to have high visibility and significance in the community. Completing the work recommended herein will make great improvements and provide a cared for appearance of the cemetery as a whole. Positive publicity on the significance of the cemetery will assist in this and future endeavors. A well written and illustrated guidebook for the cemetery would help stimulate public interest and provide increased public exposure which would in turn lead to greater appreciation and use of this historic open space. The 130th anniversary of the establishment of Walnut Hills Cemetery occurs in 2005. That would be an ideal time to unveil such a publication.





*Landscape character adjacent to Trinity Avenue, 2003*



## HISTORIC BACKGROUND

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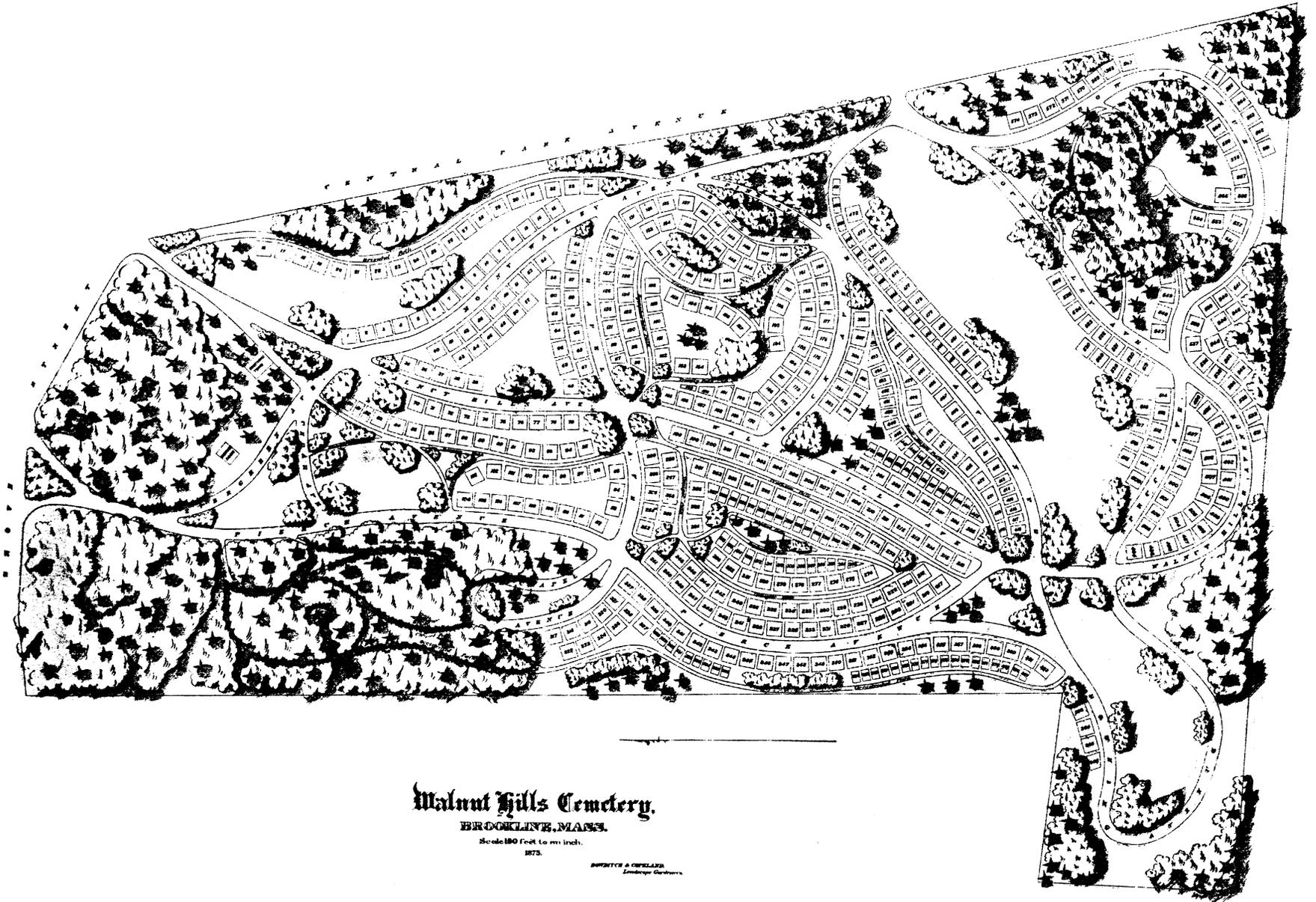
### OVERVIEW

The second oldest municipal burial ground in Brookline, Walnut Hills Cemetery is a 45.66 acre cemetery listed on the National Register of Historic Places. The cemetery was established late in the rural cemetery movement, following local examples like Mount Auburn Cemetery in Cambridge, Forest Hills Cemetery in Jamaica Plain, Woodlawn Cemetery in Everett, Mount Hope Cemetery in Mattapan and Sleepy Hollow Cemetery in Concord.

The cemetery developed during the Victorian period, an era of romanticism. Lush and abundant vegetation supported that romantic image. Interest in the expression of nature and natural beauty dominated. Given the involvement of Charles Sprague Sargent, a Trustee of the cemetery and director of the Arnold Arboretum, it can be assumed that vegetation played an important role in the development and character of the cemetery.

The 1926 expansion area followed the example set by Forest Lawn Memorial Park in Glendale, California which was established in 1913. This new aesthetic relied on the use of flush burial markers, placing a greater emphasis on lawns, creating a sense of spaciousness and unity, and reducing visual distractions. In this style plantings often became a backdrop for large artistic memorials that emphasized community rather than individual.

Overall the cemetery is a hybrid in terms of style because it evolved over time. The two main parts of the property each reflect a landscape character expression appropriate to the era that they were created in.



1875 Plan for Walnut Hills Cemetery  
by Bowditch and Copeland.  
Courtesy of the Brookline Public Library.

### THE RURAL CEMETERY MOVEMENT

New Haven's New Burying Ground, established in 1796, introduced the idea of a private nonsectarian burial ground free from church and municipal oversight. It was located far enough from the city so it would not be perceived as a public health risk and was laid out in a geometric grid with private family burial lots. It was an enclosed level field with pathways broad enough for carriages to pass and the area was planted with trees [Poplars and Willows]. This design influenced the form and style of burying grounds to follow.

The 1804 design of the new rural cemetery, Pere Lachaise in Paris, drew international acclaim. It too was located outside the city but unlike earlier precedents, it was deliberately laid out to reflect an Arcadian ideal, a landscape for mourning. The design borrowed elements from the English romantic landscape style of the period with formal and informal design elements. It was a picturesque commemorative landscape with paths separated from carriageways. The cemetery was unified by a curving drive which led visitors past the classical monuments and offered a sequence of carefully constructed views.

From these two early precedents, and the specific issues arising out of Boston's burial reform, came Mount Auburn Cemetery in Cambridge, established by the Massachusetts Horticultural Society in 1831. Key principles for Mount Auburn were that it was located outside the city, it was a place of permanent burial in family lots and it was nondenominational. It was the first American cemetery intended to emulate the romantic character of estate design and was widely imitated in the years that followed.

Mount Auburn Cemetery and Pere Lachaise were created with a similar design intent and landscape aesthetic. But the two sites developed with very different results. Pere Lachaise became built up and congested with monuments and the French landscape expression of man's dominance over nature. It became a classic representation of mourning. At Mount Auburn natural expression dominated and came to represent a calming sense of hope and expectation in the hereafter. It has retained the careful balance of art and nature intended by its founders.

The rural cemetery movement brought a new aesthetic to the design of other cemetery landscapes. Varied topography was desirable to create a landscape of complexity and visual interest. Broad vistas and picturesque landscapes were introduced to offer a view of the sublime in nature. Roads were circuitous and laid out to create a series of views as visitors moved through the landscape. Unlike earlier burial grounds, rural cemeteries were heavily planted. Some, like Mount Auburn, were even conceived of as arboretums. Enclosed vegetated spaces were provided for contemplation.

*Mount Auburn Cemetery, Forest Pond  
1845 engraving*



Central to the concept of the rural cemetery was the idea of family lots where family members could be buried together in perpetuity. Absorbed in the world of the dead, Victorians lavished family plots with embellishment as an outward recognition of their sorrow. Lots were often edged with stone and/or defined by ornate iron fences or hedges. A large central family monument often supplanted individual grave markers. Families often took pleasure in maintaining their lots, which sometimes had furnishings for visitors.

### ORIGINAL DESIGN INTENT AND APPEARANCE

While no written documentation has been found describing this aspect of the cemetery, it can be assumed that it followed the general aesthetic principles used during the rural cemetery movement. This is supported by the content of the 1874 and 1875 initial plans for the cemetery.

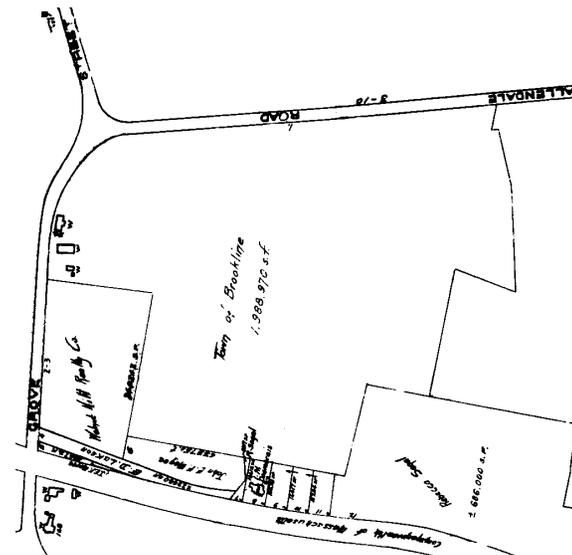
### THE DEVELOPMENT AND DESIGN EVOLUTION OF WALNUT HILLS CEMETERY

In the 1870s, it was clear that the 1717 Walnut Street Cemetery, the first burial place for residents of Brookline, was no longer adequate for the growing town of Brookline. In January of 1872, the town advertised for land suitable for a new cemetery. Two lots of land were originally offered for sale and one was recommended, but no action was taken. In 1874 the purchase of 30 acres from Willard A. Humphrey at the junction of Grove Street and Allandale Road was recommended for use as a town cemetery. At a special town meeting held on May 19, 1874 the selectmen were authorized to purchase the land.

*Extent of Walnut Hills Cemetery after the last acquisition from 1931 Town Assessors Map. Courtesy of the Brookline Public Library.*

Ernest W. Bowditch and Franklin Copeland, Landscape Gardeners, prepared a plan for laying out the cemetery. Two plans were prepared, one in 1874 and one in 1875. The plans were very similar in layout, but the 1874 plan was more elaborate. It included a formal traffic circle at the junction of Walnut Hills Avenue and Chapel Avenue to have been called Central Square. It also included five buildings, a chapel on Chapel Avenue, superintendent's cottage, stable, greenhouse and receiving tomb. A small pond called "The Pool" was to have occupied the lowlying area near the entrance triangle. Sylvan Lake, connected twin ponds spanned by a footbridge, was to have been located in the lowlying land south of Cypress Avenue. It was to be fed by an existing stream that ran through the property.

The design of the cemetery generally followed precedents set by the rural cemetery movement in that it has curvilinear roads and paths, and extensive plantings. Rustic ponds were initially proposed, but not implemented.



A receiving tomb, designed by A. W. Longfellow, was built by the Johnson Brothers in 1901. The tomb is classical revival in style and was constructed of Roxbury puddingstone to blend with the surrounding cemetery. It is still used occasionally in severe winter weather. A. W. Longfellow, the architect, started as a draftsman in H. H. Richardson's office and went on to design many residences in Brookline. He is noted as the architect of the first Georgian revival building in Harvard Yard in 1898. A stable, shed and fence [gateway] were provided in the same year by architect Guy Lowell.

Walnut Hills Cemetery was enlarged by 1.1 acres in 1918 and by two parcels totaling 14.58 acres in 1926. These additional lands were acquired mainly to the south and west of the original boundaries of the cemetery. Landscape Architect Franklin Brett was retained to study the newly acquired land for development in 1928. Regrading and the laying out of new sections of lots in the land west of the original cemetery began in 1947 and was completed in 1951.

*Aerial photograph of Walnut Hills Cemetery from the 1932 report of the Trustees. Courtesy of the Brookline Public Library.*



**REMAINING HISTORIC FEATURES**

The basic cemetery layout including the circulation system, burial lots, perimeter stone wall, receiving tomb, cottage and stable are intact and remain the dominant historic features of the site. The general topography or lay of the land also appears to be intact.

While the cemetery retains a significant amount of vegetation, much of the “romantic” aspects of the overall landscape character has been lost, the detail at the lower level understory in particular. Invasive growth is pervasive in many areas. Landscape development related to Eagle Path [adjacent to the Dane plot] above Mt. Walley Avenue and the Blake plot on Pierce Avenue are the remaining areas where that level of character supportive of the romantic image remains.

**CHANGES TO THE ORIGINAL PLAN**

Features have been added and subtracted over time including the 1926 expansion area, cemetery office and changes in the maintenance yard.

The area between Mt. Walley and Cypress Avenues, originally planned as the site of Sylvan Lake, has been filled in and developed as grave sites. Spruce Avenue was developed as a loop drive as opposed to a through drive, presumably because of topography. A few intersections are different than originally planned.

The second and current receiving tomb is on the site originally proposed for the superintendent’s cottage which is now located near the Grove Street entrance.

*Henry Hobson Richardson grave site, 2003*

**SIGNIFICANT PEOPLE BURIED IN WALNUT HILLS CEMETERY**

Many prominent families and citizens of Brookline are buried in Walnut Hills Cemetery. It is interesting that despite their prominence in life, many chose recumbent grave markers, a quiet statement compatible with the overall landscape expression of the cemetery. The following gives a brief glimpse of some of those figures. Additional genealogical research will be necessary to supplement and further verify what is known at this time.

**Henry Hobson Richardson [1838-1886]**

The renowned architect of Boston’s Trinity Church has a very large flush slate marker with a decorative edge located on Bow Avenue. There is no landscape treatment in the lot.



**John Charles Olmsted [1852-1920]**

The stepson of Frederick Law Olmsted, landscape architect, principal in the Olmsted firm and first president of the American Society of Landscape Architects, has a small, simple, flush granite marker on Tangier Path. There is no landscape treatment associated with the lot.

**Charles Sprague Sargent [1841-1927]**

The first director of Arnold Arboretum [54 years], editor of the journal “Garden and Forest” and author of numerous books has a large simple flush slate marker on Bow Avenue, very close to that of H. H. Richardson. There is no landscape treatment in the lot. The marker shows evidence of rotation.

**Guy Lowell [1870-1927]**

The architect of Boston’s Museum of Fine Arts, New York County Courthouse, numerous homes in Brookline and a stable, shed and fence [gateway] for Walnut Hills Cemetery has a large simple flush slate marker similar to that of Sargent on Bow Avenue, located between those of Richardson and Sargent. This lot does not have any landscape treatment associated with it.

*John Charles Olmsted grave marker, 2003*



**Olive Higgins Prouty [1882-1974]**

Noted novelist [including "Stella Dallas" and "Now, Voyager"], Trustee of Boston's Children's Hospital and benefactor of the 1956 Prouty Terrace and Garden has a large flush slate marker with decorative carvings on Bow Avenue across the path from Sargent. She also engaged the Olmsted Brothers for the design of Prouty Terrace and Garden at Children's Hospital, in memory of her daughters Anne and Olivia, and funded construction and ongoing maintenance.

**Ernest B. Dane**

A former Trustee of the cemetery and town selectman, the Dane family has a beautiful bronze memorial tablet, depicting a woman with eyes upturned and hands outstretched to the heavens, set into a puddingstone rock outcrop on Eagle Path and surrounded by Rhododendrons.

**Civil War Unknown Dead**



Blake Burial Lot, 2003

Planting Plan for Blake Burial Lot,

F. L. Olmsted & Co., 1893.

Courtesy of the National Park Service,

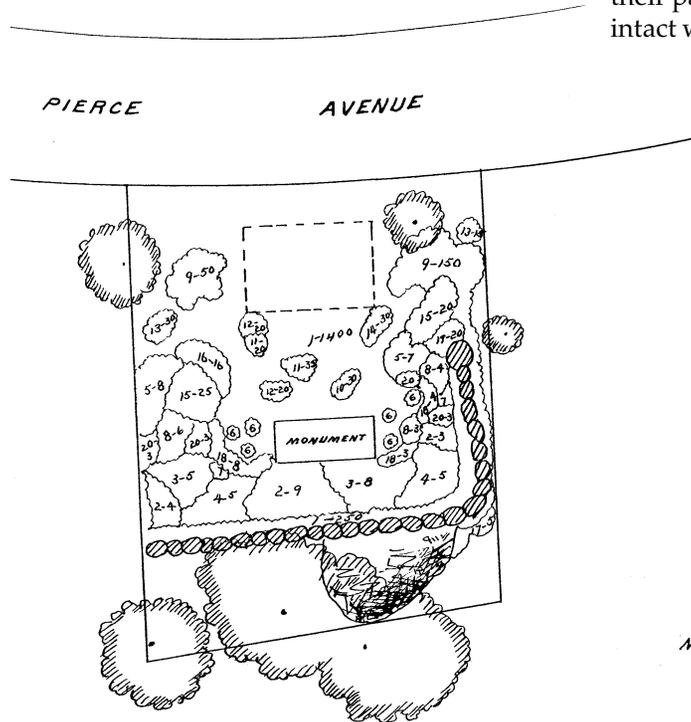
Frederick Law Olmsted National Historic Site.

**DESIGNED GRAVE LOTS  
IN WALNUT HILLS CEMETERY**

While it is quite possible that a number of grave sites have been designed, only two have been identified to date.

**Arthur Welland Blake, Esq. lot**

This large lot on Pierce Avenue was designed by F. L. Olmsted Co. between 1892 and 1899. It contains perhaps the largest monument in the cemetery and has a stone retaining wall in the rear. It has a composition of plants meant to be seen from the drive. The planting plan includes numerous species, much like the palette used in their park work at the time. It appears relatively intact with Rhododendrons and Pieris still there.



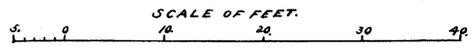
**PLANTING LIST.**

1. *Vinca minor*
2. *Rhododendron Charles Dickens*
3. *Rhododendron album elegans*
4. *Rhododendron atrosanguinea*
5. *Azalea amoena*
6. *Juniperus fastigiata nana*
7. *Crataegus pyracantha*
8. *Rhododendron myrtifolium*
9. *Euonymus radicans*
10. *Crocus, purple*
11. *Crocus, white*
12. *Crocus, yellow*
13. *Narcissus poeticus*
14. *Scilla siberica*
15. *Andromeda floribunda*
16. *Daphne cneorum*
17. *Clethra alnifolia*
18. *Leucothoe catesbaei*
19. *Aspidium acrostichoides*
20. *Rhododendron Dahuricum atrovirens*

Note. First or Upper Number refers to plants on List  
Second or Lower Number refers to number of  
Plants in group where number occurs.

**A. W. BLAKE ESQ.**

Planting Plan for Cemetery Lot.



No. 3.

F. L. Olmsted & Co Landscape Architects  
Brookline Mass. Jan. 3, 1893

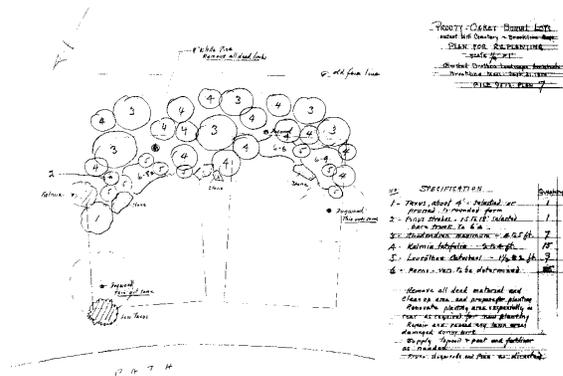
**Prouty-Oakes lot**

This large double lot on Bow Avenue was designed by the Olmsted Brothers from 1937 to 1938, with a replanting in 1950. The planting included a limited number of species, apparently selected for shade tolerance [White Pine, White Flowering Dogwood, Yew, Rosebay Rhododendron, Mountain Laurel and Ferns]. Vines [Euonymous and Ampelopsis] were added later at the former fence in the rear of the lot. The scheme also included the placement of "natural" stones or boulders. After a fire destroyed most of the original plantings in 1950, the same palette was replanted with the addition of Leucothoe. It appears that the lower level vegetation is no longer there today.



*Planting Plan for Prouty-Oakes Burial Lot, Olmsted Brothers, 1938.*

*Courtesy of the National Park Service, Frederick Law Olmsted National Historic Site.*



*Prouty-Oakes Burial Lot, 2003*



*Sketch for Prouty-Oakes Burial Lot, Olmsted Brothers, c 1938. Courtesy of the National Park Service, Frederick Law Olmsted National Historic Site.*

*Top of Chapel Avenue, 2003*



## EXISTING CONDITIONS ASSESSMENT AND MASTER PLAN RECOMMENDATIONS

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During the winter and spring of 2003 an on site investigation, analysis and evaluation of the existing conditions at Walnut Hills Cemetery were conducted. Recommendations were developed in conjunction with the Trustees of Walnut Hills Cemetery.

### **OVERALL CONCEPT**

The overall goal is to maintain the historic integrity of the existing site within the context of "rehabilitation", reinforcing the image of the historic cemetery as much as possible while adapting selected areas to accommodate existing and proposed changed needs and conditions using design principles established in the historic plan. The primary goal is to reinforce the image of Walnut Hills Cemetery within the broad period of significance between 1875 when the cemetery opened, and 1951 when development of the expansion area was completed. Achievement of the overall concept will require reinforcement of the historic character of the period of emphasis with removal of incongruent elements, vegetative work and site improvements.

In a broad sense this cemetery should be viewed as a contemporary healing garden in a historic landscape setting. The primary focus of recommendations for improvement is providing expanded opportunities for interment space, strengthening scenic quality and the protection, stabilization and preservation of historic artifacts. These efforts will maintain the cemetery as a rich and viable community asset and prevent significant deterioration of valuable resources. Additional improvements need to be made related to landscape issues and making improvements for visitors.

The goals that follow describe broad aims or ideals for achievement.

*Develop a master plan and an implementation plan that can be used as a guide for both short and long term planning and improvements.*

*Recreate the scenic qualities of the historic landscape design while solving the contemporary problems of public safety, security, appropriateness of use, maintenance, management and preservation.*

*Recommend changes to existing facilities, management policies and maintenance practices that are inconsistent with the original landscape design intent and/or contemporary cemetery needs.*

*Increase the quality and quantity of passive recreation opportunities.*

Each major component of the master plan is presented and discussed in three parts: the Issue; Objectives to be resolved in achieving established goals for the cemetery; and Recommendations.

## **CEMETERY DEVELOPMENT**

### *Issues*

#### **Interment Space**

Originally conceived in the rural cemetery tradition with large family lots, the cemetery is partially developed today in terms of layout of burial plots. It now contains family lots, multiple and single lots. The development of single lots began in 1899 and has been an important trend. Family lots still dominate the older part of the cemetery. Multiple and single lots are interspersed throughout the property. Single lots are primarily located in the southwest area with older single lot areas also flanking Trinity Avenue in the older part of the cemetery. They have a strong visual presence with a denser placement of single stones creating a more foreboding appearance. The older family plots typically have larger single stones with more landscape or breathing space around them, providing a more open appearance. This is an important consideration where overall landscape expression is deemed critical to the overall appearance of a cemetery. Setbacks from drives have been maintained and areas have been left open in some plotted areas for landscape expression.

About 100 people are currently buried in the cemetery each year and that rate has remained fairly consistent over the years. During the period from 1953 to 1977 there was a range of 98 to 132 interments per year with 1968 being the only unusual year when 174 interments occurred.

Last year 29 double lots were sold in Walnut Hills Cemetery compared to 11 single lots. Last year there were 75 full body interments and 20 cremation interments. There is an increasing demand to provide space for cremated remains. This demand is about 25% nationwide compared to other forms of burial. It is desirable to allow a variety of interment options that include the burial of cremated remains.

### *Objectives*

*To develop a plan for the expansion of interment space that is consistent with the landscape character and historic style intended for the cemetery.*

*To satisfy current and projected future demands by providing alternatives to traditional burial and memorialization.*

*Recommendations*

**Interment Space**

This plan is intended to address interment needs for the next 30 to 40 years, which means providing 3,000 to 4,000 new burial spaces. While considering the form of expansion in terms of burial type options, Walnut Hills Cemetery should develop new interment space to accommodate 25% for burial of cremated remains [750 to 1,000], and 75% for lots [2,250 to 3,000].

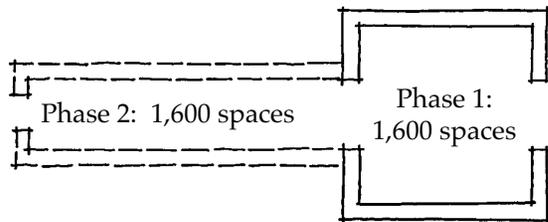
In order to meet public demand for choice in interment method and location, it is recommended that the grave lot survey and layout process be expedited such that 3 or 4 choices can be made available for patrons. The layout of all forms of lots should take topography into consideration as well as efficiency such that the overall layout is complimentary to land forms.

A transition has been made in the cemetery from providing family lots to providing single and double lots, but there is no current provision for cremated remains. Creation of options for the latter must be considered an important direction for the cemetery, not only to meet an increasing demand, but also as a means to conserve land and protect landscape character.

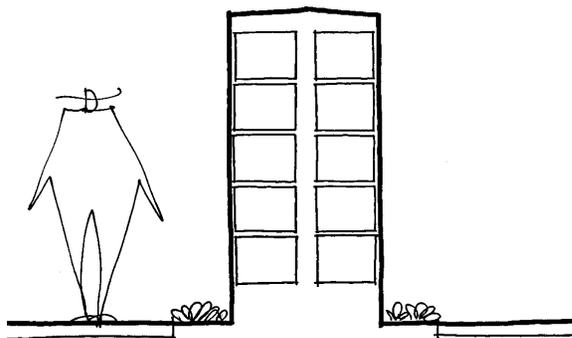
To meet this need, space for in ground cremations should be developed as soon as possible, followed by a new freestanding columbaria should be provided at the crest of the hill on Chapel Avenue. In ground cremations should be developed in areas of shallow bedrock to preserve deeper areas for traditional forms of interment. In ground cremations should have flush, not erect markers to reduce the visual impact of the concentrated form of this type of interment.

To accommodate the current high demand for single and double lots, growth of this type of interment choice is recommended in the 1926 expansion area. Due to a concern regarding the visual impact of upright headstones in these lots, the use of flush markers should be stressed. Upright markers can continue to be used in perimeter areas outside Beech Avenue and adjacent to Maintenance Road. The areas between Willow and Beech Avenues should continue as areas for flush markers to continue to reinforce the established landscape character in that vicinity.

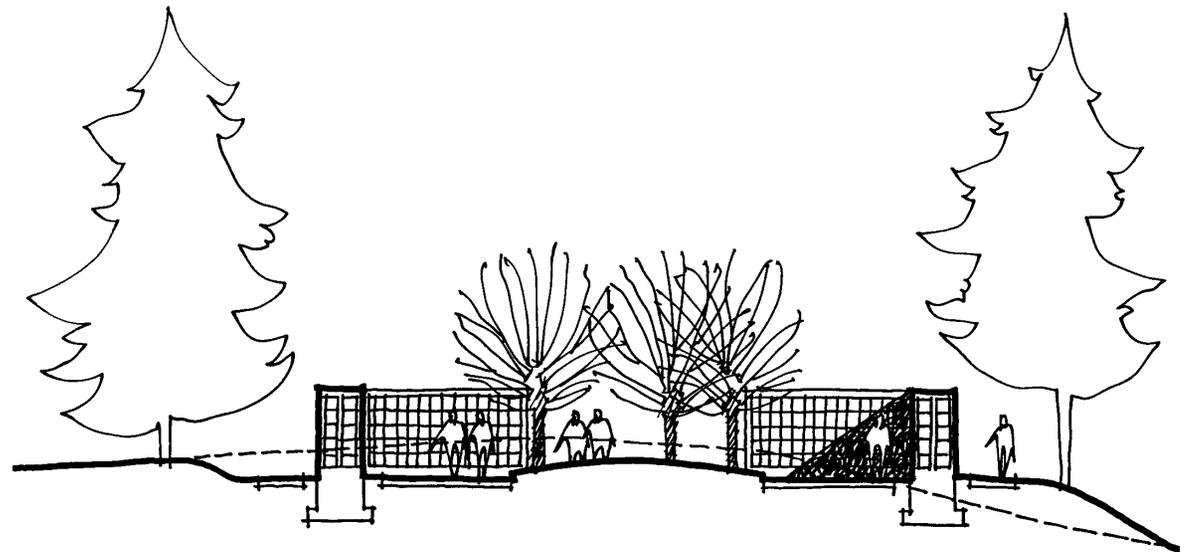
*Conceptual Plan of Columbarium*



*Detail Section through Columbarium*



*Conceptual Section through Columbarium*



Control of grave marker type, material and size is an important consideration where the overall landscape expression is deemed critical to the overall appearance of a cemetery. While areas for erect markers should be provided, they should also be limited to locations where they will create the least distraction from appreciation of the cemetery landscape as a whole. The use of flush markers should be encouraged throughout, as they are more compatible in areas where landscape expression is paramount. When lot owners are considering the decision of selecting a marker, they should be reminded that some of the most important people interred in the cemetery have selected recumbent or flush markers.

In addition, consideration should be given to converting the Receiving Tomb into a crypt for full body interments. It is an attractive building that is appropriate for the cemetery and receives little use today. Conversion should be less expensive than creating new crypt space.

It is understood that family lots are no longer offered even though there are some opportunities for infill lots in the older areas of the cemetery. Family lots are the predominant expression for burial in the historic sections of the cemetery and they offer the benefit of leaving more landscape intact with less, although perhaps larger, markers. Selected infill family lots should be identified and made available.

For the long range future, low lying areas should be filled in to improve drainage and aesthetic characteristics as well as preparing space for the future development of lots and areas for cremated remains. Some of these areas, particularly those with shallow depths to bedrock, could be considered future space for the in ground interment of cremated remains, but not scattering gardens. Other areas should be reserved as freestanding columbarium sites.

The current area between the historic main entrance and Chapel Avenue should remain undeveloped for burial space until it is determined that there is no more available interment space in the cemetery. At the current level of development, amount of available space and rate of lot consumption, that should not occur for many decades. By that time, alternative means of interment may have been developed that have less space requirements.

## **LANDSCAPE CHARACTER AND VEGETATION**

### *Issues*

#### **Landscape Character**

A number of components contribute to the landscape character of the cemetery including topography, vegetation and manmade elements. Rough, uneven and interspersed with rock outcrops of puddingstone, the topography of the historic portion of the cemetery contributes to the drama of the experience. Puddingstone is a conglomerate or clastic sedimentary rock often found in coastal areas. It is composed of eroded materials [cobbles, pebbles, sand and other fines] that have been redeposited and compacted by wave and current action to form new rock. Mixed vegetation, evergreen and deciduous, works with the topography to create a rich and varied experience. Wooded and open lawn areas work in harmony with the land, drives and grave sites, producing an overall bucolic expression. The character of other manmade elements like walls and buildings contributes to the quiet dignified landscape.

The landscape character of the cemetery is generally supportive of the two eras of development that have occurred in the cemetery. The historic portion of the site appears to have lost some of the richness typically associated with a cemetery of that era. Several factors contribute to this loss. There are several areas of monoculture overstory that is incompatible with the romantic Victorian image. Volunteer and invasive growth has compromised understory diversity. The interior of the 1926 expansion area is appropriate for that era in that lawn expression dominates with shade trees lining the drives.

- A MASTER PLAN FOR WALNUT HILLS CEMETERY -

The landscape character related to burial lots, particularly lots developed less than 50 years ago, is generally not supportive of overall character of the cemetery. Inappropriate and overgrown shrubs, empty planters and other similar elements are detrimental to the broader experience.

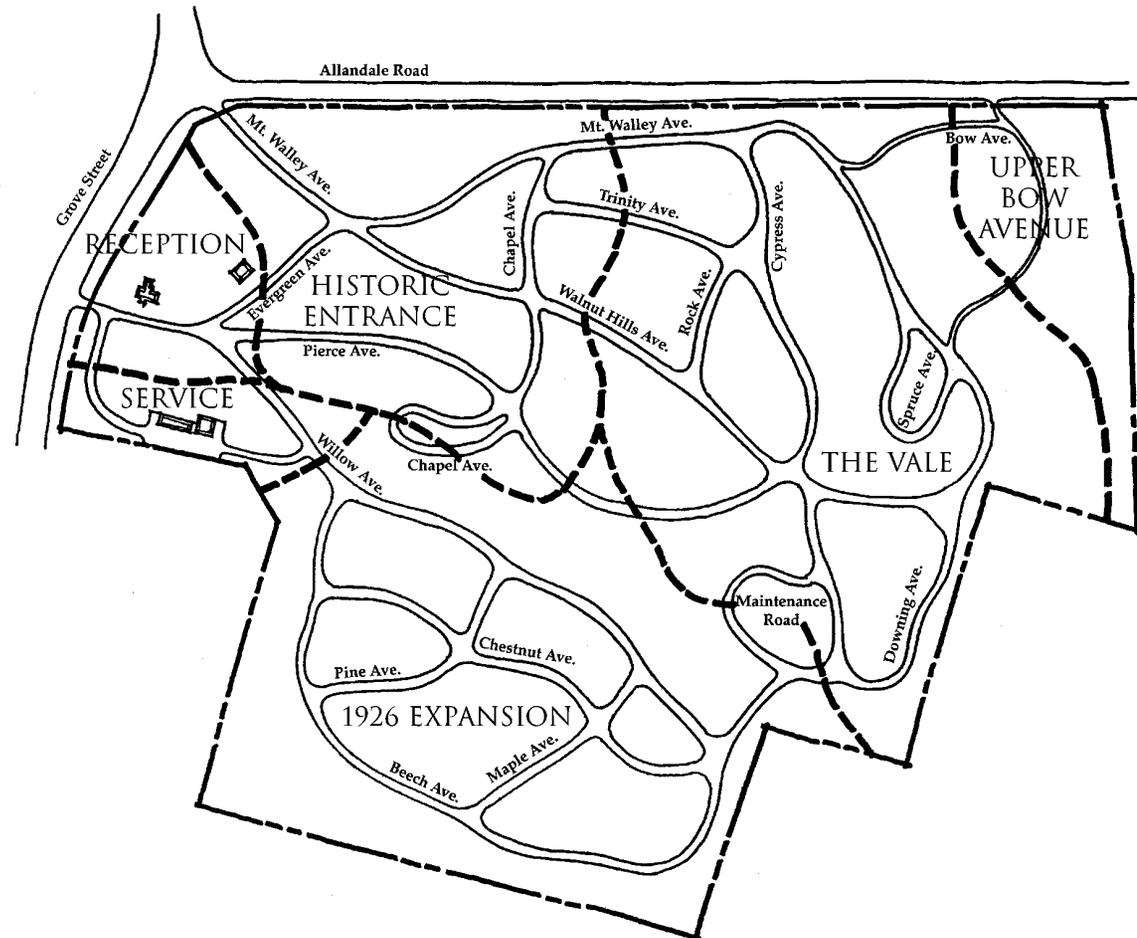
Walnut Hills Cemetery has a number of landscape character zones defined by topography. They are identified and described as follows:

Historic Entrance

Except for the small identifying bronze entrance plaques at the entrance gate, the casual observer would not know that there is a cemetery inside the puddingstone gateway. Walnut Hills Avenue, the historic and symbolic main drive into the cemetery, brings visitors in from the intersection of Allandale Road and Grove Street.

Lined with 8 Flowering Cherries that were planted in 1992, the entrance road leads to a gently sloping open grass meadow with specimen Maples and Oaks evoking a pastoral landscape. This entrance experience is an essential component in the appreciation of the grounds. It provides time and space for transition and decompression from the stresses of the urban world to the calmness of the world within.

*Landscape Character Diagram*



On the west edge is the second highest hill in the cemetery. Once planned to contain a chapel, the site is secluded and wooded, and offers a potential site for a columbarium. With a modest amount of woodland thinning, it could offer excellent views to both the historic part of the cemetery and 1926 expansion area. It would be an excellent location for some memorial benches.

This area is made up primarily of deciduous shade trees with evergreen trees along a portion of the Allandale Road edge, south of Chapel Avenue and along the ridge line above and west of Pierce Avenue. Many of the trees throughout this area are old and need care and attention.



*Tree damage, 2003*

#### Reception

This is an important area, particularly for first time visitors and those with cemetery business. It is presently undistinguished and somewhat concealed in terms of letting passersby know that there is a cemetery here. It gives the visual impression that it is part of the residential neighborhood. In addition to containing the Caretakers Cottage and Office, it also houses a simple, elegant, ivy covered puddingstone Receiving Tomb on a side slope surrounded by Hemlocks and Oaks.

This area has primarily evergreen tree cover except for the area near the intersection of Pierce, Evergreen and Willow Avenues where it changes to deciduous shade trees and opens up views into the cemetery. Rhododendrons and Yews on the Grove Street side reduce sight distance and interfere with views of the entrance.

#### Service

The functional part of the cemetery is somewhat concealed in regard to views from Grove Street, but has some exposure to adjacent residences. It has primarily evergreen tree cover. The service building complex would benefit from more effective screening on the Grove Street side as would the intersection of the service drive and Willow Avenue.

#### The Vale

This valley is the one of the lowest places in the cemetery and once contained a stream that was one of the headwaters of Stony Brook. This section of the historic part of the cemetery is an important character defining area. The lower central area is primarily made up of lawn with large deciduous shade trees. Edges are defined by evergreens, rock outcrops and steep topography. Many of these steep side slopes appear to have thin soil profiles and are primarily covered with grasses and moss. The Allandale Road edge is exposed along with the concrete foundation of the perimeter stone wall. The southern boundary is primarily deciduous except where some White Pines have been planted along a narrow area between Downing Avenue and abutting property for screening purposes.

*Grove Street entrance, 2003*



### Upper Bow Avenue

The highest and steepest hill in the cemetery is located on the south edge of the historic part of the cemetery and serves as a backdrop for surrounding areas. Rock outcrops and evergreen trees are closely related to developed burial areas while the undeveloped southernmost edge is made up of primarily deciduous shade trees with some volunteer evergreen trees making inroads. Understory planting along Eagle Path provides an appropriate romantic character to be strived for in other parts of the historic cemetery landscape.

### 1926 Expansion Area

This gently rolling meadow contrasts with the topography and woodlands of the older part of the cemetery. The topography and vegetation along the east edge provide a strong sense of separation between the old and new areas of the cemetery. The central developed area is defined by lawns with drives with a picturesque island of rock outcrop containing deciduous and evergreen trees.

The area is edged with woodlands except for the severe, but effective, formal Hemlock edge along the north side. The Hemlocks of even age have been treated with dormant oil and stem injections, but it is expected that they will need eventual replacement. The west edge is made up of primarily deciduous shade trees while the east and south edges are predominantly evergreen trees. These three edges also have rock outcrops that help maintain a sense of continuity with the historic part of the cemetery. Dense perimeter vegetation also assists in screening residential abutters.

### Vegetation

Some of the vegetation identified in Walnut Hills Cemetery includes large deciduous shade trees [Beech, Shagbark Hickory, Maple, Oak and Sassafras], small deciduous trees [Cherry, Weeping Higan Cherry, Crabapple, Dogwood and Shadblow Serviceberry], evergreen trees [Cedar, Canada Hemlock, and Red and White Pine], shrubs [Azalea, Lowbush Blueberry, Juniper, Pieris, Rhododendron and Yew] and ground covers [Japanese Creeper, Euonymous, Fern, Ivy, Canada Mayflower, Periwinkle, Wild Violets and Wintergreen].

### Volunteer Growth

Low growing and dense Green Brier [also known as Catbrier], Raspberry and Multiflora Rose has become established south and east of the Receiving Tomb, in the area of the Chapel Avenue loop and northwest of Beech Avenue.

### Lawns

Lawns are generally in fair condition, except where steep slopes and deep shade occurs and there it is in poor condition.

*Invasive volunteer growth, 2003*



*Objectives*

*To use vegetation to restore the scenery and historic style intended for the cemetery.*

*To enhance scenic opportunities inside the cemetery and as seen from adjacent streets.*

*To create healthy, long lived plant communities within the cemetery.*

*To develop an ongoing vegetation management program.*

*Recommendations*

**Landscape Character**

The primary thrust of the vegetative treatment for the cemetery should be to regain and maintain a level of landscape character that is supportive of the original design intent and appropriate to the romantic era that the cemetery developed in.

Vegetation should be viewed as an element used for the benefit of the overall landscape character of the cemetery as opposed to the decoration of individual grave sites. While the latter may be appropriate in older sections of the cemetery where larger family lots exist, it is not appropriate in areas of more recent development where a higher density of grave markers exist.

The interior treatment of the historic area of the cemetery should be maintained with an overall green bucolic impression with horticultural diversity.

The interior treatment of the 1926 expansion area should be maintained with open lawns and large deciduous shade trees lining the drives. The long central outcrop dividing the space should be maintained as a natural woodland element.

Treatment of the perimeter edge should include vegetative screening that is primarily evergreen. This buffer would help separate the visual relationship between visitors to the cemetery and intrusive adjacent residential and other buildings as well as vehicular traffic, thus reinforcing the rural atmosphere and seclusion of the cemetery. This screen should be relatively open at the historic entrance and reception areas to help give the cemetery a visibly public identity.

In addition to the removal of invasive vegetation and detrimental volunteer growth, new plantings should focus on reinforcement of appropriate woodland edges and development of understory treatment. Plant materials for the latter should include numerous evergreen species mixed with deciduous species selected primarily for foliage and texture characteristics with year round color and interest. Fall color is particularly important in a New England landscape. Shrub materials should include Rhododendron, Azalea, Mountain Laurel, Blueberry and Holly.

*Understory vegetation along Eagle Path, 2003*



On difficult to maintain steep slopes, vegetation should be mixed with trees, shrubs and ground covers. The latter should include plants like Periwinkle, Ivy, Euonymous and Wild Ginger. The development of mosses should be encouraged. Lawn should be provided only where necessary.

### **Landscape Character Area Recommendations**

#### **Historic Entrance**

Make the main entrance more inviting by adding more color and texture with the use of flowers and shrubs to create more visual interest and make the entrance more welcoming, identifiable and important. In addition to removing invasive and volunteer vegetation, provide selective cleaning and thinning of the adjacent wooded areas. Remove damaged and diseased trees. Prune free standing older trees. Reinforce the edges of wooded areas with appropriate understory vegetation. Fill in the depression adjacent to Evergreen Avenue, between Walnut Hills and Pierce Avenues.

#### **Reception**

Walnut Hills Cemetery needs a stronger definition along Grove Street to distinguish it from the surrounding residential neighborhood. This working entrance should have a stone wall and gate to give it the dignity it needs, as was desired by the Trustees in the early 1900s, using the historic entrance treatment as a model. Improving sight lines by removing the existing Yews and providing color with flowers and shrubs will make this entrance more identifiable and inviting.

The cottage and office building would also benefit with additional planting and could thus contribute to the overall landscape effect of the cemetery. Consideration should be given to providing a vegetated or other enclosure to the back yard of the cottage to provide visual separation of back yard use and cemetery use.

#### **Service**

Greater visual separation of this area from Grove Street and adjacent residences is desirable. With potential expansion of the area toward Grove Street a stronger buffer planting of evergreen trees and shrubs would help along the north side. Because there is virtually no planting space along a portion of the east side, consideration should be given to replacing the chain link fence with an opaque barrier.

#### **The Vale**

Reinforce the character of the valley with supplemental shade trees at the edges of Cypress and Mount Walley Avenues, and evergreen trees adjacent to Spruce Avenue. Plant the steep, often barren, side slopes with shrubs, and ground covers as well as moss. Remove damaged and diseased trees.

#### **Upper Bow Avenue**

Selectively thin the vegetation and prune the canopy to introduce more sunlight in this area. Provide additional shrub and ground cover planting to enrich the landscape character of this older part of the cemetery. Provide a buffer planting of evergreen trees along the southern periphery. This should allow time for these to grow and fill in prior to development of the adjacent area for burials.

#### **1926 Expansion Area**

Reinforce the buffer planting with new evergreen trees and shrubs in areas as needed along the west and south edges. A replacement strategy for the Hemlock edge on the north side involves removal of the Hemlocks before replanting because any new planting prior to that would have to be on the north side of the Hemlocks which is too shaded. Replacement planting should be of mixed varieties of Fir and Spruce with some understory plantings on the south side.

On the east side and on the central rock outcrop, initiate a selective woods cleaning program to open up space for an understory of new shrubs and small trees.

### **Vegetation**

#### **Species Selection Considerations**

A specific planting plan should be developed prior to planting additional trees. The selection of tree species is an important consideration in terms of appropriateness, maintenance requirements and protection of historic artifacts. Botanic diversity is an important consideration. Large scale monocultures are generally not recommended because of experience with devastating diseases like Dutch Elm Disease, White Pine Blister Rust and Chestnut Blight and are not recommended here because of the style of this historic cemetery.

Replacement trees should be limited to areas that do not interfere with grave markers, paths, drives, fences and walls. New plants should be tolerant of urban conditions. The general preference is to use large native shade trees like Maple and/or Oak. Consideration should be given to the reintroduction of improved disease resistant species of Elm and the use of nonnatives like Katsuratree.

Acid rain has been monitored for many years and it is suspected to be affecting Sugar Maples, causing Maple decline. Traditionally, Maples have been considered to be long lived trees where narrow tree pits, road salt and drought have not been a problem.

Evergreen trees add winter interest and could be used where selected visual screening is desirable like in the southwest corner. Evergreens also offer the symbolic connotation of immortality. Appropriate species include a number of Pines, Spruce and Fir.

Small deciduous trees, and large and smaller shrubs also have their place as understory and at the edges of wooded areas. Selections should ideally have at least two seasons of interest. Species to consider include Amelanchier, Hawthorne, Lilac, Viburnum, Abelia and Clethra.

Trees that require increased maintenance or present potential hazards to historic resources, like Poplar and Willow, should be used sparingly as should trees that are subject to storm damage because of the potential damage to historic artifacts with falling limbs, etc. This includes Ailanthus, Ash, Black Cherry, Cucumbertree, Magnolia, Poplar, Red Maple, Silver Maple, Sophora, Tuliptree and Willow. White Pine, White Ash and Tuliptrees are also struck more often by lightning than most other trees.

Trees that grow fast like Willow, Poplar and White Pine break up easily and have one of the highest failure rates. Most White Pines have codominant branching from White Pine Weevil invasion when they were young. This type of growth is prone to large branch failure facilitating the entrance of decay within main stems.

Trees that are subject to wind throw have had their surface roots damaged from vehicles or lawn equipment. Root failure occurs more readily on trees that have root decay or other root problems. Up to 75% of all tree failures are due to root problems. Tall trees with large upper crowns are more subject to wind throw with root loss. Trees that have vertical cracks and decay throughout the lower and upper stems are prone to failure.

Trees with a dense surface feeding root system make it difficult to grow turf in the same area and should also be avoided. These include Beech, Honeylocust, Linden, Norway Maple, Poplar and Willow. Trees that have annual problems with insects such as aphids on Lindens should be avoided because of the staining and mess it causes on the grave markers.

Trees that create significant litter due to fruit and/or seed production should also be used sparingly because of the additional cleanup work required by maintenance staff. This includes Ash, Black Cherry, Catalpa, Corktree, Ginkgo, Horsechestnut, Mulberry, Planetree and Sweetgum. Many fruits cause staining on grave markers, pavements, walls, etc. Flowering trees of choice should have small fruits and be disease resistant to leaf and stem disease like fire blight, leaf spot and apple scab. Crabapple and Red Cedar should not be on the same site unless disease resistant varieties are used. Diseases, causing leaf and stem damage, can be devastating when both hosts are present.

The dropping of aphid excretion or 'sap' on gravestones and tombs is also a particular problem when the preservation of gravestones is of prime importance. Linden and Norway Maple should be avoided because of this undesirable trait. Both also create a dense shade that inhibits the establishment of a stabilizing ground cover beneath them. Their tendency to develop basal sprouts is unattractive and blocks views. Structural problems and heavy pruning requirements for Zelkovas to allow sufficient light penetration for lawn development should limit the use of this tree.

#### **Volunteer Growth**

Remove the volunteer growth. Many are weak wooded trees and they present a hazard to the historic resources of the cemetery. The invasive understory of Brier, Raspberry and Multiflora Rose should be removed. These aggressive understory materials are difficult to eradicate. Where lawns are to be established, cut it back to the ground surface, seed and mow on a regular basis. In "natural" areas and on steeper slopes, clear and grub. Then install desirable plants to control erosion. Chemical treatments for removal should only be used if necessary.

#### **Lawns**

All lawn areas should be restored where necessary. After loosening the top surface to prepare a proper seed bed, limestone and fertilizer should be added before seeding.

## **ACCESS**

### *Issues*

#### **Vehicular Access**

The cemetery is bounded by Grove Street on the north and Allandale Road on the east side. The historic main entrance is at the intersection of Grove Street and Allandale Road while the functional entrance is on Grove Street. Three tertiary entrances for service access are on Allandale Road in the southeast corner of the cemetery.

The historic main entrance has a 12'-9" clear opening because of constriction caused by granite wheel guards at the stone posts. The gate opening is about 14'-3". Entering through this gate is relatively easy considering it is a heavily traveled area. Exiting can be difficult and dangerous when trying to make a left hand turn.

Entering the cemetery through the Grove Street entrance is difficult when heading west during heavy traffic hours, as is exiting when turning left. The entrance is relatively narrow and edged with granite curb that has a tight radius. This combination makes it extremely difficult for large delivery vehicles. This entrance is gated beyond the Caretaker's House and at the service area drive with relatively new tubular steel gates.

The tertiary entrances are each treated differently. The northernmost has an 8' wide opening with a wood gate that has to be lifted and removed for access. The middle gate has an 8'-2" clear opening. Apparently rarely if ever used, the southernmost gate has a 16' wide opening.

#### **Parking**

There is no obvious parking area anywhere within the cemetery. Some undefined parking is located opposite the cottage and Office with widened pavement, comfortably accommodating parallel parking for about 5 vehicles. While this is a functional solution, it isn't particularly attractive, nor does it contribute to the landscape character of the cemetery.

#### **Pedestrian and Universal Access**

The cemetery is accessible by public transportation and a concrete sidewalk along Grove Street which has accessible ramps at the Grove Street entrance. There is no walk connection into the cemetery. Except for some paved internal paths, for the most part pedestrians walk on paved drives. Not all gradients inside the cemetery are considered accessible. Most visitors arrive in vehicles and use them to get to their destinations inside the cemetery.

#### *Objectives*

*To provide pedestrian and universal access, and meet current safety standards while restoring historic character.*

*To maintain adequate visitor and maintenance access to the site.*

### *Recommendations*

#### **Vehicular Access**

Maintain the current access and egress points, except perhaps the southernmost entrance on Allandale Road. Consider eliminating the latter entrance and extending the stone wall in its place. This action will make the replotting of lots 730, 731 and 732 unnecessary as vehicular circulation through this entrance would have to cross over these lots.

Improve turning radii at the Grove Street entrance to better accommodate large service vehicles.

#### **Parking**

Create a more appropriate parking area with 10 to 12 paved spaces near the office for visitors. It is preferable for this facility to be located south of the office and west of the holding tomb in an area separated from the entrance drive.

A less expensive alternative would be to improve the existing parallel parking by providing perpendicular spaces for about 10 vehicles with some planting to reduce visual impact. This solution would also preserve more open space.

Another alternative would be to maintain and improve 3 to 4 parallel parking spaces adjacent to the office and provide 7 to 8 additional perpendicular spaces adjacent to the recommended Grove Street wall extension. This could be accomplished in conjunction with entrance and planting enhancements in the area.

Separate parking for the Cottage tenant should be provided outside the control gate.

#### **Pedestrian and Universal Access**

Provide an accessible walk from the Grove Street entrance to the cemetery office.

## **CIRCULATION SYSTEMS AND MATERIALS**

### *Issues*

#### **Circulation Systems**

The internal vehicular system consists of a series of curvilinear loops. While the overall design is consistent with circulation systems designed during the late 19th century, the system is very confusing for a first time visitor. The use of “Y” intersections, in combination with a weak directional sign system and topography that conceals a view of the entire system, contribute to a sense of disorientation.

Drives in the older area of the cemetery tend to be narrow, about 14' wide while in the expansion area they are about 18' wide. The former is generous for single lane travel, but tight for two way traffic. The latter is narrow but adequate for 2 way traffic. Where the drive has been widened to accommodate parallel parking at the cemetery office, it is about 23' wide. Tight turning radii at most intersections makes it difficult for large maintenance vehicles to navigate the entire system. Passenger vehicles can not make all turns without driving on lawns. Bow Avenue is about 8' wide which is too narrow for vehicular use. Wheel marks in lawns adjacent to drives are common in this area.

The names of drives in the older part of the cemetery come from the 1875 plan. They include Walnut Hills Avenue, Mt. Walley Avenue, Chapel Avenue, Rock Avenue, Cypress Avenue, Spruce Avenue, Bow Avenue, Downing Avenue, Pierce Avenue and Evergreen Avenue. Trinity Avenue was originally planned as a path. Cedar Avenue was not built. Willow, Chestnut, Maple, Pine and Beech Avenues as well as Maintenance Road are in the new area on the west side.

Paths are primarily located in the southeastern half of the cemetery and are about 3-1/2' wide. Not a system in themselves, paths generally make connections to drives. Most path names are also taken from the 1875 plan including Summit Path, Rock Maple Path, Daphne Path and Tangier Path. Some paths were constructed in part like Eagle Path, Occidental Path and one other. Some paths were not built like Alpine Path, Oriental Path, Arboretum Path and 2 others. Laurel Path is new, not part of the original plan.

#### **Pavement Materials**

The original drive materials were gravel and paths were either gravel and ash or cinders and ash. Drives were changed to macadam and later bituminous concrete beginning in 1928. They were seal coated between 1967 and 1969. Sections of the drive were repaired and resurfaced in 1995 and 1996. Drives were patched in 1998. The drives are currently paved with bituminous concrete. Drives have some major and minor cracks and potholes, particularly in the older area.

The pedestrian system consists of some paved [bituminous concrete] and unpaved [lawn or forest duff] paths. The walk to the office is constructed of concrete while the walk to the cottage is bituminous concrete. The perimeter walk along Grove Street is concrete and the sidewalk along Allandale Road is bituminous concrete.

#### **Pavement Edging**

Few paved surfaces are edged. A bituminous curb has been recently added in the service area to control surface drainage. There is also a bituminous curb at the parking near the cemetery office.

#### **Steps**

The only steps inside the cemetery are on Bow Avenue where there are 4 flights without handrails. The lower three flights are in close proximity while the highest is somewhat separated. The latter appears to have been added at a later date as the stone has a rougher finish than the other three which appear to have a “picked” finish. There are 2 sets of granite stairs with 4 risers and 2 more with 5 risers. Typical riser heights vary from about 7” to 7-1/2” while the tread width appears constant at about 12”. These steps are considered steep for outdoor conditions. A plan from 1895 indicated an additional 7 sets of steps on a similar route in this area which were apparently not installed.

#### *Objectives*

*To maintain and reinforce the historic interconnected network of circulation systems.*

*To maintain the historic style of pavement materials.*

*Recommendations*

**Circulation Systems**

Maintain the current internal vehicular circulation system. While the older 14' wide drives could be widened to better accommodate 2 way traffic, it is not recommended in order to preserve the landscape space between the drive and burial lots.

Funeral processions currently enter through the historic entrance and exit on Grove Street. This route should be maintained as it gives the best first impression of the cemetery to visitors.

Widen a portion of Bow Avenue and provide a means for maintenance vehicles to turn around. Consider providing vehicular controls at the loop portion of Chapel Avenue and making that portion pedestrian except for scheduled vehicular access. The controls could take the form of removable bollards or gates.

Where possible, increase the paved turning radii at entrances and intersections where necessary as part of an overall drive improvement project. Provide a new name for Maintenance Road after relocating the maintenance use of that area.

In the older historic portion of the cemetery pave incomplete paved paths. Do not pave other paths. Paved walks are not recommended for the expansion area.

**Pavement Materials**

Resurface the drives, reconstructing poor areas as necessary. Insure that anticipated underground utilities are in place prior to resurfacing. Phase the work over a 3 to 5 year period, beginning with the older part of the cemetery.

Consideration must be given to historic and visual appropriateness as well as initial and long term cost and maintenance implications. Although the original drive materials were gravel, a return to gravel or the use of a chip sealed material, which would provide a rustic historic appearance, is not recommended. Gravel surfaces require ongoing maintenance. Chip seal is not recommended because drives are plowed of snow. Drives should remain bituminous concrete.

The existing paved interior walks could remain bituminous concrete. Walks could also be chip sealed as they are not snow plowed. This would also further differentiate them from drives. The walk to the office should remain concrete until such time as replacement is necessary. At that time the materials should match other walks on the property.

**Pavement Edging**

Do not provide additional edging unless absolutely necessary for control of surface drainage or vehicles. If edging is ever deemed necessary, it should be granite that is both durable and visually compatible with the historic components of the cemetery. Granite should be thinner than normal street curb and have a split face, thermal or sandblast top finish to give it a more appropriate rustic appearance.

**Steps**

Handrails would be a beneficial addition to the existing steps. No other changes are recommended. When new steps are necessary, they should emulate the example of the lower steps on Bow Avenue.

## GRAVE MARKERS AND MONUMENTS

### *Issues*

Walnut Hills Cemetery lies on a large outcrop of Roxbury conglomerate or puddingstone. The conglomerate typically contains quartzite, granite and felsite, pebbles and cobbles which are rounded to sub-rounded in shape. Boulders and outcrops of this material have been incorporated into the grave markers of the cemetery, giving it a distinctive character. As early as 1886, the slate grave markers of H. H. Richardson and family were embedded at the base of a hillside outcropping of puddingstone at Bow Avenue. Later, small rectangular bronze grave markers were embedded into the outcropping directly.

Monuments placed in the cemetery prior to 1886 [for example, those found in the area of Mt. Walley and Spruce Avenues] show diversity of material and type consistent with traditional Victorian cemeteries: crosses, covered urns on pedestals, sculptural markers, headstones and footstones appear in brown sandstone, white marble, true slate and granite.

In 1886 Walnut Hills Cemetery was the first cemetery to place limitations on the size and design of new monuments. No white marble, mausoleums and few sculptures were to be used, with the purpose of creating a harmonious feeling throughout the cemetery. This coincided with the increased use of granite for grave markers during the 1870s and 1880s because of improved equipment related to quarrying and stone carving. Later, slate, dark Quincy granite and bronze tablets were permitted.

Grave markers include plain tablet headstones, multipart headstones and flush markers. The primary materials found in the cemetery today include granite, slate and bronze. The term "slate" commonly includes a wide variety of uniform, dense black stone used for monuments. Recent granite colors vary from light to dark grey with some red and pink. There are also a few brownstone and marble markers. Bronze plaques are typically either placed flush with the ground surface or mounted on the exposed Roxbury Puddingstone ledge or free standing pudding stone boulders.

No zinc markers were found in the cemetery. These markers are an example of a controversial late 19th century material called "white bronze". Although durable and inexpensive, these markers were prohibited in many cemeteries because they were perceived as "cheap and faddish." Manufacturers promised better durability than marble. Some considered zinc as good as marble aesthetically in that it could be cast to take very fine artistic detail and lettering.

There is a significant amount of bronze in the form of sculptural reliefs, tablets bearing the names and dates of the deceased, and flag holders for the graves of veterans.

While the vast majority of the grave markers are in good condition, a number of the usual problem conditions occur throughout the cemetery. A few markers have overturned and a flush slate marker is delaminating adjacent to Walnut Hills Avenue. A large 2 part granite monument near the intersection of Rock and Trinity Avenues has apparently subsided and the top portion has slid off its base. Some markers show evidence of mower scrapes. Overgrown shrubs and trees crowd some of the markers. Some of the older flush markers are becoming covered with soil and vegetation. The Blake monument, perhaps the largest in the cemetery, with some beautiful delicate carvings at the sides, is beginning to show signs of delamination, particularly on the back side of the monument.

Virtually all of the slate markers have clear inscriptions and very little splitting or delamination [spalling] is evident. Stone is subject to deterioration by natural weathering, and that process has been accelerated by atmospheric pollution. Porous stones like marble, sandstone, brownstone and limestone are more subject to the effects of weathering than nonporous stones like granite. The stones that show the most extensive deterioration and are the most at risk are the marble and sandstone markers. All of the marble markers have eroded surfaces varying from slight to severe.

There are special areas for veterans 1876-77 GAR Post 143 and a granite Civil War Memorial for the unknown dead. The earliest death date found was 1815 on a Sullivan family marker. Because the cemetery did not open until 1875, it is very likely that this interment was moved here at a later date. The most recent death date is current because this is an active cemetery.

### **Materials and Considerations**

Classification of natural stone falls into three categories: sedimentary, metamorphic and igneous. Sedimentary, like limestone [calcium carbonate], sandstone [siliceous material], and puddingstone [a conglomerate] are composed of mineral material laid down in beds. With time and pressure, individual crystals reform to promote adhesion between the minerals. They become a solid piece of stone but remain porous and contain bedding planes. As a result, sedimentary stones may delaminate in the direction of the bedding plane.

Sedimentary stones absorb water through their pore structure. However, there is a wide variation in the degree of porosity and permeability of individual stones. In an exterior environment, porous sedimentary stones are subject to freeze/thaw cycles that are extremely damaging. Along with water, they absorb the dissolved minerals and salts in the water, i.e. fertilizer, deicer, natural acidic material from the decomposition of vegetation, etc. These materials may adversely affect the stone as well. On the other hand, low porosity sandstones and limestones can be exceptionally permanent. The inclusion of igneous pebbles within the puddingstone has decreased its porosity.

In addition to the issues mentioned above, limestone or lime containing stone is subject to further dissolution by water and acid rain. Water itself is slightly acidic due to the absorption of carbon dioxide and the formation of carbonic acid. However, acid rain significantly increases the rate of dissolution of lime and is a common conservation issue for urban sites. Many stones, even sandstones, contain small amounts of lime that become problematic with time.

Marble and slate are the two most common metamorphic stones used in cemeteries. Marble is a recrystallized limestone and slate is a recrystallized shale. Metamorphic refers to the process by which the individual minerals of the sedimentary stone have recrystallized under increased pressure, temperature and time to form a stronger, less porous stone. As these stones are subjected to the pressures of mountain building, the crystals within them reorient perpendicular to the direction of the applied force. Therefore, these stones are directional in nature, i.e. they have a foliated structure. The typical cleavage of slate reflects this structure and is unrelated to the bedding plane of the original shale.

Marble came into use during the 1810s and remained very popular through the 1870s. The rural cemetery movement became a showcase for carved marble and most sites of this era contain a very high percentage of marble markers. Marble has not endured as well as the earlier slate and sandstone markers, particularly in the northeastern states, because it is very susceptible to acidic deposition [acid rain] and other atmospheric pollutants like sulfur dioxide.

As calcite, marble is subject to dissolution by acid rain. The smaller particles creating the adhesion between grains are often the first material to be dissolved, causing the marble to become "sugary", i.e. to deteriorate into individual grains of marble. This process has affected all marble markers in the cemetery. Most of the marble markers have lost surface detail due to acid rain and general weathering. Consolidants are being developed for use on marble to restore the adhesion between grains, however these are not always advisable to use in an exterior environment.

Slate was the predominant material used for grave markers through the 17th, 18th and early 19th centuries. Sandstone, including brownstone, was used much less frequently than slate. Slates are generally low in porosity. Slate's relatively smooth surface does not absorb much water and is less affected by acid rain deposition than marble. Many markers carved from slate have remained in good condition, still readable despite the passage of time. Cleavage may occur if a slate marker is set vertically in the ground with the most porous side facing up, exposed to rain, snow and freeze/thaw cycles. Water enters into the vacancies between the bedding planes, freezes, and forces the planes apart.

The most common igneous rock type used for cemetery markers is granite. Within igneous rocks, the mineral matter has completely melted and reformed so that the stone lacks pore space and adhesion between crystal phases is strong. Now the standard for grave markers, granite is relatively impervious [more than slate]. Resistant to the effects of freeze/thaw cycles, granite endures quite well in outdoor environments. It is the hardest and most stable grave marker material in general use.

Granite has been used as a base for markers at the Walnut Hill Cemetery as well as for the markers themselves. This is generally a wise practice, although care must be taken to check from time to time that water is not collecting in the slot of the join between base and marker. With marble or a sedimentary stone, the impermeability of the granite does not allow the water to drain, and it reacts with the weaker component, i.e. the marker. Breakage of the marker often occurs at this juncture as a result. Dowels will also be subject to corrosion at this point due to the lingering water, and mortars will dissolve.

Damage to granite monuments is often structural in nature rather than chemical. Granite markers are heavy and may topple over, breaking in the process. They are usually repaired using a dowel and mortar or dowel and epoxy adhesive method.

In addition, stone provides a good substrate for lichen and algae growth. This is a sign of the good health of the environment, in that lichens require clean air in which to live. The dirty appearance of many of the markers is probably not particulate deposition from urban pollution, but rather deposition from plants, like pollen and the growth of algae and lichen. Polished granite is slightly less subject to lichen growth than matte finished granite, as it provides less of a foothold for the organism initially. The same is true of slate versus marble. However, once established on a polished surface, the lichen can dissolve the mineral and create a surface that is easier to use for attachment.

*Objectives*

*To preserve a primary historic resource by restoring grave markers.*

*Recommendations*

**Cemeterywide**

Establish a preservation philosophy and a policy related to grave marker restoration and conservation. Include a policy to restore and preserve selected grave markers, particularly those of historic or artistic value or those that contribute to the visual character of the cemetery. Determine whether the presence of algae and lichens is acceptable or not.

Inventory the grave markers in the manner recommended by the Association for Gravestone Studies and create a comprehensive electronic database that can serve as a tool for management and fund raising. Engage a conservator to undertake a stone by stone survey of the non-granite stones. Each piece should be photographed with a scale marker and inventory number, producing a hard copy that can easily be used for later comparison. The conservator should work with the cemetery staff to review those works of greatest historic interest in all media as well. In addition, markers of all media should be checked for security of their mounting system.

The highest stabilization priority should be given to public safety hazards, structurally unsound stones, restoration of marker foundations, dowel replacement in multipart markers that are visibly cracked, resetting and repair, and conservation of historically significant markers that are in danger of becoming illegible.

Stones that have legible inscriptions covered by lichen or other botanical growth should be also priority conservation items. Stones that have barely legible inscriptions should be earmarked for priority recording, documentation and conservation as funds become available. Lichens on stones that have no legible inscriptions should be left in place. Workshops led by stone conservators could lead to cleaning and resetting in a cost effective manner.

Establish guidelines and a system of design review for all new monuments. Materials, scale, style, spacing and letter size must be addressed.

**Stabilization Needs, in order of priority.**

- The Blake monument, the largest monument in the cemetery, is created from a brown sandstone. It is actively deteriorating and would strongly benefit from treatment.

*Blake monument, 2003  
[Barbara Mangum]*



- All marble and sandstone monuments are in relatively poor condition and should be further inspected and evaluated for treatment. Although limestone monuments were not identified in this survey, they may exist and if so, undoubtedly require further inspection and evaluation for treatment.

*Sandstone marker, 2003  
[Barbara Mangum]*



- The bronzes throughout the cemetery are frequently corroded in disfiguring patterns of black and green. It is likely that if air quality improvements are sustained, the bronzes in time will turn completely green. In many cases, this may be acceptable. However, in the case of the sculptural bronzes, like the three wreaths of bronze embedded in a large boulder and in the Dane monument, corrosion is an irreversible loss of the metal surface causing significant disfigurement over time. The main issue is often the pattern of water runoff. Areas where the bronze is frequently washed with rain water become areas of significant bronze corrosion, usually through formation of a bright green patina and loss of metal. Areas nearby that are more protected often appear black due to the presence of sulfides in the air. This corrosion product is not easily washed away. The end result of stripes of black and green rarely enhances the object and can make it difficult to read or comprehend. This loss of detail and disfigurement can be stemmed through treatment and annual maintenance.

*Bronze wreath, 2003  
[Barbara Mangum]*



- Several grave markers appear to be in jeopardy of falling over. These should be stabilized. Markers to be moved for repair or resetting should be carefully documented in regard to location and orientation.
- There are a few instances of plants taking root behind a bronze tablet embedded in a boulder or marker. These plants should be removed or eliminated before the marker is pushed out from its bedding. One grave marker in puddingstone is missing its bronze tablet. Has the marker been intentionally removed or is it missing?
- In a few cases, vines are allowed to cover a monument. The vines typically dissolve the stone to gain a footing for the vine and will cause surface damage to the monument, especially if the vine is removed through pulling rather than careful trimming. Contribution to the overall aesthetic character of the cemetery must be weighed in relation to potential harm on a case by case basis when determining whether to allow a specific vine to remain in place.
- Many monuments in the cemetery have become home to algae and lichens. Algae are frequently mistaken for dirt, as they turn black when the colonies dry out or die. However, in wet conditions the living colonies will swell again and turn bright green. The algae hold moisture against the stone through creation of a slime layer thus accelerating deterioration through chemical and biological means, although the extent of damage varies with the substrate. The algae can be removed by a variety of cleaning methods, but will return without continued maintenance.

- Lichens, a symbiotic combination of algae and fungi, frequently flourish in the company of the algae colonies and on the stone provided that the air quality is pure enough to support them. Evidence of lichen growth abounds throughout the cemetery, and is especially noticeable on the granite monuments. Lichens break down stone through acidic byproducts and enzymes, and will etch the surface of the monuments. On the other hand, lichens generally grow very slowly and are appreciated by many people for their beauty. They can be removed, but will return without continued maintenance. As with vine, it should be determined whether the presence of lichens and the incipient damage they cause are aesthetically acceptable or not on a case by case basis.
- The deposition of bird guano on grave markers is an ongoing maintenance issue. It should be removed as soon as possible, before it hardens. Care should be taken not to breath the material during removal.

## **BUILDINGS**

### *Issues*

There are 4 buildings within the cemetery. All of them are in good condition but there are minor issues with 3 of them.

### *Caretakers House and Office*

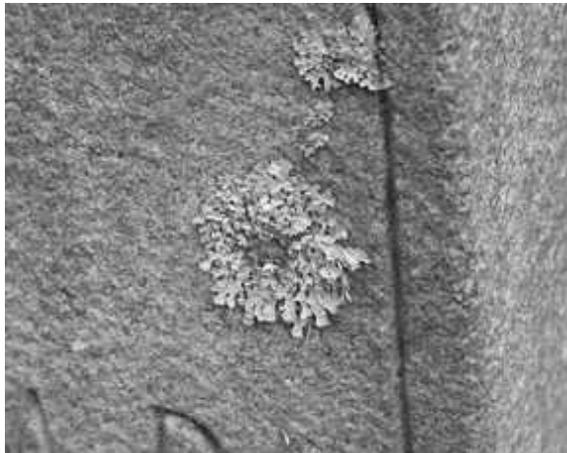
The oldest, an 1891 two story caretakers house at the Grove Street entrance has an attached one story office that was added in 1956. The wood frame structure has new cedar shingle siding, an asphalt shingle roof and a brick foundation. The roof was replaced and interior walls were repaired in 1992. A strip of shingles appears to have loosened at the top of the roof at the back of the house and needs to be reset. The foundation masonry is in good condition although mortar joints are cracked and loose at the several projecting brick entry stoops. Except for the periodic maintenance that is needed at the stoops, the exterior of the house appears to be in excellent condition. The house or cottage is now rental property for the Town and the occupants have no responsibilities in regard to the cemetery.

### *Holding Tomb*

As a replacement of the original, the current 28' by 32' receiving or holding tomb, designed by architect A. W. Longfellow, was completed by the Johnson Brothers of Brookline in 1901. A handsome structure, the tomb is classical revival in style and was constructed of dressed Roxbury puddingstone, to blend with the surrounding cemetery, laid up in a broken coursed ashlar pattern. Exterior walls are 31" thick.

The mortar between the stones is tight and intact although there are random hairline cracks between the mortar and stone arrises. Decorative stone corbels project from the walls directly under the eaves. Their rounded ends are extensively weathered. The weathering may have been accelerated by the micro-fractures induced in the end of the stones when they were initially shaped. The stonework does not need any repairs.

*Lichen on granite, 2003*  
*[Barbara Mangum]*



*Caretakers House and Office, 2003*



*Holding Tomb, 2003*



The low, slate shingle gable roof appears to be supported by a system of layered tiles, although what appears to be tiles on the underside of the roof may actually be terra cotta units enclosing a steel framing system. The edge of the roof system projects slightly beyond the face of the walls and is dressed with a cement plaster that is cracked and spalled. Tile sub-roofing is exposed at the edge of the eave and rake but has not been damaged from direct exposure to rain and snow. Potentially, water can get under and between the tiles and create future problems. While there is no urgency to repair the plaster immediately, it should be scheduled as a maintenance task and, until it is done, the exposed edges of the roof should be observed periodically to ensure deterioration does not accelerate.

The holding tomb has an arched front entrance opening and two small round openings in the south wall and a half round plus two small round openings in the north wall. There are no doors, windows or shutters over these openings. The interior of the tomb is exposed to the weather through the openings, although entry is prevented by iron window grills and an iron gate. The iron window grilles were apparently never painted and exhibit significant rust. The iron gates were painted at some point and need restoration. Earth settlement has exposed the stone foundation on the west side.

The interior has a concrete floor, tan brick on the interior surfaces of the walls, a ceramic tile ceiling and a bank of marble faced coffin drawers with bronze pulls on each side of a central aisle. The ceiling of the aisle is a barrel vault that appears to be a Guastavino tile arch system. The vault appears to be supported by the coffin drawer framework, but it is more likely that there is a concealed beam or truss spanning from front to rear on each side of the vault. As seen from the locked entrance gate, the interior masonry appears to be in excellent condition. The tomb is still used occasionally in severe winter weather.

#### Service Barn

In the service area there is a one and two story wood frame barn with wood shingle siding with an asphalt shingle roof that was renovated in 2001. It is assumed that the barn is part of the 1900 stable and shed complex designed by architect Guy Lowell. Except for a noticeable downward sweep in the eave directly over the vehicle doors, it is in excellent condition. The sweep may be due to past or present inadequate support above the door openings.

#### Service Garage

Adjacent to the barn is a textured concrete block storage building with a flat roof that was built c 1928 in a low area that was filled. The block may have cinder aggregate [hence the older name, cinder block]. The textured block faces simulate rough cut stone and were formed with a press that was attached to the block formwork. In the 1920s, the press and formwork were sold in kits by Sears Roebuck to brickyards and backyard entrepreneurs and, for a while, the pressed, textured block unit was ubiquitous.

A bay was added to the garage in 1956 to accommodate a truck with a wider plow. Old cracks have been repaired and new steel lintels have been installed over the garage door openings. All maintenance vehicles are stored in the garage to improve security and neighbor relations. Yellow painted steel bollards are located adjacent to the garage for protection from vehicles.

Soil materials are currently stored on Maintenance Road in a relatively visible area. These materials are often placed over tree root systems, shortening the lives of the trees they support.

*Service Garage and Barn, 2003*



*Soil storage area on Maintenance Road, 2003*



*Objectives*

*To meet current public safety standards while restoring historic character.*

*Recommendations*

Make the minor repairs required for each of the buildings. Make the cemetery office universally accessible. For tenants of the cottage, consider implementing responsibilities related to the cemetery. Consider developing guidelines for the use of exterior space in relation to the cottage, ie BBQ, picnics and the placement of outdoor elements. It is desirable to provide an enclosure for the yard to separate these activities from cemetery patrons.

The holding tomb is used infrequently for it's intended purpose. The structure is not particularly suitable for conversion into a columbarium but could be considered as crypt space for full body interments. A significant portion of the income from the sale of these spaces should be used for an endowment to maintain the structure. Alternatively, this structure could be converted into a reception building.

Expand the area for exterior storage at the service buildings to allow relocation of the soil storage area on Maintenance Road. This should be located on the north side of the complex and it should be heavily screened in terms of views from Grove Street. Change the name of Maintenance Road.

**PERIMETER WALLS**

*Issues*

Erected between 1910 and 1913, a stone wall runs along the length of Allandale Road and part of Grove Street. Although desired by the Trustees at that time, the wall along Grove Street was never finished. Fencing along the rest of Grove Street was suggested in 1923.

The wall has 4 openings including the historic main entrance and 3 others on Allandale Road. It is both free standing and retaining. Portions of the wall have a concrete foundation, some have a puddingstone foundation and others have a constructed foundation. It maintains a relatively constant height along the street side and varies in height quite a bit on the cemetery side.

The wall is accentuated by stone masonry posts at three openings. Puddingstone posts at the historic main entrance are 3'-2" square by about 6' high with single piece granite capstones. Similar posts at the middle and south entrances on Allandale Road are 2'-4" square by about 5' high with mortared multipiece caps.

In 1962 portions of the wall were reconstructed, pointed and capped. Small sections of the Allandale Road wall were repointed in 1990. The walls need repair, as mortar is missing or loose, and some stones have moved. A repointing contract is expected to be awarded in 2003.

**Grove Street Wall**

A 30" high by 24" wide stone wall runs along the Grove Street edge at the base of a hill. Although the hill is primarily an outcrop of bedrock, the space between the top of the wall and the face of the stone is filled with earth. The wall is built of roughly cut, mortared puddingstone with a mortar wash across the top. The mortar has generally failed and is severely disrupted or missing throughout the length of the wall. However, there has been little movement of the individual stone units except at 2 or 3 places where stone at the top of the wall is missing. At one location, earth at the face of the bedrock has slumped down the hill and forced the stone wall into a tilt. The tilt has apparently stabilized but in order to remove the tilt, the wall would have to be dismantled and rebuilt at this location.

**Historic Main Entrance**

As the stone wall curves around the corner from Grove Street to Allandale Road, it is interrupted by a gated driveway. The two gate leaves are suspended from stone posts. The posts consist of irregular pudding stone units. The mortar between the stone units of the posts are deeply disrupted and one or two stones on the north post have shifted laterally. There is no cap flashing under the capstones and the capstones are flush with the faces of the posts.



*Historic Main Entrance, 2003*

### Allandale Road Wall

The stone wall along Allandale Road is about 1,500 feet long and varies in height from a typical 30" to 40" along the street side and up to 10' high in one location on the cemetery side. It also goes up and across bedrock outcroppings in a few locations. As one views down the length of the wall it has a sweeping curve that corresponds to the location where it is 10' high. This sweep is probably due to the slight natural tilt that occurred in the underlying retaining wall. At one location, between the wood and iron gates, the puddingstone wall appears to be built on top of an earlier, lower fieldstone wall.

The wall is in poor condition for about 250 feet from the corner of Grove Street and Allandale Road and then it is in fairly good condition overall with random disrupted areas. It appears that the mortar closest to the corner is adversely affected by splashing winter road salts.

At one location the level of the cemetery is about 10' below the top of the wall. The 30" high stonework wall sits on top of a concrete retaining wall that contains the sidewalk and street. This retaining wall is about 200' long. Calcium carbonate efflorescence is present on the surface of the concrete, following ragged lines that were probably the "pour" lines that formed between batches of concrete when they were originally placed. The concrete surface has chipped and spalled around vertical construction joints. At the present time the concrete wall surface is generally intact. However, the efflorescence is indicative of moisture movement through the concrete from the back of the wall to the front and the dissolution of component materials in the concrete. Several long term deteriorating activities are probably occurring within the wall and at the exposed surfaces. This includes carbonation of the surface [benign unless steel reinforcing is present close to the exposed surface], silica alkali reactions in the aggregate [which causes the aggregate stones to expand and crush themselves], and freeze-thaw action from trapped moisture [which expands and splits the concrete].

At the south end of the wall are two stone gate posts and one stone property corner post. One of the gate posts and the corner post are disrupted and in the same poor condition as the Grove Street/Allandale Road entrance gate posts. One of the gate posts has been repointed fairly recently. Unfortunately the work was unsympathetic with a contrasting white mortar smeared across the face of the stone.

### Objectives

*To meet current public safety standards while restoring historic character.*

### Recommendations

About half of the Grove Street wall and all of the Allandale Road wall is in need of extensive repointing and rebuilding. These recommendations for repairing the stone walls are very general. A detailed survey with extensive mapping of the various degrees of damage and needed repairs is needed to prepare a repair document and receive bids.

### Grove Street Wall

Remove all mortar and moss from joints and repoint 100% of the joints on the existing wall. Extend the wall along Grove Street to complete the public perimeter treatment.

### Historic Main Entrance

Dismantle the posts down to sound mortar or to the ground, whichever is less and rebuild the post. Add metal cap flashing with turned down edges under the granite capstone.

*Stone wall on Allandale Road, 2003*



*Stone wall on Allandale Road, 2003*



#### Allandale Road Wall

In the first 250' length, 100% of the mortar needs to be removed and replaced and at least 50% of the stonework needs to be dismantled and rebuilt. Beyond that damaged length, about 25% of the mortar needs to be repointed, ranging from shallow to deep repointing. About 10% of the stonework needs to be locally rebuilt.

Where the exterior faces of the wall are repointed and effectively sealed against moisture penetration, the interior of the wall must be protected from moisture penetration coming through the top of the wall. While not a permanent repair, this can be efficiently done by repointing the exposed joints across the top of the wall, by coating the top of the wall with a non-shrink mortar wash, and by removing the top course of stone and resetting it in a fresh mortar bed.

As for the concrete retaining wall and wall above it, at this stage of deterioration the processes of deterioration can be arrested or at least slowed by chipping out the cracks and patching them, by drilling weep holes near the bottom of the wall to induce free moisture on the back of the wall to drain out rather than migrating through the wall, and, possibly by sealing the exposed surface with a breathable water repellent.

Repairs should be considered an ongoing process, rather than "permanent" solutions, because the work involves exposed historic components. The rate of natural deterioration can be slowed, but can not be completely stopped, as long as masonry and metals remain in their historic outdoor locations. Superficial repairs will deteriorate rapidly but more thorough repairs will also deteriorate, albeit more slowly. Repairs can be made and then the stonework can be neglected for another 25, 50 or 100 years until major work will be needed again, or minor maintenance repairs can be scheduled and made systematically on a 5 year maximum cycle, such as repairing 20% of the wall length annually.

The principle underlying all conservation work is the retardation of the natural process of decay in a manner that does not cause any other sort of harm. Water penetration, combined with freeze/thaw movement, is the major cause of damage to historic landscape structures encountered today. Horizontal and vertical structures exposed to the weather are susceptible to a gradual infiltration of moisture and frost with subsequent damage in the form of movement and deterioration of porous elements like mortar, brick and concrete. When moisture crystallizes, it expands and creates damage. It has been observed that structures made up of large stones withstand the punishment from weather much better than those built of smaller elements.

The use of lime/sand mortar predominated until about 1880. Although susceptible to washout, it was soft enough to allow stones some movement relative to each other. Cement mortars used after about 1880 were hard, creating strong and unyielding joints. They are appropriate to contemporary bricks and concrete blocks. Hard and soft building materials cannot be used together effectively. Hard cement mortar will cause soft bricks and stones to spall and deteriorate. In a structure that lacks flexibility, stones and bricks break, mortar joints open and serious damage results. The type of mortar used in this repair work should be compatible, both in strength, color and finish, with the repairs being made.

## PERIMETER FENCES AND GATES

### Issues

#### Perimeter Gates

There are four entrances along Allandale Road including 2 iron picket gates, one chain link gate and an opening blocked up with wood. All except the wood gate are double leaf gates.

#### Historic Main Entrance Gate

The 1905 iron gate at the symbolic main entrance was repaired in 1930. The current simple iron gate appears to be a replacement gate, ie., not original to the entrance, as it matches the construction of the other iron gate on Allandale Road which was erected in 1939. While the hinges appear to be original, the simple picket and rail design of the gates also suggests that they may not be original. The main gate is about 4-1/2' high and has been repaired many times. It has several minor bends and extensive weathering [rust]. Hinges appear to be in good condition and the stone surrounding the hinges are intact.

#### Wood Gate

A wood gate is set into grooves in the stone wall. Secured in placed with two slide bolts, the wood gate has to be lifted to allow access. It is worn but in fairly good condition in spite of the bottom edge sitting on the ground and having earth being trapped between the vertical edges and stone recesses.

*Wood gate on Allandale Road, 2003*



#### Second Iron Gate

This gate is similar to the entrance gates at Grove Street/Allandale Road entrance, both in its construction and condition.

#### Chain Link Gate

The chain link gate consists of 2 swinging leaves of chain link fencing. Leaning against stone gate posts, the gates are nonfunctional and have been left open allowing pedestrian access.

There are also two recent black painted functional double leaf tubular steel control gates, one adjacent to the office and one at the drive entrance to the maintenance yard.

A galvanized steel post is sited on Bow Avenue above the steps to prevent vehicles from driving down the steps.

#### Perimeter Fences

The south and west cemetery boundaries are defined by about 4,000' of perimeter chain link fence that was initially installed beginning in 1918. Damage to the fence caused by the 1938 hurricane was repaired with new posts and salvaged fabric. In 1955 a 6' high chain link fence was placed at the boundary of the newly developed area on the west side. In 1964 an additional 256' of 6' high chain link fence was erected and damage to the existing fence was repaired.

An Olmsted firm 1938 drawing for the Prouty-Oakes lot notes a wire fence at the rear of the plot on the south side of Bow Avenue that they tried to conceal with vines [Ampelopsis and Euonymous]. This was likely a chain link fence that once defined the boundary of the cemetery and was later moved to reflect the expanded property.

The fence along the west side, apparently almost 50 years old, appears to be in the best condition. The fence along the east end of the south edge is heavily rusted and appears to be the oldest. Most of the fence is galvanized steel, about 6' high, with a 3' high section extending from the service area to Grove Street. There is a 5' high length of vinyl coated fence along the Payson Road edge that appears to be related to a residential lot. Some 6' high vinyl coated fence is also related to the service area. The chain link fence along the residential edge of the service area once had barbed wire on it.

Much of the fence needs repair today. A number of breaches are evident in the fence, 6 along the south side, 1 on the west side behind the Putterham Branch of the Brookline Public Library and 1 at the south end of the service area edge. Some of the breaches have apparently been used for access while others appear to have been used to facilitate disposal of debris in the cemetery. There are also areas where the fence is bent and twisted, where the fabric is high, where fill has been placed against the fabric, and where top rails and/or support posts are bent, disconnected and/or missing.

Set on a 2' high concrete retaining wall facing the cemetery is about 100' of fence made up of concrete posts and 2 horizontal unpainted pressure treated wood rails on the Grove Street edge. It appears to have been part of the sidewalk construction project and does not contribute to the character of the cemetery.

#### **Fences and Gates at Family Plots**

There are no fences or enclosures around graves in keeping with the initial plan to preserve an unobstructed natural flow of open space. Although popular early in the rural cemetery movement, these elements fell into disfavor by 1867 and were being removed. Extensive plot fencing came to be viewed as detracting from the overall beauty of the landscape. By 1890 cemetery managers actively discouraged the installation of fences at individual plots. The boundaries of numerous adjacent plots were marked with competing fences, with complete disregard for the visual impact on the cemetery as a whole. No evidence has been found that these elements were ever a component of Walnut Hills Cemetery.

#### *Objectives*

*To reconfirm the historic character of the cemetery through the appropriate use and restoration of fences and gates.*

#### *Recommendations*

##### **General**

Older paint finishes on iron gates should be laboratory tested for lead content prior to removal. Given the age and number of layers of paint, it is quite probable that at least some of the paint layers contain lead. Comply with all current regulations for the handling and disposal of lead and lead products. While a semigloss black finish is often recommended for ease of maintenance, a paint seriation analysis should be performed on existing remaining metal components to determine historic paint colors and other characteristics.

##### **Perimeter Gates**

Repair and refinish the iron gates at the historic entrance. Over the long term, consider replacing the two gates with a style of gate that is more appropriate to the landscape character of the cemetery.

When the wall is extended and a new entrance is created at Grove Street, maintain the existing gate locations inside the cemetery to allow off hour access to the Cottage.

##### **Perimeter Fences**

As a first and immediate step, repair all of the breaches in the fence. Then replace the oldest fence along the south edge with 6' high black vinyl coated chain link fence. As funds permit, replace the remaining fence with vinyl coated chain link fence.

At the service area, consider replacing the chain link fence with an opaque fence or wall to provide a more effective visual screen at abutting back yards.

##### **Fences and Gates at Family Plots**

Do not allow the addition of these elements. They are not appropriate to the historic style of Walnut Hills Cemetery.

*Breach in perimeter chain link fence, 2003*



## SECURITY AND VANDALISM

### *Issues*

The site does not appear to have suffered from much vandalism over the years. No broken markers or graffiti were found. Various types of litter were found particularly along the east and south edges. Various types of debris, some construction related, were found associated with some of the breaches in the fence along the south edge. Older earth piles and some construction debris that appear to have been related to cemetery activities were found south of the Soldiers Lot and southwest of Maintenance Road.

Gates are closed at sunset by the Town Highway department. This maintains control of vehicular access to the cemetery. Walls and fences, where they exist on the perimeter, are relatively easily scaled by pedestrians, allowing unauthorized access. The Grove Street edge is particularly open for pedestrians and the southeast gate is nonfunctional and left open, allowing pedestrian access. There are also breaches in the fence. There are no light fixtures inside the cemetery other than security lights at buildings.

### *Objectives*

*To enhance the safety and security of visitors.*

*To keep vandalism to a minimum.*

### *Recommendations*

Continue to monitor for vandalism and remove litter. Repair the breaches in the fence and remove debris. Maintain a presence in the Caretakers House.

## SITE AMENITIES AND FURNISHINGS

### *Issues*

#### **Signs**

Four categories of signs are appropriate to historic cemeteries: identification; regulation; orientation; and interpretation. No information has been found to date about the historic style and extent of signs, if any, used in Walnut Hills Cemetery. However, a remnant of an apparent iron sign post base is located on a rock outcrop near Pierce Avenue.

A number of existing signs relate to the cemetery. There are 2 bronze identification plaques at the historic main entrance, one on each side of the gate installed in 1953. While appropriate in scale to the gate, they are difficult to read in part because they are in the shade on the north side of the gate. There is no identification sign at the Grove Street entrance. A wood sign kiosk with a wood shingle roof, installed in 2001, is located near the office. It houses an aerial photograph of the cemetery, posted rules and regulations, and a rack for handouts that have a brief description of the property. A small regulatory sign is also sited near each entrance composed of painted wood [green letters on white background] and mounted on a steel post.

Clearly marked drives and paths that continue the tradition of a gardenlike landscape are an invitation to the public to enjoy the cemetery. Once inside, the drives have a pleasant layout, but the twisting and turning can create confusion. There are numerous contemporary drive name and directional signs installed in 1995 that are visible and helpful, but not supportive of the character of the cemetery.

#### **Trash Receptacles**

A number of residential type galvanized steel trash receptacles are located inside the cemetery. The quantity of receptacles varies with the season. They are appropriately painted black to help them recede into the landscape. It has been noted that they are not always used, but that they are useful to dog walkers. No historic reference to trash receptacles related to the cemetery has been found.



*Cemetery sign, 2003*

**Seating**

While there is no record of benches being provided as part of the original cemetery development, they are often associated with cemeteries of this era. Two granite benches are found inside the cemetery today, associated with burial plots on Bow Avenue and Willow Avenue.

**Flagpole**

None.

**Focal Points**

None.

*Objectives*

*To reconfirm the historic character of the cemetery through the appropriate use of site amenities.*

*Recommendations*

**Signs**

A new system of consistent and appropriate signs is recommended. Signs should be legible and visually compatible with the character of the grounds and an overall system to present a sense of uniformity and wholeness. The system should be designed to reflect the museum quality of the grounds. The placement of signs inside the grounds should be coordinated with drive and path systems so that visitors naturally remain on path surfaces and are not attracted to walk on lawn surfaces or over grave sites.

Decisions related to sign materials should be made with consideration to the overall setting. Many materials, colors and styles can be visually distracting in terms of viewing a historic property. Signs set in stone bases might give the appearance of grave markers, potentially confusing visitors. Concrete bases are often an inappropriate material.

Visible identification signs are needed at both entrances as a first priority. The identification sign should provide some basic information like date of establishment and historic designation, at a minimum.

Regulatory signs enumerating rules and regulations are critical to help resolve and control issues related to use. Rules and regulations regarding tributes at graves should be amended as discussed under maintenance/management and published. Speed and parking regulations should also be posted including the requirement to keep wheels on paved surfaces.

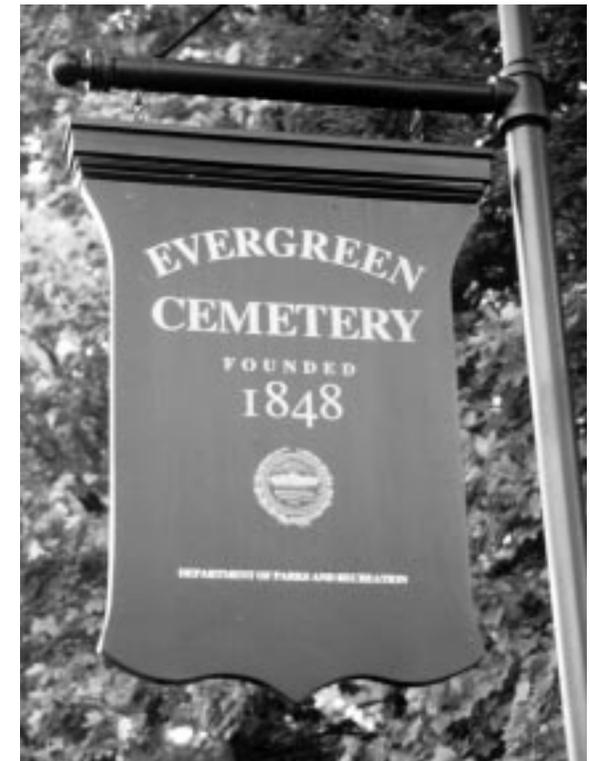
The orientation map and handouts near the office makes visitor information easily available. A sign directing visitors to the office from the historic main entrance would be beneficial. Internal drive and path identification as well as directional signs should be updated.

The placement of a supporting informational or interpretive sign system component is also recommended. Identifying and giving direction to important grave sites, as well as providing explanations for particular historic features like the holding tomb would be very beneficial in assisting visitors understand the significance of this resource.

**Trash Receptacles**

As long as the cemetery remains active and open to public use, trash receptacles are necessary. Continue to maintain the paint finish on existing receptacles. While there is no consensus in regard to quantity or placement, consideration should be given to an experiment of removing all of the receptacles from the interior of the cemetery and relocating them near exit points. This would likely reduce the number of receptacles required, ease maintenance requirements and remove a visual distraction from an otherwise bucolic landscape.

*Example of an appropriate identification sign*



### Seating

A desire has been expressed to provide benches for commemorative and leisure use. Benches could be part of larger burial plots provided by lot owners, and/or they could be provided in nonburial areas where they do not obstruct access or views to grave markers. They could also be integrated into areas of columbarium development and/or sites with views like at the top of Chapel Avenue or near the Civil War Unknown Dead lot.

As commemorative or memorial pieces, benches should be considered temporary in nature. Styles of benches should be compatible with the style of the area of the cemetery that they are placed in. In the historic area, decorative cast iron benches are appropriate while wood benches are more appropriate in the 1926 expansion area. Specific locations for commemorative purposes requires more detailed study.

### Flagpole

Do not add a flagpole unless there is a constituency to tend to the flag.

*An example of a Cast Iron commemorative bench to be used in the historic portion of the cemetery*



### Focal Points

There is a desire for appropriate focal points to provide some visual structure in areas of the cemetery. Two locations have been identified for potentially large elements of this type, both related to entrance experiences. Each should be supportive of the overall landscape character of the areas that they are placed in. The one between Walnut Hills and Pierce Avenues, near the historic main entrance, should express the romantic ideal of the cemetery. The one between Willow and Chestnut Avenues, near the entrance to the 1926 expansion area, should emphasize the sense of community as opposed to the individual as was appropriate for the landscape expression of cemetery development of that era.

*An example of a Wood commemorative bench to be used in the 1926 expansion area of the cemetery*



### STORM WATER MANAGEMENT

#### Issues

The high point of the cemetery is elevation 218 in the south east corner between Bow Avenue and Mt. Walley Avenue. The low point of 166 is on the south side, making an overall change in elevation of 52' inside the cemetery. Slopes in the site vary from very gentle to very steep. No significant areas of erosion or sedimentation were observed.

A brook once ran through the southern part of the cemetery. It was encased in a 30x45" culvert many years ago. There are catch basins in the 1926 expansion area of the cemetery, as well as a few in the older portion, all connected to that system. A catch basin was recently added to the service area that is connected to the Grove Street storm system.

Ponding is apparent in the some areas of older part of the cemetery. One significant area was identified near the southeast corner on Bow Avenue where ponded water extends over gravesites. Other less significant areas of ponding include an area south of the receiving tomb, near the north end of the east side along Allandale Road, and at the south end below Bow Avenue. These areas are typically woodland and have not been developed yet.

*Objectives*

*To eliminate erosion and sedimentation conditions.*

*To eliminate standing water by providing positive drainage.*

*Recommendations*

Maintain the existing catch basins. Expand the system or regrade areas as they are developed to eliminate ponding in the older part of the cemetery.

**UTILITIES**

*Issues*

**General**

As the rural cemetery movement became established, water supply was deemed desirable to help maintain the overall landscape and allow visitor maintenance of plantings at individual and family plots. Electricity was only needed to service building needs and was not used for the general illumination of a site.

**Water Supply**

Service for water supply to the cemetery is provided from Allandale Road and the historic main entrance. A 6" water main is located adjacent to storm and sanitary lines which run through a low area in the south portion of the cemetery. In the southwest corner a 2" water line is located next to storm and sanitary lines that run from the west side to Baker Circle. A separate 1-1/2" water service from Grove Street is provided to the caretakers house and service buildings. Water supply was installed in 1953, and overhauled beginning in 1995 when old galvanized steel pipe was replaced with PVC pipe, and water service to the garage was replaced. This effort continued in 1996 and 2000.

In addition to a single fire hydrant, water is provided to manually operated faucets or hose bibs, typically with 1" service, located throughout the cemetery. The distribution or spacing of these elements has improved in recent years. There is no irrigation system.

**Lighting**

There is an electrical supply to the caretaker's house and office as well as to the storage barn. Other than security lights at buildings, there are no light fixtures inside the cemetery. Some ambient light is provided by street lights on Grove Street and Allandale Road.

**Overhead Wires**

Wood utility poles with overhead wires and area lights are located outside the cemetery along both Grove Street and Allandale Road, on the cemetery side of each street. There are some overhead wires inside the cemetery [from Grove Street to the cemetery office and to the service area], but they are not detrimental at this time.

*Ponding on Bow Avenue, 2003*



*Objectives*

*To accommodate utility services in a manner that is compatible with the historic image of the site.*

*To provide utility services that would benefit the maintenance of the cemetery.*

*To provide remedial measures for utility services that are detrimental to the site.*

*Recommendations*

**Water Supply**

Upgrade the water supply system to provide a consistent supply of water in all areas of the cemetery. This will assist with making supplemental water available to assist with plant establishment for the first two to three years after planting. Water is also beneficial in times of drought and helps to reestablish lawns, as well as cleaning grave markers and paved surfaces.

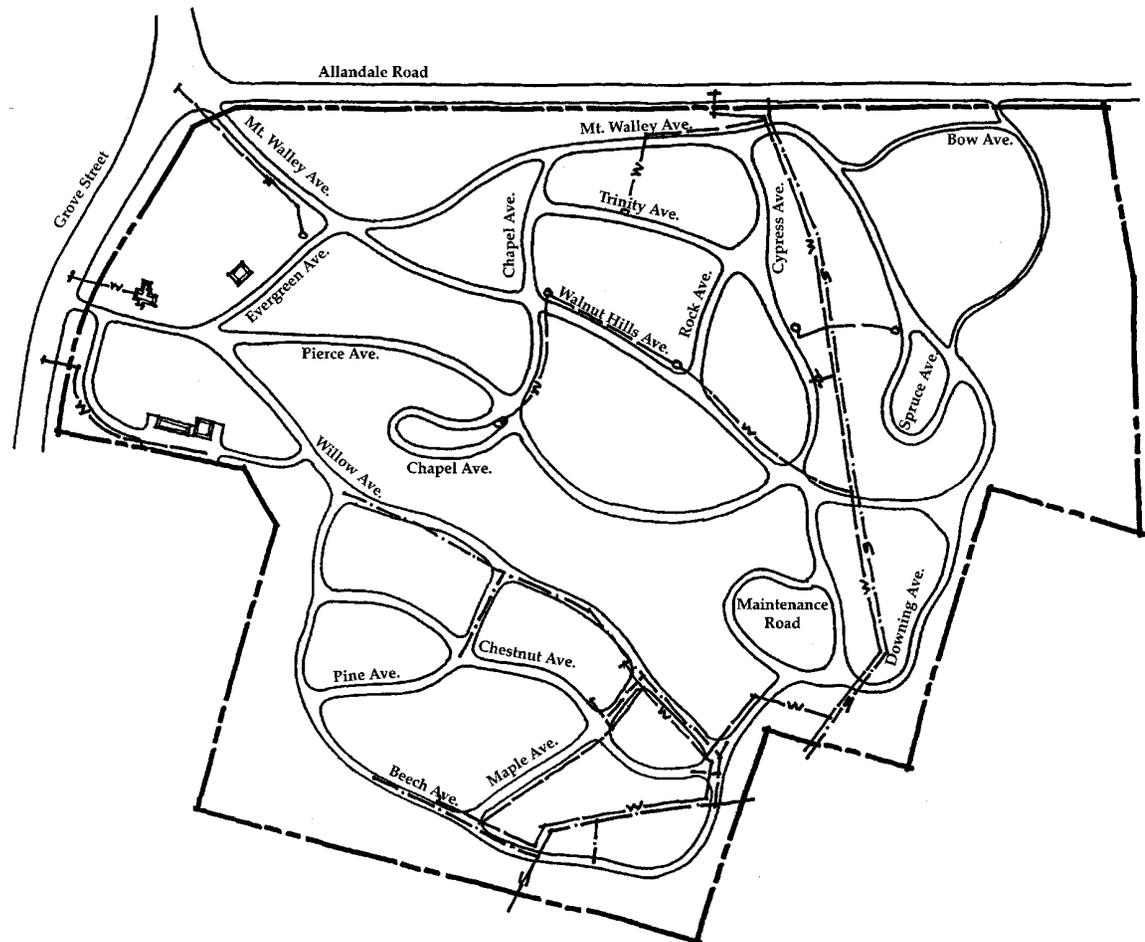
**Lighting**

Underground electric service should be provided in areas where security lights or other elements requiring power may be desired. In general, light fixtures should not be provided inside the cemetery. If it is deemed necessary, the addition of security lighting should be mounted on buildings wherever possible. If this is not adequate, security lighting should be pole mounted, preferably at the edges of heavily vegetated areas where they would create the least visual intrusion.

**Overhead Wires**

As a long term goal, work with appropriate utility companies to place the overhead wires underground.

*Existing Utility diagram, 2003*



Moss, 2003



## IMPLEMENTATION

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### **PRIORITIES AND PHASING**

#### **Priority Setting**

Priorities were established in conjunction with the Trustees of Walnut Hills Cemetery. They focus on improvements that will provide additional interment space, enhance visitor use and visual character, improve deteriorating infrastructure, ease maintenance requirements and protect historic resources.

Improvements have been broken down into four phases or priority levels to ease construction financing requirements. The actual order of events will depend completely upon sources and availability of funds and the needs and desires of the Town. Priority levels can be combined or further subdivided as funds are available and as opportunities present themselves.

Each phase should be considered a five year plan for implementation so that the entire plan can be implemented within a 20 year time frame. At that time all of the infrastructure should be reexamined as further repairs will likely be necessary at that time, hopefully to a much lesser extent.

Although this plan is intended to serve the interment needs of the town for 30 to 40 years, meeting the stated goal of being able to offer residents a variety of interment choices requires an accelerated program for the development of interment sites. Most of this preparation work should be accomplished in a ten year period with an early emphasis on providing choices that are not available today, like those relevant to cremation.

### **IMPLEMENTATION PRIORITIES**

#### **Phase One**

Additional in ground interment space for cremations is provided in the 1926 expansion area in this phase. The public perimeter appearance of the cemetery along Grove Street and at the intersection with Allandale Road is improved with the first stage of stone wall repairs and completion of the Grove Street wall. Cemetery entrances are improved with replacement of the gates at the historic entrance, and intersection improvements at the Grove Street entrance with new parking at the Office and enclosure of the yard at the Caretakers Cottage. The interior appearance of the cemetery is improved with landscape character enhancement, drive pavement repairs, chain link fence replacement and the relocation of the earth storage area on Maintenance Road to a new location near the service buildings.

**Phase Two**

The phase provides a new opportunity for the placement of cremated remains with a new columbarium on Chapel Avenue in what will become primarily a pedestrian experience with the addition of new vehicular controls. This stage also includes additional interment opportunities with the expansion of in ground interment space in the former area of earth storage on Maintenance Road and the potential conversion of the Receiving Tomb into crypt space. In this phase a new focal point could be added to the older historic part of the cemetery. Improvements continue related to landscape character enhancement, perimeter wall and drive pavement repairs, and replacement of chain link fence.

**Phase Three**

In this phase additional in ground interment space is provided in the 1926 expansion area. Improvements continue related to landscape character enhancement, perimeter wall and drive pavement repairs, and replacement of chain link fence. A new coordinated sign system is also included.

**Phase Four**

The last stage includes further expansion of in ground interment space. In this phase a new focal point could be added to the same part of the cemetery.

**PRESERVATION PRIORITIES**

In preservation projects for historic cemeteries priority setting is a relatively straight forward matter, that is, protect historic resources first. The highest priority items are typically related to issues of public safety, structural stability and protection of historic fabric. These items should be corrected first and as soon as funds allow this work to be accomplished.

Medium priority improvements should be corrected next and generally relate to issues of security, preventing accelerated deterioration or damage which could lead to higher future costs, replacement of items which are expected to last less than five years, and repair or replacement of items that significantly detract from the appearance of a cemetery.

Low priority improvements include cosmetic repairs and future considerations that can be delayed at least five years.

*Phasing Diagram*



WALNUT HILLS CEMETERY  
 BROOKLINE, MASSACHUSETTS  
 WALKER-KLUESING DESIGN GROUP

Priorities for grave markers can typically be prioritized as follows:

**First Priority**

Stone conservation including resetting and repair of slate markers and pin replacement in marble markers that are visibly cracked or spalled.

**Second Priority**

Stone conservation including marble markers with visible metal stains at the junction between marker and base.

**Third Priority**

Stone conservation including granite markers that have shifted or are leaning, and marble markers currently in satisfactory condition.

**MASTER PLAN COST ESTIMATE**

This estimate is presented with the priority levels described above. It should be considered preliminary in nature and used for discussion purposes only. Many items should be considered flexible because of the scale and level of detail development of this plan. Because of the probable long range nature of this project, a factor for inflation has been omitted. Inflation could easily double this estimate in a very short period.

This estimate focuses on capital improvements that can be funded and administered within the structure of the Town of Brookline.

Costs for work related to lot owners [such as repair of grave markers] has not been included.

SUMMARY MASTER PLAN PRIORITY RECOMMENDATIONS

Phase 1:			
Expansion of in ground Interment space [1,500 spaces]*		63,000	
Gates at Chapel Avenue		20,000	
Memorial Benches		-	
Landscape Character Improvements		115,000	
Perimeter Stone Wall Repairs		178,500	
Extend Grove Street Wall		100,000	
Paving Improvements			
including widening Bow Avenue		85,000	
Grove Street Entrance Improvements		75,000	
New Parking at Office		34,500	
New Fence at Cottage		22,000	
Chain Link Fence Replacement		37,500	
Maintenance Yard Expansion		32,000	762,500
Phase 2:			
Interment Space for Cremains [1,000 spaces]		300,000	
Holding Tomb Improvements and Conversion		140,000	
Memorial Benches		-	
Landscape Character Improvements		110,000	
Focal Point @ Walnut Hills/Pierce/Chapel Ave.		-	
Perimeter Stone Wall Repairs		227,500	
Replacement of Gates at Historic Entrance		31,000	
Paving Improvements		144,000	
Chain Link Fence Replacement		36,000	
Upgrade Water Supply		140,000	1,128,500
Phase 3:			
Landscape Character Improvements		33,000	
Perimeter Stone Wall Repairs		71,000	
Paving Improvements		131,000	
Chain Link Fence Replacement		19,000	
New Sign System		62,500	316,500

Stone conservation, one of the highest priorities, has not been addressed in this estimate. A stone by stone inventory recording the number, materials, artistic and historic significance, condition and conservation priority of each gravestone forms the basis for stone conservation programs.

These estimates are in year 2003 dollars and are subject to change. Estimates reflect a public bid process as required by the Town. Although construction costs were very stable between 1990 and 1995, they have increased substantially in recent years. Some of these costs could be reduced with selected services provided by Town forces.

It should be noted that these estimated costs are for budgeting purposes only. We have no control over economic conditions affecting construction costs and have had experiences where comparably qualified bidders have been 100% apart in bid prices for minor masonry restoration work.

Recommendations for noncapital improvement projects have also not been included.

Phase 4:			
Expansion of in ground Interment space [1,500 spaces]*		127,500	
Focal Point @ Chestnut/Pine Ave.		-	<u>127,500</u>
Subtotal			2,335,000
General Conditions			<u>350,000</u>
			2,685,000
Contingency			<u>265,000</u>
			2,950,000
Other Project Costs			
[Survey, consultants, etc.]			<u>450,000</u>
Total Project Cost			3,400,000

\* Includes site work costs only.

Note:  
The above estimate does not include costs for memorial benches or the development of focal points because of the potential wide variation in range of cost for the latter elements and because it may be more appropriate for such elements to be donated items.

*Overgrown shrub planting at grave markers, 2003*



## MAINTENANCE/MANAGEMENT

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The overall goal of this plan is to enhance the appearance of Walnut Hills Cemetery wherever possible and to preserve and stabilize various components. The importance of this site to the community is emphasized by well kept lawns, other components kept in a good state of repair and an inviting informative sign system. A well maintained site tends to discourage vandalism and promotes community support. All outdoor elements require regular maintenance regardless of age or condition.

The following contains a summary of general guidelines for protection, stabilization, preservation, restoration and/or maintenance. Because of the rapid advances in knowledge and techniques today, this should serve only as a general guide. Specific changes in these recommendations, particularly in regard to materials and methods, are expected over time.

These guidelines are provided for general information and are presented on a variety of levels. Most of these techniques and materials should not be used without appropriate training, and in most cases a professional should be consulted before attempting anything. Inappropriate use of these techniques and/or materials can cause irreparable damage. In the majority of cases, a professional conservator should prepare a program of work specifying appropriate methods and materials for use. In some instances a conservator might be able to train people to perform some of the types of work involved, and should supervise any work done by volunteers, but a majority of the conservation work should be performed by the professional conservator.

### **MAINTENANCE GUIDELINES**

#### **General Clean up**

##### *Issues*

Walnut Hills Cemetery is currently maintained by cemetery staff. The cemetery is kept reasonably free of trash and leaves, and the grass is mown regularly. Leaves, fallen limbs and debris are removed in the spring.

*Recommendations*

Litter is a major problem in any public open space and one that must be controlled to create pride in a historic property. A neglected appearance seems to encourage vandalism or additional trash dumping. In this regard it is important to provide at least a moderate maintenance and management approach. Collection of the contents of trash receptacles and litter like paper, trash or debris should ideally be removed on a weekly basis and more often during periods of heavy visitation. Leaves should be removed during the fall and the grounds cleared of fallen branches.

**Landscape Character and Vegetation**

*Issues*

**Vegetation Management**

The primary goal of tree maintenance is to maintain healthy trees free of dead wood that could fall on people or gravestones. The reasons for pruning trees also include reducing hazards, maintaining or improving tree health and structure, improving aesthetics, or satisfying specific needs like: removing disease; removing dead, dying, interfering or obstructing branches; training young trees; eliminating screened areas to discourage loitering; and providing clearances for utility lines. The uncontrolled growth of trees and weeds hides vandals and can cause toppling of stones and widening of cracks in already damaged stones.

Trees require pruning on a regular basis to protect historic resources from damage by falling limbs. Too many trees or trees of the wrong type can create shade that is too dense to support and maintain a stabilizing ground cover that makes the surface subject to erosion. Too much shade can also be detrimental, particularly to slate and marble grave markers in that moisture could be retained for long durations, increasing the probability of biological growth on important historic artifacts.

**Volunteer Growth**

It is essential to maintain a landscape with an appropriate historic character. The character of a landscape is dynamic compared to the relative stasis of other historic components like grave markers and structural elements. Natural forces like landscape succession will change an unmaintained lawn into a forest in a relatively short period of time. The undeniable results of these forces are evident.

**Lawns**

The primary ground cover is grass. It is in fair condition with areas of bare spots and weeds. Bare spots are typically related to root competition from trees and/or dryness. Weed intrusion is primarily related to dryness and low fertility levels. Heavy shade conditions also impact lawn quality. Moss is present in some areas. The presence of moss in lawns is an indication of wet soil, poor soil in need of fertilizing, very acid soil or a combination of these factors. For the most part wet soil does not appear to be the issue here. Most New England soils are acidic, but not to the degree that moss is present. More often than not, moss is an indication that a soil has low light and fertility levels, particularly a nitrogen deficiency.

Most lawn areas need renovation, including proper pH level and fertilization. Maintaining a healthy lawn cover with adequate light, moisture and nutrients, and good maintenance procedures would reduce bare spots, weeds, moss and erosion.

**Soils**

**Soil Tests:** Soil analysis and testing helps determine the proper quantity and ratio of nutrients and other additives to improve a soil. Tests for pH and fertility levels should be made every 3 to 5 years to determine fertility changes made with basic treatments and to give a bench mark for further soil improvements. It typically also takes 3 to 5 years for the soil and the basic treatments to reach an equilibrium.

*Recommendations*

**Vegetation Management**

New plantings and pruning or removal of trees should be done with care. An archaeologist should be consulted regarding specific tree locations and a permit should be obtained from the Massachusetts Historical Commission prior to the execution of new planting. Any plantings requiring a hole deeper than 24" should be excavated by hand by an archaeologist who would recognize edges of burial features.

Inspect trees to safeguard against threats to stones and other elements from root systems and falling or scraping branches. Inspections should be made on a yearly basis and after each storm where winds exceed 55 mph. Ideally trees should be pruned to remove potentially hazardous dead wood on a yearly basis, but safety pruning every 5 years by certified arborists is acceptable. A 5 year cycle of pruning will help maintain and preserve large old trees. Provide plywood shelters as necessary to protect stones and monuments until pruning operations are complete.

Trees should be pruned in such a manner as to preserve the natural character of a plant and in accordance with ANSI 300 standards. All pruning cuts should be made outside the branch collar. Remove all dead wood, suckers and badly bruised or broken branches to reduce potential injury or damage to people, grave markers, vehicles and structures. Remove branches to provide 8 foot overhead clearance on walks and 12 foot clearance on drives.

The pruning of trees should only be performed or supervised by a certified Arborist. It should be done by nonprofessional crews only during an emergency situation or when there is an immediate issue related to public safety. The removal of dead trees should also be done by certified arborists. In cases where gravestones are impinged upon by tree trunks or roots, the gravestones should be temporarily moved to a new location to prevent additional damage to them, but only if it is safe to move the gravestone. If growth is in conflict with gravestones, extreme care should be exercised. Cut trunks as close to the soil as possible and leave it in place to decay. After a stump has decayed sufficiently, topsoil fill should be added to blend in with surrounding grades, and the area should be reseeded.

Root collars should be cleared of soil, mulch, stones, brush and other items that could hide or cause decay that could cause a tree to fail. Keeping root collars clean helps control girdling roots and decay that leads to tree decline and failure. Questionable trees with cavities, cracks or seams in main stems or branches, or fungi fruiting bodies on or around the root area should be assessed for potential tree failure.

Failure prediction with any sort of accuracy is difficult. However, performing a systematic approach of evaluating each part of a tree with proven procedures that the International Society of Arboriculture has adopted through the guide known as "A Photographic Guide to the Evaluation of Hazardous Trees in Urban Areas" will help to eliminate most of the suspected hazards. Remedial action such as pruning, installing support systems and removal will help reduce the failure percentages and the damage or injury to property or persons.

**Tree Thinning:** In some areas the cemetery would benefit from selective thinning of trees and replanting. This would improve growing conditions for the remaining vegetation and facilitate maintaining a collection of trees that gives character to the cemetery's landscape.

**Mulching:** Mulch is very valuable in supporting plant growth. It allows the soil to remain open to receive moisture and promotes the exchange of gases between the soil and the air. All introduced plantings should be mulched. Trees growing in an area with a restricted root zone, low nutrient levels, pH imbalance, low moisture conditions and soil compaction decline faster as they mature. Grass and weeds also compete for nutrients and moisture. While the removal of turf or grass under the branch spread of trees is often recommended for improved tree health, it is often not appropriate where tree canopies are large.

**Shrubs:** Spread fertilizer over the surface of the ground surrounding shrubs once a year during the spring. Soak the area thoroughly. Edge plant beds twice a month or as needed. Ornamental trimming or pruning should be consistent with the natural landscape and historic character. Plants should appear natural and healthy as opposed to geometric and fanciful. Prune to admit light and air to the center of the shrub. Prune only as plant growth requires, generally every 2 years. Prune spring flowering shrubs after they have bloomed. Prune summer flowering and other deciduous shrubs during the dormant season. Prune evergreen shrubs in late spring or early summer. Remove dead wood at any season.

**Ground Cover:** Keep weeded continually. Avoid disturbing runners. Prune regularly to maintain a low spreading appearance. Remove vertical shoots. Fertilize at the same time lawns are fertilized.

**Vines:** Many vines are not a suitable ground cover as they are difficult to control. Remove aggressive vines from the cemetery.

#### Volunteer Growth

Most, if not all, volunteer species should be removed. Volunteer growth should be removed on a yearly basis during the months when frequency of mowing is reduced and maintenance crews have time to remove it. Because lawn areas and edges attract volunteer growth, lawns must be mowed on a regular basis to keep this under control. The edges of lawn areas and individual elements like grave markers must also be constantly monitored to keep volunteer growth in check.

#### Lawns

**Rehabilitating existing lawn areas:** The rehabilitation of lawn areas in historic cemeteries needs to be done with more care than any other lawn because of the grave markers and potential bone fragments at or just below the surface of the ground. Weeds and other undesirable species should be removed. The soil should be loosened by power rake or vigorous hand raking. Rototilling is not recommended because of potential damage. Fertilizer and lime should be added as recommended by soil analysis. The fertilizer choice should be checked with a stone conservator as recommended herein under the discussion of soils.

Depressions that inhibit proper drainage of an area should be filled with topsoil to blend smoothly into surrounding grades. Care should be exercised with mounded or raised areas and regrading should be avoided or limited to avoid potential damage to subsurface elements. Bare spots should be topdressed, seeded and rolled. Water must be provided to maintain a sufficient moisture level to establish grass. The best time to plant a lawn in this area is between August 15 and October 1 to reduce weed infestation and maintenance requirements. If it is necessary to plant in the spring, plant as soon as the ground can be worked and when the soil is free of excess moisture.

Most seed mixes should incorporate improved, low maintenance, slow growing, drought resistant and shade tolerant seed cultivar mixes of Kentucky Bluegrass and Fescue.

Eliminate grass that is difficult to maintain due to shade or root competition or where other vegetation like ground covers or mosses would be appropriate.

**Watering:** Water lawns as necessary to maintain normal growth and color. Soak the entire root area. Avoid light, frequent sprinklings. Water is essential to establish a lawn. Watering established lawns during the dry months of summer, does not appear to be a realistic possibility at this time given the current budget, maintenance crew size and lack of an irrigation system.

**Mowing:** Mow to an average height of 3 to 4 inches. The most serious issue is the routine removal of grass in the immediate vicinity of gravestones and trees. Power mowers can scar trees and stones, and break stones. The types of stone used in older gravestones tend to be softer and more easily damaged than granite. Damage of this type was observed on some markers. The best current solution is to mow with lawn mowers to within twelve inches of gravestones and then use weed whips [rotating nylon filament trimmers] to trim the remaining area. The use of weed whips is permissible at granite, possibly slate, but not marble markers. Metal hand trimmers should not be used because they can abrade stone. At the marble gravestones, and perhaps slate, consideration should be given to removing grass from areas around the bases of the stones. However, with most maintenance crew staffing, hand trimming is not feasible nor is the removal of lawn by hand to maintain a vegetative free zone adjacent to gravestones.

**Frequency of Mowing:** An ideal schedule would include: mowing every 5 days from the beginning of the season to mid June; every 10 days from Mid June to mid August; and every 5 days from Mid August to the end of the season. Mowing just once or twice a year has some appeal in grounds with a low visitor population. However, the removal of grass adjacent to gravestones is more difficult with longer and thicker grass blades, which in turn could potentially cause more damage to gravestones.

**Weed, Disease and Pest Control:** The use of salt, chemical weed killers as well as insect and disease sprays should be discouraged to prevent potential damage to gravestones. Many of these materials contain salts and acids that can be damaging to marble, limestone and cast stone markers. When chemical controls are recommended, the formula should be checked with a stone conservator before use. Provide appropriate pesticide application in late spring and early fall, if necessary. Do not treat a new lawn until its second year of growth. Do not burn the grass.

#### **Pest Management and Plant Health:**

Insects, diseases and other pests are a normal part of nature. The safest and most responsible approach to preserve the cemetery's plants while safe guarding the environment is Integrated Pest Management (IPM). IPM utilizes alternatives to chemicals for pest control and establishes a monitoring system for early detection. It requires a detailed plan to inspect specific plant species at specific times for evidence of problems. It also requires that trained personnel inspect the grounds, detect the presence of pests and apply the proper biological controls. While IPM is an essential program to pursue, current horticultural thinking recommends that grounds care move beyond IPM or incorporate it into the principles of Plant Health Care which involves the concepts of selecting the proper plant material for any given location and providing the supportive culture needed to maximize plant development and minimize stress.

**Rolling:** Roll lawn areas in the spring as necessary to repair frost heaving irregularities caused during the winter. Use a light roller and roll the lawn when the soil is fairly dry, and freezing weather has passed.

**Aeration:** Aerate compacted lawn areas twice a year during the spring and late summer or early fall. Tines should not penetrate more than a 3 inch depth to protect buried resources. Do not aerate when the soil is extremely wet or dry.

#### **Soils**

**Liming:** Lime serves several important functions. It is of particular value in correcting the acidity of the soil. It also changes the structure of the soil, hastens bacterial action in the soil, aids in the liberation of plant foods which otherwise remain in the soil in an unavailable form, hastens the decomposition of organic matter and supplies a small amount of calcium, one of the essential plant foods. By reducing the acidic nature of the soil, lime also helps protect in ground stone like marble, limestone and cast stone markers that are susceptible to acid damage.

In established lawns, ground limestone should be applied every 3 to 5 years as determined by soil test results to bring lawn areas to the preferred 6.0-6.5 pH level. If a lime application is necessary, apply it 2 to 3 weeks prior to fertilizing. The soil pH must be at the proper level to make the benefits of a fertilizer available to plants. Lime should not be used in combination with animal manures or with nitrogenous fertilizers, as it causes the rapid release of ammonia. A fall application of lime provides time for it to break down in the soil before spring growth.

When applying lime for new lawn construction, it should be spread over the surface of the ground and thoroughly mixed with the upper few inches of soil. The rate of application depends upon the form in which the lime is applied and the texture of the soil. The rate of application of ground limestone should be determined by soil testing and should not exceed 75 pounds per 1,000 square feet at any one time. For new lawns lime should be applied either in early spring or late fall, with early spring [April] preferred. On established lawns or under trees, lime should only be surface applied so as not to disturb below ground elements or roots.

Fertilizing: Supplemental fertilizer improves vegetative health and vigor in a short period of time. Lawns and trees are both heavy consumers of nitrogen and they compete for it. Because nitrogen leaches from the soil, it should be applied annually. Application methods are different for trees and grass. If fertilizer is applied on the surface, the grass absorbs most of it.

Soil tests are required to determine fertilization needs. Lawn areas should be fertilized a minimum of twice a year to maintain a healthy lawn. Light, frequent applications of readily available nitrogen fertilizers are preferred over heavy, infrequent applications. Lawns in this area generally require 0.5 pounds of nitrogen per 1,000 square feet per growing month. Fertilizer should be applied with a mechanical spreader when turf is dry. This work could be either contracted out or performed by maintenance crews.

All trees and shrubs should receive an annual application of fertilizer to sustain a reasonable level of health. Fertilizing with a slow release fertilizer with a ratio of 3-1-1 will not only improve the health, but will also prolong the life of a tree. Trees should be subsurface fertilized to a depth of 12" at least every other year during the growing season, with spring or fall preferred. This could be contracted at the same time as pruning.

The chemical formulation of all fertilizers proposed for use should be checked by a stone conservator prior to use to prevent potential damage to gravestones and other artifacts. Many fertilizers are acidic which is detrimental to marble, limestone and cast stone. Ideally a nonacidic, slow release, organic fertilizer should be used to reduce the potential conflict between stone conservation and the desire to obtain healthy vegetation.

### **Circulation Systems and Materials**

#### *Issues*

Well maintained, universally accessible circulation routes are key to the public's enjoyment of the site.

#### *Recommendations*

##### *Paved Surfaces*

Sweep clean drives and paths weekly from spring through fall. Remove snow and repair paved areas as needed. Patch depressions of 1 inch or more annually. Repair cracks every 5 years.

### **Grave Marker Conservation and Repair**

#### *Grave Markers*

#### *Issues*

Stone conservation emphasizes the preservation of the original object as found rather than its restoration. Conservators have numerous and varied opinions on the issues of grave marker repair, restoration and protection. The suggestions and recommendations presented here are a relative, but not complete, consensus of opinion. Professionals should always be consulted on these matters and a permit must be filed with the Massachusetts Historical Commission prior to undertaking any of these efforts.

#### *Recommendations*

Seasonal site visits should be conducted to check for fallen stones and any other cases of accelerated deterioration due to weather and/or vandalism. Repair/restoration efforts should be monitored at least once each year. Gravestone rubbings should be prohibited because the process can leave wax or ink and cause surface losses.

Specifications and trained supervision must accompany all conservation treatments. The repair of broken, vandalized, otherwise damaged or deteriorating gravestones should be assigned to professional conservators, particularly when the gravestones have historic value. These general recommendations include mention of many conservation materials which may be used to conserve historic stone and masonry in burying grounds and cemeteries. In no case, however, should anyone attempt to purchase and use these materials and techniques without the supervision of a qualified conservator. The recommendations often do not include information about dilution, methods of application, techniques of removal, dwell time, symptoms of dangerous situations or unforeseen hazards to applicators and stones. The infinitely various conditions of old grave markers require that the use of conservation materials must be done only by experienced persons in controlled conditions.

Many grave markers require repairs and/or cleaning because of general deterioration, vandalism, inappropriate previous repair techniques, etc. Prior to making repairs, all markers should be inventoried and then prioritized for conservation/restoration in terms of significance. Most survey and some evaluation work can be performed by trained volunteers and/or municipal staff. Work should be completed according to priority rank and as funds are available. All repairs, resetting and cleaning should be done by professional stone conservators, particularly for sensitive work on historic pieces. It should not be undertaken by general contractors or amateurs, unless the work is done under the supervision of a conservator. Trained local staff can assist with resetting, mortaring into bases and keeping grave markers free of botanic growth and graffiti. Repair of stone masonry other than grave markers in this historic site may be done by professional masons.

Stone conservation programs need to consider the urgency of a condition along with the integrity of a gravestone, visual priorities and cost effectiveness of treatments. In conjunction with the existing conditions survey, photographic inventory and Grave Marker Inventory report, future periodic surveys should be done to measure and evaluate deterioration that occurs gradually. An understanding of the decay processes is considered essential to developing appropriate and effective conservation treatments.

Conservators should document their work thoroughly. Conservation efforts should include documentation of methods and materials used and a close evaluation of the performance of those materials and methods. All repair treatments should be documented before and after treatment in writing and with photographs. All repairs that are documented should be monitored on an annual basis for performance. Reexamine previous work every 5 years to evaluate long term condition trends and effectiveness of treatments.

Proper treatments must be based on analysis of the stones and their conditions for any given location at any specific point in time. Miracle cures proposed for all stones and conditions often cause greater damage in the long term. Understanding what does not work might serve future expenditures well, so that investment in repairs which only endure for a short term is done with the knowledge that the repairs will have to be repeated within a year or two. When possible, conservation efforts should also include documentation of past methods and materials used as well as a close evaluation of the performance of those materials and methods.

Several guidelines should be followed when repairs are required on historic stone.

- Survey the stone and its history to determine its age, source, geologic type and the extent of degradation as accurately and as specifically as possible. This could be considered a modified form of a conservator's standard statement of existing conditions.

- The goal should be a repair that returns the stone to a sound functioning condition with the least alteration of its historic appearance. The repair should not remove all traces of the history of the stone, or the passage of time.
- Specify materials suitable for use in outdoor conditions. Many materials are only suitable for indoor conditions and cannot stand up to the harsh extremes of the New England climate.
- Specify the use of known stable noncorroding materials to protect stone such as stainless steel dowels [type 304 or better], titanium dowels for monuments, nylon or Teflon dowels for gravestones and monuments prone to vandalism, and lead flashings. Avoid iron dowels because they rust, expand and crack stones. Do not use face pinning, polyester resin adhesives or gray cement grouts.
- Include fabrication and setting tolerances in the specifications as well as joint sizes.
- Stipulate criteria for acceptance in the specifications including viewing distances and finishes to match weathered appearance of adjacent historic stone.
- Stone dutchman repairs are rare, but may sometimes be required on large monuments. This type of repair is even more rare on small individual grave markers. Where these repairs are required, cut deteriorated stone to a depth of at least 2 inches until sound stone is reached. Require a sample of the stone to be used for patching.
- Where epoxy adhesives or grouts are used, the epoxy glue line should be kept back from visible surfaces by 1/4 to 1/2 inch so that the visible surfaces can be filled with a cementitious material having a historic appearance and composition. Epoxy adhesives should be concealed because the color of epoxies tends to darken over time. Hard or rigid epoxy adhesives should not be used on materials with significant coefficients of expansion like slate and sandstone.
- Prebid and preconstruction meetings should be required to fully acquaint Bidders and Contractors with site conditions, requirements and special conditions.
- Require submittals and mockups [to remain in place until completion of work] for approval of all materials used, [e.g. mortar and grout formula and samples, dowels, adhesives, parging].
- If field measurements are made by an installer, they should be submitted for review prior to commencement of work.

#### Slate Markers

##### *Issues*

Various treatments used to stabilize conditions like splitting, cracking and delamination lead to losses. A variety of repair and conservation techniques for slate markers have been used in historic burying grounds and cemeteries including encasement in concrete, encasement in bronze, encasement in sheet copper, encasement in slate, bronze bolts, bronze and iron straps, material applications and various coatings. Some of these efforts were made almost 100 years ago, and most have proven either unsuccessful, unattractive or both. Some of the different methods have had disastrous effects.

Some early repairs and many contemporary materials that were considered miracle cures when first used 10 or 20 years ago have failed, leaving the stones in fragments today. Epoxy repair techniques, and later polyester resins, were often specified for the adhesive repair of gravestones in the 1970s and 1980s. Many of these repairs failed within 5 to 7 years because of the adhesive's sensitivity to ultraviolet light, thermal conditions and external stresses. The encasement of slate in various materials must also be given thoughtful consideration because of the high coefficient of expansion of slate compared to other materials.

*Recommendations*

Stones that have vertical splits or are about to delaminate present difficult conservation issues and should be treated by a stone conservator. Ideally, moisture should be prevented from entering the voids, with a substance that remains flexible and does not expand to push the slate layers further apart. Previously used fillers have proved unsatisfactory. Mortar and adhesives should not be used to reattach peeling stone, as that material inserted between layers will eventually act as a wedge, applying pressure that continues the splitting process. Before filling any delaminations on slate tablets, a careful re-evaluation of all existing methods of treating that condition should be completed.

Until a long term solution is discovered, consideration could be given to installing a noncorroding metal cap [perhaps lead or anodized aluminum] that covers the skyward edge, limiting intrusion of rain and snow into the stone and movement of the stone layers. This is not, unfortunately, a particularly attractive solution. Earlier attempts using such caps in bronze, copper and iron have proved mechanically stable, but the resultant corrosion stains on markers can be permanent and unsightly.

Resetting Single Slab Grave Markers

*Issues*

Upright grave markers are one of the most important visual impressions conveyed to visitors. This gives the appearance that a property is being watched over and cared for. Righting the stones is also one of the least expensive maintenance activities for the value received. Fallen or tilting grave markers should be reset in an upright position. Left in place, a leaning grave marker is more liable to be damaged by lawn mowers. Deterioration may be accelerated because some stones may absorb moisture from the ground or collect rainwater.

A number of grave markers are individual grave markers. Stones tilted 15 degrees or more can break off at ground level due to their own weight. Grave markers will suffer less deterioration if they are upright. All grave markers that are lying on the ground are in danger of damage from mowers, pedestrians and weather. Sunken stones subject their inscriptions to lawn mower scarring. Those that are being overgrown by grass may soon disappear from sight. Displaced stones can rub against other stones and fall over on the ground.

*Recommendations*

All stones that are tilted or toppled should be reset in a secure upright position. They should not however be reset to straighten minor tilts, "correct" orientation, or moved to line them up in straight rows. Markers should not be moved or turned capriciously. Once a stone is moved it no longer serves as a grave marker because it no longer marks a burial site. A marker should also not be reset if the stone appears in fragile condition.

Some excavation needs to occur to reset a gravestone because the use of force to straighten one may cause the stone to snap. Some conservators recommend straightening one piece slate and marble grave markers by digging out the soil from the backside of a stone, if possible. This keeps the soil on one side firm for a strong compacted face against which to reset the stone. After the stone is set on a firm foundation with a cushion of sand, the excavation should be filled with alternating layers of soil with layers of a mixture of sand and crushed stone [1/2 - 3/4" sharp edged gravel], periodically wetting the earth as it is applied. Topsoil and lawn should be replaced at the surface.

Other conservators recommend excavating on all sides of a marker and then surrounding it with compacted sand and peastone. This is particularly beneficial when working in soils that tend to retain moisture.

Generally, 40% of a single slab marker is below ground. Stones with insufficient bases or shaft length should not be reset. They should remain on site temporarily or be removed for storage until a suitable mounting technique is developed. They can temporarily be leaned against the back of another stone, or against an adjacent building or fence until repair is done. This should not be considered a long term solution, because leaning stones are subject to breakage.

Gravestones, even incomplete broken markers, should not be set directly in concrete. This setting method is too rigid and soluble salts in the cement may migrate into a porous stone forming efflorescence and accelerating deterioration. However, markers broken at or below ground level may be reset with a buried concrete foundation provided a soft, high lime content mortar joint separates the marker from the concrete. This method can also be used for marble markers. Dowels should not be used on slate markers because drilling can cause delamination and destroy a stone.

#### Marble Grave Markers

##### *Issues*

Conservation needs are significant in this part of the country. Most of these relatively porous stones have lost surface detail due to acid rain, other pollution damage and general weathering. Others have suffered the negative impacts of vandalism.

##### *Recommendations*

The recutting of markers should never be done. This irreversible alteration of a historic artifact violates all codes of conservatorial ethics. Where surface detail has been diminished or lost, the honing of sugared marble surfaces is also **not** recommended because it results in loss of the information cut into the stone.

Two part markers that have come apart or been poorly reassembled should be reconstructed in their original configuration. Priority in dowel replacement should be given to marble markers that are visibly cracked or spalled, and second to marbles with visible metal stains at the junction between marker and base. Recommending an appropriate method to join two part markers is based on determining what may cause the least damage when the stones are subjected to vandalism and what will resist corrosion when the joint filler fails. Iron rods are clearly not recommended.

Multipart stones that have come apart should be repinned with noncorroding dowels. Ideally these should be set in lead, preferably molten, although lead wool and/or lead wedge strips tapped in place may be acceptable. Lead work should be done by an experienced and skilled tradesman. An epoxy fill is often used by conservators because less time and training is required. The joint between the vertical stone and base stone should be filled with a material matching the original installation such as lead or a high lime mortar. The latter may not be as stable in the long run as lead which has the added benefit of killing mildew and fungus as water or ambient moisture bring some of its ions into solution and washes them down over the stone. No polymeric caulk or sealant should be used.

Repair of broken stones may be done using Akemi or other appropriate adhesives if the break is clean and not worn at the edges. This is particularly appropriate for marble. The adhesive should match the color of the stone, if it will be visible. The use of cement or lime mortar is not recommended for these repairs. Teflon dowels may be used in cases where reinforcement is required.

Mounting truncated stones and fragments requires the development of clips to attach them to "blanks", new stones cut to support fragments. This method is proposed for use if ready made clips can be found or custom clips can be fabricated according to a conservator's specifications.

#### Cleaning Soiled Stones

##### *Issues*

It is difficult to remove even some of the soiling from historic stones safely. Stones with heavy soiling have limited legibility. Airborne particles that settle into the pores and crevices of porous stones are even more difficult to remove.

##### *Recommendations*

General cleaning of all stones is not necessary and less cleaning is generally considered better than over cleaning. Soiled markers should be examined for legibility of inscriptions. If the inscription is fully eroded and the surface has no legible lettering or designs, the stone should be given a lower priority for treatment. No stone should be cleaned if its stability is in question.

Much more care needs to be exercised when cleaning marble compared to granite. Marble markers should be cleaned only if the surfaces are stable and not sugaring. If a grave marker is cleaned, the entire surface should be treated. Otherwise, the stone will look mottled and future soiling or growth will occur differentially and may appear more intense in some areas than others.

Some cleaning may be done using only a very soft, natural bristle brush with distilled water and a properly diluted, very mild non-ionic detergent in solution, safely removing some soiling from grave markers. Sound marble should not be cleaned with any more than regular hose pressure. These simple things can prove dramatically effective against environmental soil.

Never use any acidic compound or household bleach for cleaning. Acid cleaning of marble should be avoided, not only because of the damage it can cause, but also because it tends to leave marble with an orange cast. Ordinary household bleaches should never be used on marble because of discoloration and the long term detrimental effects of destructive salts.

Baking soda blasts for granite should be avoided because it can cause salt build up and general site clean up is difficult.

The removal of stains should be left to professional stone conservators. After the nature of a stain is determined, an appropriate solvent and poultice is typically applied and then covered with plastic for 24 hours. At that point the poultice is removed, the stone is thoroughly rinsed with clean water and checked for a neutral pH balance. Oxalic acid may be used on granite. Clorox, Naval Jelly or Lime Away should not be used on any stone.

### Removing Biological Growths

#### *Issues*

Some lichens and biological growths are acidic in nature or produce acids that can etch the surface or eat into stone, particularly porous stones like marble and limestone, in addition to discoloring them. Some lichen penetrate stone, causing microfractures. Others develop parallel with the stone surface and may be mechanically removed. It is possible that some protect the surface of stone, reducing degradation from weathering.

In general, the larger the population of certain types of growth above the stone surface, the more decay is caused below the surface, and thus the greater the need for removal. On the other hand, more damage is often incurred by removing these growths than the decay caused by them. Removal may be desirable but can result in considerable harm. Careless intervention can make the process of degradation more rapid.

#### *Recommendations*

A stone conservator should determine the type and nature of biological growths and the condition of a stone prior to taking any action. If it is determined that it is a growth that can be removed without causing damage, a conservator may proceed with caution. Biological growths on the surface of markers should be removed **only** if the stone is stable to the touch. Only those older stones which have substantial moss or dark botanical growth should be cleaned.

One approach to removing some surface biological growths is dry brushing with a soft brush during dormant seasons. With great care, soft wood or flexible plastic scrapers may be tested, but care should be taken not to remove any surface grains of a stone, particularly if it is marble or sandstone. Another good conservative approach entails the use of copious wetting and neutral poultices.

It is possible to retard the growth of harmful biological matter on historic markers. Seek the advice of a professional conservator for how that may best be done for any given stone and growth. Always be sure to have supervised testing of any material recommended before working on a whole stone.

After brushing and/or scraping, a biocide solution may be brush applied to retard recolonization and to remove exceedingly stubborn growths. Markers with stable surfaces may be brushed with a biocide solution and then washed gently.

Once every five years is a typical cycle of retreatment, but local conditions of exposure to vegetation, water and shade may suggest more or less frequent application.

## Marble Protection

### *Issues*

Marble components have generally deteriorated much more than the older slate components. Most of the white marble stones have lost surface detail due to acid rain and general weathering. A survey should be undertaken to identify and locate the most endangered marble markers, designating those that still have legible inscriptions for immediate conservation.

### *Recommendations*

A long term plan should include selective conservation. Enough carved detail and lettering must remain legible to make a stone worth conserving. Where there is no legible lettering, conservation or consolidation is not advisable.

Do **not** treat stones with protective coatings that are impermeable to water vapor. These coatings can be very harmful to stones over time and others are ineffective.

Some conservators recommend that significant marble components have a clear protective coating applied to prevent further deterioration. The coating should have a proven track record like "BMC" or "Conservare". These materials have a low risk and can be applied by less experienced personnel. This will last 8 to 10 years before wearing off. Reapplication will be necessary at that time.

While there are conflicting opinions on the matter, some conservators recommend the use of stone consolidants like "Conservare OH Consolidation Treatment". These require more attention and experience during application and need a water resistant top coat for effectiveness. A two coat system is generally recommended with a first coat of "Conservare OH Consolidation Treatment" and a second coat of "Stand-Off Stone, Tile and Masonry Protector" also manufactured by ProSoCo, Inc., Kansas City, Kansas or approved equal. Materials should be applied in strict accordance with the manufacturer's recommendations, after the marble is clean and repointing is complete. This system should be reapplied in 8 to 10 years.

## Structural Elements

### *Issues*

Because this site is located in a northern temperate climate, structural elements are subjected to a wide range of temperatures. This thermal stress requires regular examination and subsequent maintenance of structural elements.

### *Recommendations*

Inspect for cracked mortar, loose or broken stones and other movement annually. Repair at least every 5 years.

### Stone Retaining Walls

Inspect the stone walls and make repairs on a routine, periodic basis. Care should be taken to match the workmanship and materials [replacement stones, mortar] of the original work.

## Masonry Repair and Repointing

Repointing is probably the most common operation practiced in preserving and restoring old masonry structures. Improper repointing with soft mortars has been done on occasion in the past. But repointing that has been done since the introduction of hard cement mortar is more harmful. Poorly done repointing is difficult and expensive to correct. In extreme cases it causes irreparable damage to the physical structure as well as its appearance.

Masonry repairs should be performed by experienced conservation professionals. When choosing the type of mortar to be used in repointing, full consideration must be given to matching the old mortar in color, texture, aggregate, strength and hardness [density and porosity]. The new mortar used in repointing should have the same physical characteristics as the old, only if the old mortar was reasonably appropriate in the first place. It is best to repoint with mortar having the same density and absorbency as the stones in a structure.

Masonry repairs should be performed with a mortar formulation which contains at least equal parts of cement and Type S hydrated lime for repointing. Lime mortars are both more compatible with brick masonry, and more flexible in conditions of thermal and moisture cycling. It is important that mortar used for routine pointing is compatible with the softness or hardness of a brick or stone. With long stretches of unrelieved wall, the mortar should be as soft as possible [for thermal expansion and contraction resiliency] with some hardness for durability. A type N mortar formulated just above the proportions used for type O would provide both of these characteristics. Use a color, aggregate and joint profile to harmonize visually with the adjacent work.

Perimeter walls and retaining walls need routine, periodic maintenance at least once every five years. All joints that have loose mortar should be repointed. All surfaces to be repointed should be properly prepared and cleaned, removing all loose and deteriorated mortar. Joints should be raked out by hand. The depth of chipping and raking should be at least twice the width of the joint to a maximum depth of 1-1/2 inches. Care must be taken to avoid enlarging the width of joints. Mortar should be applied in lifts no greater than 1/2 inch at a time.

Masonry repairs should include repointing of all field stone walls. Where mortar which is deep inside the joints of a wall is soft, remedial work should include consideration of weep holes or other drainage devices. In addition, cavities should be packed with a material such as foam backer rods or the equivalent. Walls should be anchored to the work of adjacent materials where possible. Many walls remain standing despite incredible abuse and neglect simply because they possess some form of tie back.

Masonry repairs should be supervised by experienced professionals. Specific but broad comments relating to this topic are as follows:

- Never use premixed bagged mortar or grout. These materials are too hard. They will not accommodate movement of the masonry and in rare cases they may overstress the stone edge.
- Never point a bulged or leaning wall with hard mortar. This type of quick fix solution accelerates outward movement. Bowing is generally caused by earth pressure and/or mortar washout. Where possible and appropriate, use gravel backfill behind the wall and install weep holes.

- Masonry that has undergone excessive local movements should be rebuilt, not repointed. Do not exceed a joint width of 3/8 inch when rebuilding.
- Whenever possible, carry repointing below grade.
- Do not smear mortar on adjacent surfaces or on the joint being repaired.
- Where possible, tie thin elements together using stainless pins.

On masonry and stone fence or gate posts, the insertion points of horizontal metal fence rails should be repaired with appropriate pockets to receive the metal inside the masonry or stone surfaces.

#### Repointing weathered materials

Weathered stones in an old wall frequently acquire worn edges and rounded profiles. When repointing them it is advisable to recess the face of the new mortar slightly to keep the joint from becoming too wide and avoid spreading mortar over the edges of the stones. When repointing rubble, feather edges should be avoided. They break off easily, carrying particles of stone with them and leaving cavities through which moisture may enter.

The surface of an area that has been repointed or patched should be brushed so that some aggregate is raised before the mortar becomes hard. Alternatively, stippling the joint [marking it by touching it with the end of a stiff brush] before the mortar completely sets helps to give it a worn appearance. This surface texture retains a historic appearance and does not call as much attention to itself as a smooth mortar surface.

#### Sealants

A sealant is a contemporary material that has been used in historic applications to prevent the intrusion of moisture. The use of sealants should be limited because they are not visually compatible with the historic appearance of stone and masonry construction. Sealants also invade adjacent materials, making them extremely difficult to remove without removing some of the adjacent material. In addition, there is some degree of difficulty in controlling joint preparation and installation. Where sealants have been used, they are typically failing. It is preferable to use sealants only at expansion joints. In other locations, such as at a moving crack, they should only be used as a last resort. Caulking and sealing materials should not be used for repointing. Silicone sealants should not be used because of their tendency to absorb soil from soot and atmospheric pollutants. A fine aggregate can be applied to the surface of a sealant during the curing period to make it more closely match adjacent surfaces. Over time however, this aggregate has a tendency to erode away.

Sealant backings must be provided of preformed, compressible, resilient, nonwaxing, nonextruding strips of plastic foam of flexible, open cell polyurethane foam or nongassing, closed cell polyethylene, of a size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

### Concrete Repair

In many instances repair is a preferable option to replacement. Remove damaged concrete [cracked, chipped, spalled, gouged, etc.] to a 2" minimum depth and 2" minimum beyond the damage in all directions. Roughen and prepare finish surfaces to accept new concrete material. In locations where reinforcing can be repaired, clean it to bright metal and prime with a zinc rich primer. In locations where it cannot be repaired but replacement is possible, provide in kind or epoxy coated replacement. Remove reinforcing where it is exposed, corroded and cannot be repaired or replaced. Replace it with vinyl ester resin bars reinforced with fiberglass equal to "Rebar," as manufactured by IMCO Reinforced Plastics, Inc., Moorestown NJ.

Seal all field cut ends in accordance with the manufacturer's recommendations. Keep reinforcing back 1-1/2" from exposed faces.

In areas where concrete is to be repaired, install threaded dowels, vinyl ester resin reinforced with fiberglass equal to "Fibrebolt" as manufactured by IMCO Reinforced Plastics, Inc., Moorestown NJ, at 6" on center and 1-1/2" clear from exposed faces. Apply a bonding agent [equal to Nitobond Epoxy Gel 400C by Fosroc, Inc., Georgetown KY or Sonneborn Sonoprep by Chemrex, Inc., Shakopee MN] prior to placing concrete. Concrete should be air entrained and of the same strength as the concrete being repaired. The concrete should match the profile, finish and color of adjacent concrete.

### Fences and Gates

#### Issues

#### Iron and Chain Link

Although both are relatively durable, they do require periodic inspections and maintenance to extend their useful lives.

#### Recommendations

#### Iron Gates

All metals that are rusting or have failing paint finishes should be cleaned down to bright metal and properly primed and coated to prevent further corrosion.

The preferred method of cleaning and paint removal from historic iron is using low pressure, dry grit blasting on site. It is the most effective, being fast, thorough and economical. The pressure should be less than 100 pounds per square inch using a fine aggregate of iron slag or sand, but not copper slag. The aggregate should not be very sharp or very hard. It is preferable not to use wet sandblasting or flame cleaning. Hand scraping, chipping and wire brushing is not as effective as other methods. Chemical rust and paint removal methods should generally be employed in the shop as opposed to in the field. When employing pressure blasting, comply with local building codes and environmental authorities, and take every precaution to protect adjacent materials, including plant materials.

Bare surfaces should be painted within 48 hours of proper cleaning. The preferred paint system for cast iron includes a two part epoxy primer and an aliphatic or acrylic polyurethane finish coat. An acceptable, but less durable, less expensive alternate for non corrosive environments includes an application of a passivating material, such as a high zinc dust content [90% zinc content minimum] primer, then a red oxide alkyd metal primer and alkyd enamel finish. Concealed surfaces should be thoroughly prime coated prior to concealment. Shades of green, brown or black may be appropriate historic colors.

If spray operations are used, extreme caution should be exercised to prevent overspray from coming into contact with persons, motor vehicles, trees, surrounding buildings and other objects [particularly historic artifacts like gravestones] not intended for treatment.

Paint as often as required to maintain good condition and appearance, but not less than once each ten years. When coatings fail, metals corrode. Paint coatings should be monitored annually for peeling and failure.

In the design, fabrication and installation of gates, allowances should be made for the thermal movement that results from changes in ambient temperature to prevent buckling, opening up of joints, overstressing of components or connections and other detrimental effects. Slip joints should be provided between embedded elements and connecting rails for lateral movement. Slip joints should consist of slotted holes and Teflon washers.

Galvanic action and other forms of corrosion should be prevented by insulating metals and other materials from direct contact with incompatible materials. Although the corrosion or oxidation of aluminum is far less destructive to stone than iron's "rust jacking," it is nevertheless unsightly. Aluminum replacement parts should not be used in cast iron or steel gates.

Where metal gate posts are inserted into masonry or concrete, there should be no pockets to collect moisture. The preferred joint material in these locations is molten lead or a lime-sand mortar. Sealant will shrink and embrittle over time. The use of joint sealants within metal fabrications is appropriate to prevent moisture from collecting in metal to metal joints. Sealants for this use should be a premium grade polyurethane based elastomeric sealant conforming to ASTM C920, Type S, Grade NS, Class 25 equal to Sikaflex-1a as manufactured by the Sika Corporation, Lyndhurst NJ of a color to match the paint finish.

#### Chain Link Fences

Inspect fences once per season and clean as needed. Repairs should be made immediately upon discovery of need or notification. Replace and/or repair missing and bent components. Prepare and paint rusted sections. Support posts should be inspected at least once a year for stability to insure structural support. Replace those that are weak or structurally unsound. Repair damaged fabric as soon as possible.

#### Site Amenities

##### *Issues*

These are the elements that invite the public to use the cemetery. They also provide the conveniences that much of the public has come to expect. They should be kept in a condition that sustains that sense of invitation.

##### *Recommendations*

Signs: Signs should be kept clean and legible. Text on all signs should be reviewed at least once every 5 years to insure that it is current.

Trash Receptacles: Inspect at least 3 times a year including all connections. Repairs should be made immediately upon discovery of need or notification. Paint metal components once a year.

Benches should be inspected weekly with immediate repairs if needed. Paint benches once a year.

#### Utilities

##### *Issues*

Maintenance of recommended utility systems will be essential for the rehabilitation of the cemetery.

##### *Recommendations*

Water Supply: Inspect all working parts and plumbing for leaks or faulty operation at least annually and repair at once. Drain each fall to prevent damage from frost and turn on each spring.

#### Vandalism

##### *Issues*

Vandalism tends to be more of a problem in older inactive sites without adequate security measures and where visibility is difficult. The impacts of vandalism include toppled grave markers, vandalized tombs with doors removed, painted graffiti and broken glass. The latter is usually found at the rear of a site, away from public streets. Evidence of recent vandalism appears to be minimal at Walnut Hills Cemetery.

##### *Recommendations*

Efforts should continue to avoid the misuse of this sacred ground and remove any evidence of vandalism. A stone conservator should be consulted to determine the gentlest effective means to remove graffiti from grave markers.

Should the level of vandalism increase, consideration should be given to locking the gates when the site is not open to visitors. Vandalism and other problems should be reported promptly to cemetery staff. The Police Department should be notified immediately if an act of vandalism or other delinquency is in progress.

**LANDSCAPE MAINTENANCE  
TIME REQUIREMENTS**

The current cemetery staff consists of 4 people: a supervisor, laborer, grounds laborer and small equipment operator. Responsibilities include: burials, processions, enforcement of rules and regulations, mowing, trimming, pruning, litter removal, and leaf and snow removal. The leaf removal effort is supplemented by other town forces [4 people over 10 days last year]. Cemetery staff assists with snow removal in other areas of town. Overall, these work efforts balance out departmentally. The Department of Public Works is responsible for road repairs in the cemetery.

The chart at the right includes an estimate to the time required for various landscape maintenance tasks. Items not shown include: burials, processions, tree, shrub and ground cover work, storm drain inspection and cleaning, building maintenance, general inspection and repair of grave markers, signs and fences, as well as other miscellaneous items like enforcement of rules and regulations, and travel time.

**STAFF RECOMMENDATIONS**

Landscape maintenance for this and the other town cemetery is provided by the current cemetery staff. The time requirements shown here are only for Walnut Hills Cemetery and does not take into account the many other responsibilities of department staff.

Based upon experiences at other cemeteries, and the density of obstacles at Walnut Hills Cemetery, it is projected that it should take approximately 8,255 manhours per year for a thorough job of mowing, weed whipping and clean up. More than 90% of the landscape maintenance requirements occur within an 8 month time frame between April and November.

LANDSCAPE MAINTENANCE TIME REQUIREMENTS				
Area and Operation	Average Frequency per Year	Minutes per 1000 SF	Area in SF	Man Hours per Year
<b>Lawns</b>				
Mowing	24	9	815,000	2,934
Weed Whipping	24	9	815,000	2,934
Raking	2	30	815,000	815
Fertilizing	2	15	815,000	407
Weed Control	2	10	815,000	271
Disease Control	1	10	815,000	135
Aeration	1	15	815,000	203
Seed Bare Areas	1	30	100,000	50
<b>Drives</b>				
Sweep/Vacuum	3	4	180,000	36
Remove Snow	10	12	180,000	360
<b>Litter</b>				
Empty trash receptacles	104	20	-	35
Litter pick up	39	0.1	1,160,000	<u>75</u>
<b>Total Time requirements per year</b>				<b>8,255</b>
The above estimate assumes implementation of the master plan recommendations.				

Using 1,840 working hours annually per staff person, which allows for holidays, vacations and sick leave, the above landscape maintenance time requirements indicates that Walnut Hills Cemetery would benefit most with 4 full time staff positions dedicated to maintaining the cemetery exclusively and an additional seasonal position during the 8 month busy season. Given that the staff is also responsible for care of Walnut Street Cemetery, another seasonal staff position appears warranted.

Maintaining a continuity of maintenance staff with a commitment to the preservation of a historic place is critical. It is also beneficial that this specialized knowledge becomes transferred to new staff members over time. The issues of continuity and transfer of specialized knowledge make the value of full time positions much more significant to the Town than seasonal positions.

Each landscape character has its own requirements and potential hazards that maintenance personnel and budgeting or funding entities must be aware of. There needs to be maintenance standards and an interest in upgrading training beyond a basic level.

**CEMETERY RULES AND REGULATIONS**

Update and consolidate cemetery rules and regulations.

There is no current training other than on the job training. There needs to be maintenance standards and an interest in upgrading training beyond a basic level. Staff for the full time positions should have a background in grounds maintenance.

Tree work is currently performed by the Town tree crew. They should be made aware of concern about historic artifacts on the ground below trees. Maintenance practices should continue to include the use of weed whips to reduce chipping and scratching damage on grave markers and not use side collecting lawn mowers. Power mowers should be equipped with rubber bumpers as well as blade guards to prevent stones and sticks from being thrown by them and causing damage to grave markers.

Periodic help for tree pruning and volunteer growth removal at Walnut Hills Cemetery from Town personnel and outside vendors will continue to be required. The long range reality is that trees require continual, recurring work. Each tree needs to be examined and pruned at least once every five years. With the exception of seasonal positions, unskilled labor for this work is not desirable.

*While the procedures outlined in these guidelines are accepted practices in the field of conservation, the authors do not assume any responsibility for the preservation, conservation or restoration work of readers of this publication.*

*Detail of Henry Hobson Richardson  
slate grave marker, 2003*



## DEFINITIONS

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**Columbarium:** A vault or structure with niches for the storage of urns containing ashes of the dead.

**Cremains:** Ashes of the cremated.

**Cremation Area:** An area where ashes of the cremated are scattered or contained.

**Crypt:** An underground vault or chamber, especially beneath a church that is used as a burial place. An enclosure for a casket in a mausoleum or underground chamber.

**Flush Marker:** A flat, rectangular grave marker set flush with the lawn or surface of the ground.

**Grave:** A place or receptacle for burial.

**Grave Marker:** A sign or marker of a burial place, usually variously inscribed and decorated in commemoration of the dead.

**Headstone:** An upright stone marker placed at the head of the deceased, usually inscribed with demographic information, epitaphs, or both, sometimes decorated with a carved motif.

**Inter:** To place in a grave, bury.

**Interment:** The act or ritual of interring. The act of committing the dead to a grave.

**Inurn:** To put or seal in an urn as the ashes of the dead. To bury or entomb.

**Inurnment:** The act or ritual of inuring.

**Mausoleum:** A large and stately tomb or building housing such a tomb or tombs. A monumental building or structure for burial of the dead above ground. A "community" mausoleum is one that accommodates a great number of burials.

**Monument:** A structure or substantial grave marker erected as a memorial at a place of burial.

**Sepulcher:** A burial vault or crypt.

**Tomb:** A vault or chamber serving as a repository for the dead.

**Urn:** A receptacle for cremation remains or ashes.

**Vault:** A burial chamber, especially when underground. A room or space with arched walls and ceiling, especially when underground.

*Rock outcrop with ferns, 2003*



## SELECTED CHRONOLOGY

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- |      |   |      |   |      |  |
|------|---|------|---|------|--|
| 1705 | Brookline established as a separate township from Boston.   | 1873 | A new committee is appointed to take action regarding the purchase of land for a cemetery.  | 1875 | Newly appointed Trustees hold their first meeting in April. Rules and regulations are established. Changes in aspects of the plan result in a second plan for Walnut Hills Cemetery prepared by Bowditch and Copeland. Lots are staked and legibly numbered. A receiving tomb is completed. Cemetery opens and the sale of lots begins in October. |
| 1706 | Town seeks land suitable for a cemetery.  | 1874 | After previously concurring with the findings of the previous committee, the new committee recommends purchase of about 30 acres of land on Grove Street formerly belonging to Willard A. Humphrey. In May the Selectmen authorize the purchase for new town cemetery. Initial plan for Walnut Hills Cemetery prepared by Bowditch and Copeland. Thomas S. Pettengill appointed Superintendent. | 1876 | Fence and gateway in front on Grove Street completed as well as several avenues and paths. Ground prepared for a small nursery. Culvert on Walley Avenue enlarged.   |
| 1717 | Land for Walnut Street Cemetery purchased.  |      |   |      |  |
| 1840 | Walnut Street Cemetery refurbished and expanded with acquisition of 3/4 acre.   |      |   |      |  |
| 1872 | Town advertises for land suitable for a new cemetery. In January a committee reports that two properties were offered. In March the committee recommends the purchase of 21 acres from William H. Cowan. In April the committee is discharged |      |   |      |  |

- A MASTER PLAN FOR WALNUT HILLS CEMETERY -

1877	Pierce, Downing and Spruce as well as large parts of Chapel and Cypress Avenues, and Daphne, Tangier and Rock Maple Paths completed. A good and substantial fence is erected around grounds that had not been fenced before. Lots, including Soldier's Lot on Spruce Avenue prepared by trenching, grading and sowing with grass.	1888	Avenue construction.	1897	Walk of gravel and ashes provided from Cottage side door to street. New paths and tree trimming including removal of young trees in woodland undergrowth to prevent injury to permanent trees.
1880	Lots trenched and graded. Avenues finished and graded. Sale of wood and grass for income.	1889	Avenue construction. Walnut Hill Avenue and Mount Walley Avenue repaired and resurfaced with gravel.	1899	Trustees receive appropriation of \$2,000 for improvements because income from the sale of lots is only sufficient to meet the ordinary running expenses of the cemetery. Funds are used for the trenching of single graves. The price of lots is raised.
1881	Superintendent of Cemeteries Pettengill, who has been in charge since the opening of Walnut Hills dies. George Craft appointed.	1890	Walks graded and underground drain installed.	1891	Cottage of moderate cost erected in cemetery for superintendent so he could always be accessible to those wishing to visit the cemetery for examination or inquiry. Cottage designed by architects Longfellow, Alden and Harlow. Walks graded.
1882	Work on Rock Avenue and Rock Maple Path completed as well as some on Pierce Avenue and Occidental Path. Construction of new highway by the side of the cemetery leads to an exchange of gravel for loam to be used in the cemetery.	1892	Walks and avenues graded, repaired and graveled. Olmsted firm begins design of Arthur W. Blake, Esq. lot.	1900	The receiving tomb is noted in poor condition. The small shed is noted as an insufficient accommodation for the horse and vehicles. The location of the shed is preferred as a new location for the receiving tomb. The Trustees receive an appropriation of \$10,500. A stable ["a pretty structure fronting on Grove Street"], shed and yard enclosed by a substantial wood fence are completed from plans by Guy Lowell, Architect. A new receiving tomb is started but not completed because of difficulty finding slate of appropriate quality and color. A. W. Longfellow is architect and Johnson Brothers of Brookline is the Contractor.
1883	300' of Trinity Path completed.	1893	Walks and avenues graded, repaired and graveled.	1894	New shed [10' x 33'] erected for storage of vehicles and tools.
1885	Culvert on Walnut Hill Avenue relaid. Trees pruned. Decision to construct pond in Walnut Hills Cemetery deferred to some future date.	1895	Myron D. Fisher, Superintendent. Additions and alterations to superintendents house. Additional shed built at stable.	1901	The new receiving tomb is completed and the old one is removed. A new avenue is provided as an exit for carriages from the tomb to Grove Street. In November care of Walnut Street Cemetery is placed in the hands of the Trustees. The Superintendent takes responsibility for cemetery matters and the Park Department maintains the grounds.
1886	Walnut Hills Cemetery places limitations on the size and design of new monuments. H. H. Richardson buried at Walnut Hills Cemetery.	1896	Walnut Hills Avenue repaired. Good material under the drive is used for fill at lots. Ash and cinder walk provided to stable. Tree trimming, repairing sunken graves, lawn mowing and fertilizing are normal activities. Average of 7 men employed in the cemetery.		
1886	Avenue construction.				
1887	Avenue construction. Third article of rules and regulations amended.				

- A MASTER PLAN FOR WALNUT HILLS CEMETERY -

1902	New fencing at the Cottage and repair of the old fence around the cemetery is noted as desirable.	1913	Stone wall extended along Allandale Road. An appropriation of \$1,500 is requested for the 230' left to complete to work. All responsibility for the care of Walnut Street Cemetery is placed with the Superintendent.	1923	More vegetative work is done repairing the ice storm damage. Trees are trimmed in the woodland of the former Weld property and sprout growth is grubbed. 351' of 6' high chain link fence erected. A swamp through which the fence passes is filled with rocks. It is desired to fence to the street and along the street to the stable enclosure fence.
1903	Stone steps and path between Walnut Hills and Bow Avenues installed. The fence around the cemetery is noted as being 30 years old and in shaky condition.	1917	Trustees request acquisition of 50,000 square feet of land from the A. D. Weld estate to help resolve some layout issues. The old fence on the back boundaries is noted as so dilapidated that it is not worth repairing. Grading and developing the area designed for single graves is completed.	1924	New chain link fence work is completed.
1904	Perimeter fence work still needed.			1925	Repairs to superintendents house. 1,000' of chain link fence painted.
1905	The wood gateway entrance to the cemetery is noted as badly decayed and the further repairs are ill advised. Stone posts and iron gates with a permanent character, simple in design, are desired. Entry walls and gateway are completed later that year.	1918	Walnut Hills Cemetery enlarged with acquisition of approximately 1.1 acres. 497' of 6' high chain link fence erected.	1926	Walnut Hills Cemetery enlarged with acquisition of two parcels, 14.58 acres. Widening of Grove Street in progress. Trustees note that cemetery drives were not built for the vehicles of the day and needed much resurfacing and subgrading.
1906	A permanent wall or fence is desired for the cemetery grounds.	1919	594' of 6' high chain link fence erected.	1927	Charles Sprague Sargent [cemetery trustee for 52 years] and Guy Lowell buried at Walnut Hills Cemetery. Resurfacing of drives.
1907	A stone wall on the street boundary similar in character to the wall at the entry gate is desired.	1920	481' of 6' high chain link fence erected. John Charles Olmsted buried at Walnut Hills Cemetery.	1928	Resurfacing of drives. Landscape Architect Franklin Brett retained to study the newly acquired land for development.
1909	Rules and regulations, and bylaws related to Walnut Hills Cemetery are amended. The 1907 request is reiterated.	1921	Ice storm in November causes serious damage to trees and shrubs. The southeasterly line of the perimeter fence is complete. It is desired to proceed with the southwesterly line.	1929	Resurfacing of drives. Grove Street wall constructed. Trees receive more attention than usual. Chain link fence painted.
1910	592' of stone wall built on Allandale Road and a 250' section of concrete foundation prepared. An appropriation of \$5,000 is requested for another 500' of stone wall on Allandale Road and Grove Street.	1922	25 trees removed. 500' of new fencing installed. An additional section for burial purposes is being developed.	1930	Resurfacing of drives. Posts and wall adjoining main entry rebuilt. Gate repaired. Water Department installs water pipe with lateral extensions and 2 hydrants.
1912	New wall on Grove Street deferred until the lines of the street are definitely determined. An appropriation of \$1,000 is requested to extend the stone wall on Allandale Road.				

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|------|--|------|---|------|---|
| 1931 | Resurfacing of drives including Pierce Avenue noted as a second main avenue leading into the cemetery. Cottage reshingled.   | 1938 | A appropriation is made for a road to the new garage and for fences on the new line of Grove Street and around the service yard. Many old trees are destroyed during the 21 September hurricane. Trustees obtain a \$10,000 WPA grant to remove damaged trees and restore the grounds and nearly complete the work. New drives laid out and trees and stumps are removed in the section purchased in 1926. Some drainage is installed. It is noted that trees falling from the hurricane practically ruined the entire perimeter fence. It is also noted that it is desirable to continue macadamizing the drives, an activity that was discontinued several years ago. | 1942 | New lawnmower that cuts a 60" swath purchased.  |
| 1932 | Resurfacing of drives. Regrading near Pierce Avenue. Updated rules and regulations adopted. Tree planting planned next year.   | 1939 | All hurricane damage is repaired. The single graves section is complete and the family lots sections is about 80% complete. Resurfacing of drives resumes with 1,045 square yards at 3.5" thick and 1,807 square yards at 6" thick as well as some drainage work. 1,045' of chain link fence [salvaged wire and new posts] and 80' of new fence is installed. At the new entrance from Allandale Road, 3 new stone piers are built.   | 1946 | Trustees request appropriation of \$35,000 per year for 5 years to grade the land acquired in 1926. It is planned to remove as little ledge as possible and fill with earth.  |
| 1933 | Regrading near Pierce Avenue. Welfare and Civil Works Administration men open up new roadways, cut and burn brush and undergrowth in newer section and paint boundary fences.  | 1940 | 150 trees are planted to replace hurricane losses. Resurfacing of drives continues with 2,180 square yards of macadam installed as well as drainage work. 150' of new fence posts and salvaged wire is installed.   | 1947 | Drainage improvements and grading begins in the land acquired in 1926.  |
| 1934 | ERA men clear brush in newer section, and trench and grade an area in the southwest part near the old single grave section. Prices for burial lots raised.   | 1941 | Resurfacing of drives and laying of drains is completed. Area for family lots is completed.   | 1949 | After years of deferrals due to war restrictions, resurfacing of drives resumes with the installation of 840 square yards of bituminous mix. Forestry Department prunes dead limbs from 1/2 of the trees in the cemetery. |
| 1935 | Myron Fisher resigns as superintendent and son Herbert B. Fisher is appointed. Purchase of power lawn mower and truck with plow attachment.  | 1950 |   | 1951 | Drives in the south end of the section purchased in 1926 are paved with bituminous concrete. Other drives in the area are seal coated.  |
| 1936 | Large trees infested with canker worms are sprayed. 1/3 of section for single grave lots trenched, graded and loamed.  | 1953 |   | 1954 | Oil burner installed at Cottage and Office. Oil space heater installed at Service Building. 300 shade trees lost during 2 hurricanes and removed with the help of a new chain saw. 2 rotary power mowers acquired.        |
| 1937 | The plot for the Veteran's of All Wars is trenched, filled and graded. 1/3 of the section designated for single grave lots is seeded and ready for sale. Resurfacing of drives that began in 1927 continues. Tree pruning. It is noted that the chain link fence on the south and west sides is not in good condition and that the fence line should be moved to incorporate the land added to the cemetery in 1926. Olmsted firm begins design of Prouty-Oakes lot. |      |   |      |   |

- A MASTER PLAN FOR WALNUT HILLS CEMETERY -

1955	6' high chain link fence installed at the boundary of the newly developed area of the cemetery. Station wagon and dump truck acquired.	1967	2/3 of drives seal coated. 2.5 ton dump truck acquired replacing 1954 model.	1988	Several trees donated by the Country Club planted at entrance. Survey of dangerous trees begins. Those in poor condition removed. Funds from Office of Veterans Services used to complete historic stone marker preservation project. New survey for stone markers underway. Articulated backhoe acquired.
1956	Office added to Cottage. Space added to garage to house truck with wider plow. Four 16" rotary mowers acquired.	1968	7 hp snow thrower and tractor with 42" rotary mower and 48" dozer blade acquired.		
1959	72" power mower and new lowering device acquired. Carl Untersee, superintendent of cemeteries.	1969	Remaining drives seal coated. 7 hp leaf blower acquired.	1989	Ornamental trees, spring bulbs and annuals planted. Cemetery rules, regulations and fee structure revised.
1960	Trustees forward proposal to develop 44,000 square feet of wooded land in southeast part of cemetery.	1970	72" power mower acquired replacing 1958 model. Tractor with backhoe, snow and dirt loader acquired.	1990	Wall at Allandale Road inspected and small sections repointed. Radcliffe student Jan Childs begins development of long range landscape program for cemetery.
1961	Trustees again forward proposal to develop the southeast portion of the cemetery. Forestry Department prunes trees.	1982	CETA youths help with cemetery maintenance during the summer.		
1962	Trustees request no action on the proposal to develop the southeast portion of the cemetery. 350 lf of wall along Grove Street and 1,800 lf of wall along Allandale Road are reconstructed, pointed and capped for a cost of \$1,672. New snow plow is acquired replacing the 1955 model.	1983	Cemetery crew assists other DPW divisions with snow removal and special park maintenance projects. Crews from other DPW divisions assist with street sweeping, leaf raking and general grounds maintenance in the cemetery.	1991	First phase of landscape program identifies locations for new trees and shrubs. Small flowering trees and perennials planted. Desire expressed to improved aging water supply system. Wide area rotary mowing riding tractor acquired.
1963	Repaired damage to lawns and shrubs caused by severe winter. 6 hp snow thrower and 4 hp leaf blower acquired.	1985	Walnut Hills Cemetery listed on National and State Registers of Historic Places. 4 trees downed during hurricane Gloria. Lawns receive applications of lime, fertilizer and seed. New cab crew dump truck and 52" rotary mowers acquired. John Johnson, superintendent of cemeteries.	1992	First phase of landscape improvements implemented with removal of old trees an entrance and planting of 8 Flowering Cherries. Low land adjacent to Pierce and Walnut Hills Avenues regraded and seeded. December storm damages trees. Cottage and Office roof and interior walls renovated in Brookline High School student training program.
1964	256' of 6' high chain link fence erected and damage to existing fence repaired.	1987	Increased maintenance program improves appearance of cemetery. Flowering shrubs and bulbs planted. DAR provides funds for planting flowering trees. Repair work on Allandale Road wall begins.	1993	Plans made to repair fence at south boundary. Superintendent John Johnson dies.
1965	76" power mower acquired.				
1966	Repaired damage to lawns caused by 2 year drought.				

- 1995 Older diseased trees removed and dead wood pruned. Hemlocks sprayed for Woolly Adelgid. Sections of drives repaired and resurfaced. Street signs installed. Water supply system in cemetery overhauled replacing old galvanized steel pipe with PVC pipe. Water service to garage replaced.
- 1996 New planting added to main entrance by landscape designer Jan Childs. Sections of drives repaired. Replacement of water pipes continues. Bylaws revised. Continue search for additional burial locations including a proper place for a columbarium.
- 1998 Fertilizer, lime and aeration program implemented. Trees pruned by Forestry division. Drives patched.
- 2000 New guidelines to enhance beauty and decorum of cemetery approved. Cemetery fees adjusted. Hemlocks treated for Woolly Adelgid with dormant oil. Water lines placed.
- 2001 Sign kiosk installed. Maintenance barn restored.
- 2003 Fran Thomas appointed Superintendent.



Detail of Puddingstone

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**SELECTED DRAWINGS**

- Bowditch, Ernest W., and Franklin Copeland, Map of Walnut Hills Cemetery, 1874. [BPL]
- Bowditch, Ernest W., and Franklin Copeland, Map of Walnut Hills Cemetery, 1875. [BPL]
- F. L. Olmsted Co., Survey [Arthur W. Blake, Esq.], 1" = 10', pencil and ink on paper enlarged from survey of 1 June 1892], 14 September 1892. [O]
- F. L. Olmsted Co., Planting Plan for Cemetery Lot [Arthur W. Blake, Esq.], 1" = 10', pencil on trace [approved JCO], 14 December 1892. [O]
- F. L. Olmsted Co., Planting Plan for Cemetery Lot [Arthur W. Blake, Esq.], 1" = 10', ink on linen, 3 January 1893. [O]
- F. L. Olmsted Co., Planting Plan for Cemetery Lot [Arthur W. Blake, Esq.], 1" = 10', pencil on print [notes on current conditions], 19 April 1899. [O]
- Franklin Brett, Plan of an Addition to Walnut Hills Cemetery [one plan for each addition], 1" = 30', September 1928. [DPW]
- Olmsted Brothers, Topographic Plan of Burial Lots [Louis I. Prouty - Francis J. Oakes, Jr.], 1/4" = 1', ink on linen, 22 December 1937. [O]
- Olmsted Brothers, Sketch for Prouty-Oakes Burial Lot, pencil on paper, undated [assumed 1938]. [O]
- Olmsted Brothers, Study for Development [Prouty - Oakes], 1/4" = 1', pencil on linen, 10 March 1938, revised 12 May 1938. [O]
- Olmsted Brothers, Plan for Replanting [Prouty Oakes], 1/4" = 1', pencil on trace, 21 September 1950. [O]

Source Abbreviations for Drawings:

- [BPL]: Brookline Public Library, Brookline MA
- [DPW]: Brookline Department of Public Works, Brookline MA
- [O]: Frederick Law Olmsted National Historic Site, Brookline MA [studies with pencil on trace not included]