CAMBRIDGE CEMETERY MASTER PLAN

MAY 31, 2024

CAMBRIDGE, MA

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Cambridge, Massachusetts

Prepared for

City of Cambridge,
Department of Public Works

Prepared by

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ACKNOWLEDGMENTS

The Cambridge Cemetery Master Plan was completed with contributions from the following individuals.

Cambridge Cemetery Advisory Committee

Henrietta Davis

Henrietta Davis is the former mayor of Cambridge and was a long-time city councilor. In January 2014, she retired from elective office after serving on the City Council for 18 years, ending her service in the position of mayor. As mayor, she focused her efforts on climate action, family and children's health, and pedestrian and bicycle safety. After serving as mayor, she was a member of the Cambridge Net Zero Task Force. In addition, she served on the board of MCAN (the Mass Climate Action Network), and the board of USGBC-MA (the green building council). She was also on the board of the Institute for Market Transformation, a national organization promoting energy efficiency in buildings. Henrietta attended the Paris Climate Talks and became more convinced than ever that it's up to cities and states to take action!

Karim Elrazzaz

Karim is a Community Program Manager at Islamic Society of Boston (ISB), where he develops and implements educational programs, civic engagement projects, and outreach strategies that foster diversity, inclusion, and belonging.

Sophia Emperador

Sophia is trained as a landscape architect and her work focuses on the importance of landscape in the urban environment. She is familiar with a wide breadth of landscape-oriented topics ranging from issues concerning urban ecology, hazard mitigation, climate change adaptation, and urban planning to creating designs with native species. Her design background has brought an understanding to the advisory committee of the multiple complexities that arise when planning layout and operation improvements at the Cemetery.

Robert J. Hutchins

Robert is the owner of the Rogers Funeral Home in Cambridge, as well as a member of the Massachusetts Funeral Directors Association, National Funeral Directors Association and Order of the Golden Rule. He has had many dealings with the Cambridge Cemetery and regularly attends seminars and trade shows to stay current with funeral industry changes.

Pastor Dr. Paul Kim

Pastor Paul Kim, along with his wife, founded Berkland Baptist Church in 1981. He is a leader in the Southern Baptist Convention, and an Asian-American Relations Consultant to the Southern Baptist Convention Executive Committee. He continues to serve as Pastor Emeritus at Antioch Baptist Church.

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Reverend Thomas St Louis is senior pastor and founder of New Covenant Church of Cambridge, a Haitian church located in Waltham. He is a former executive member of the Cambridge Peace Committee, a paralegal, and a trained mediator.

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Michael is the Clerk of Courts in Middlesex Superior Court, and has served two terms as mayor of Cambridge. He manages the day-to-day operations of 17 full-time courtrooms and the duties of over 60 employees. He also presides over the arraignments and pretrial procedures of all criminal cases that have commenced in the grand jury of Middlesex County.

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CAMBRIDGE CEMETERY MASTER PLAN

Table of Contents

Part One:
EXECUTIVE SUMMARY

1.1 | Purpose and Goals 2

1.2 | Planning Process 4

1.3 | Summary of Recommendations 6

Part Two:
SITE CONTEXT, HISTORY AND EXISTING CONDITIONS

2.1 | Context and Notable Features 22

2.2 | Historic Development 26

2.3 | Geology and Topography 34

2.4 | Trees and Landscape 40

2.5 | Burial Services and Status 46

Part Three:
DEVELOPMENT RECOMMENDATIONS

3.1 | Overall Development Recommendations 52

3.2 | Road Closures and Infill 54

3.3 | Road Narrowing 60

3.4 | Cremation Gardens 68

3.5 | Columbaria and Memorial Walls 76

3.6 | Other Development Considerations 84

Part Four:
CULTURAL LANDSCAPE RECOMMENDATIONS

4.1 | Landscape Character Improvements 92

4.2 | Elevating the Cultural Profile 98

4.3 | Facilities Improvements 102

4.4 | Utility Infrastructure Improvements 108

Part Five:
IMPLEMENTATION

5.1 | Implementation Plan 112

5.2 | Opinion of Probable Cost 122

REFERENCES 125

Part One:
EXECUTIVE SUMMARY

1.1 | PURPOSE AND GOALS

A Critical Community Asset

Cambridge Cemetery, the City of Cambridge only active municipal cemetery, is nearing 170 years of existence. Established in 1854 on a bluff overlooking the Charles River, from its beginnings it was a cemetery for citizens of all walks of life and socio-economic status. Originally designed as a Rural Cemetery and later expanded with Lawn Cemetery sections, its beautiful tree-shaded grounds are a testament to the city's growth and prosperity, as well as the changing burial ideals and preferences over time.

Today the Cemetery is nearing the end of its finite land resources for conventional burials. After several past expansions, the Cemetery's current 66 acres were completely built out by the early 2000s. Since then multiple road conversions and infill have prolonged the ability to offer conventional burials, however, the space for new lots is dwindling. Despite its admirable historic landscape, Cambridge Cemetery is not well known as a place to visit - even as the neighboring Mt. Auburn Cemetery successfully attracts many visitors that come to appreciate its beauty.

In this context, the City of Cambridge engaged the HDR / Halvorson consultant team to study and recommend ways to prolong the Cemetery's active operations, while also positioning it as a landscape and cultural resource with a wider community appeal. The resulting Master Plan was an outcome of a collaboration between the City's Department of Public Works and Cemetery staff, the City's Advisory Committee, and the planning consultants.

Master Plan Goals

The vision for Cambridge Cemetery as it approaches 170 years of existence is to continue its primary role as a municipal cemetery, while at the same time preserving, enhancing, and promoting its cultural and natural assets. This Master Plan aims to enable the Cemetery to fulfill the following goals for several decades into the future:

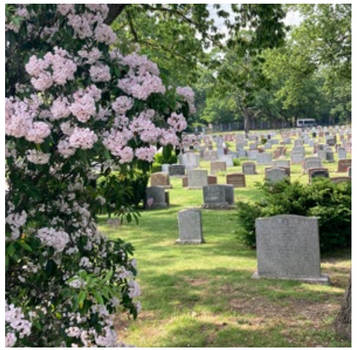
- Continue to provide cemetery services for City of Cambridge residents of all faiths and walks of life.
- Elevate its cultural profile as a resource to interpret our past.
- Enhance the quality of its landscape as an open space asset.

This Master Plan is intended to be an instrument that guides development decisions and public investments towards achieving the stated goals.

A Turning Point

The best path forward for Cambridge Cemetery is to focus on high-quality cremated burial options while also becoming a better-known open space and cultural resource. In the context of lack of space for new full-body lots, the space-efficient cremated remains options can prolong the Cemetery's active span, while traditional burials continue in a limited fashion and in already purchased lots. The preservation, enhancement, and popularization of Cambridge Cemetery's commendable historic and landscape assets can help make it known to wider community, not just as a cemetery but as a valuable cultural and landscape destination.

MASTER PLAN GUIDING PRINCIPLES



PROLONG THE ACTIVE CEMETERY FUNCTION

- Develop and sell new full-body lots in select limited areas. Continue second full-body burials in already sold lots.
- Continue providing burials for veterans in established sections.
- Develop multiple options for cremated remains and provide incentives for people to choose them.
- Support economically viable rehabilitation of the Receiving Tomb and Chapel for columbarium or other visitor-oriented uses.
- Consolidate the service functions in the current Materials Yard area.

RECOGNIZE THE CULTURAL VALUE OF CAMBRIDGE CEMETERY

- Preserve the historic buildings and site features via public funding and private support for historic preservation.
- Beautify and enhance accessibility in arrival areas.
- Publicize the history, beauty, and other information about the Cemetery.
- Facilitate public engagement and educational opportunities.
- Improve the visitor site experience and wayfinding.
- Increase public availability and ease of access to burial information.

MAINTAIN THE GROUNDS AS AN OPEN SPACE RESOURCE

- Preserve the landscape integrity by balancing development with landscape preservation.
- Maintain and enhance the tree population via systematic management. Obtain Arboretum accreditation to promote its value.
- Enhance the landscape's ornamental value for visitor enjoyment and habitat value for pollinators, migratory birds, and other desirable wildlife.
- Allow passive recreation activities that are compatible with respectful visitation.
- Enhance pedestrian connectivity with Mount Auburn Cemetery and Greenough Boulevard.

1.2 | PLANNING PROCESS

WORK ORGANIZATION

The planning process was organized in four phases:

- **Phase 1: Inventory and Analysis** included information gathering, research on the cemetery's history, and preparation of analysis maps to help identify various issues and opportunities to be addressed in the Master Plan. For the site base map we utilized GIS data obtained from the City of Cambridge, which was refined with on-site observations and City input. In this phase we also developed the draft goals and guiding principles of the Master Plan.
- **Phase 2: Schematic Design** was delayed by the Covid-19 pandemic. Upon restart, we revisited the Master Plan goals and guiding principles with the newly formed Cambridge Cemetery Advisory Committee, and developed a series of site specific design solutions for burial opportunities and landscape improvements.
- **Phase 3: Draft Master Plan** included refinement of the preferred schematic designs, along with a yield estimate. Cultural and landscape improvements recommendations were also developed. The Draft Master Plan was presented to the Cambridge Historic Commission in an informal meeting.
- **Phase 4: Final Master Plan** included compiling the materials from the prior phases into a written report, as well as implementation scenarios and an opinion of probable construction cost for select higher-priority projects.

Collaboration with City Staff

The Cambridge Cemetery administration is part of the City's Department of Public Works (DPW). During the planning process the Consultant team collaborated with the DPW and Cemetery staff, sharing a wealth of information and discussing ideas on development priorities and other improvements.

Additionally we met with the City Arborist to discuss issues related to the Cemetery's trees; and with the Cambridge Historic Commission Executive Director to gain feedback on the Draft Master Plan.

Public Engagement

The City formed the Cambridge Cemetery Advisory Committee in March 2023, inviting a group of Cambridge residents with various affiliations including former City officials, pastors, funeral home directors, and other community representatives; their short bios are included in the 'Acknowledgments' section at the beginning of this report.

The Committee has been helpful in shaping the Master Plan recommendations by providing diverse view points, ideas, and feedback. The format of collaboration was via Advisory Committee meetings that included a total of seven meetings of which two were site walks.

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1.3 | SUMMARY OF RECOMMENDATIONS

Goal One:

Prolong the Active Cemetery Function

- Develop new full-body lots in select limited areas. Continue second full-body burials in already sold lots.
- Continue providing burials for veterans in established sections.
- Develop multiple options for cremated remains and provide incentives for people to choose them.
- Support economically viable rehabilitation of the Receiving Tomb and Chapel for columbarium or other visitor-oriented uses.
- Consolidate the service functions in the current Materials Yard area.

The summary of recommendations below is organized by the goals / guiding principles for Cambridge Cemetery that they help support. More specific discussion of recommendations along with conceptual plans, are provided in Parts Three and Four of this report.

1. PROLONG THE ACTIVE CEMETERY FUNCTION

Recommendations are focused on creating new burial opportunities, as shown on Development Opportunities Map on the next page.

Create Full-Body Lots in Select Areas

There are few remaining areas for new full-body (FB) lots. The most feasible opportunities include:

- **Road Closures: (see Chapter 3.2)**:
  - Birch Avenue (already converted), estimated yield = 80 FB lots.
  - Laurel Avenue (already converted), estimated yield =95 FB lots.
  - Elm Avenue, estimated yield =30 FB lots.
  - Laurel Avenue extension between Laurel and River Avenue, estimated yield = 25 FB lots.
  - No additional road closures beyond the above-listed are recommended, as it is necessary to retain a functional Cemetery vehicular circulation.
  - Provide trees at intervals where possible, to break down the long array of graves
- **Full-Body Infill (see Chapter 3.2)**
  - Infill at existing wide aisle next to Main Avenue and the Korea and Vietnam Veterans section, estimated yield =36 FB lots.
  - The space is tight and requires precautions and possibly GPR survey to test feasibility.
- **Road Narrowing (see Chapter 3.3)**
  - Greenwood and Winchester Avenues Narrowing: Reconfigure the segments between Fir and River Ave as a one way loop with vehicle pullovers. Minimize visual impact to adjacent lots. Restore the currently declining avenue trees with new tree planting along the road setbacks. Estimated yield = 70FB + 60 CR lots (see note below).
  - Casey Avenue Narrowing: reconfigure to one-way, 9-feet wide road to gain FB or CR lots. Plant new trees along the road setbacks to enhance the landscape. Estimated yield = 80 FB or 80 CR (see note below).
  - Main Avenue Narrowing: Reconfigure the road to gain veteran's lots. Estimated yield = 110 FB
  - Note: The road narrowing studies require a precise topographic field survey, possibly supplemented with GPR, to complete the feasibility assessment for FB burials.
- **Expansion into adjacent land owned by the City (see Chapter 3.6)**: This option is less likely due to the technical challenges (very steep slopes), permitting challenges (within Riverfront area), and high construction cost.

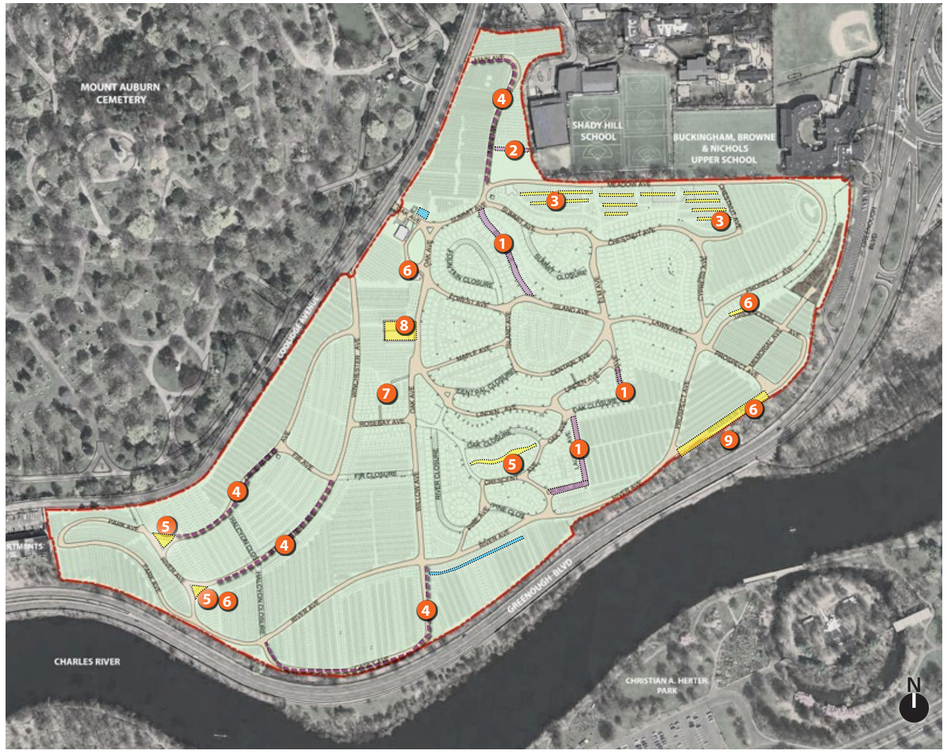


Figure 1. Development opportunities map.

DEVELOPMENT OPPORTUNITIES MAP

Legend

FB = Full-Body Burial

CR = Cremains Burial

Potential New Areas for FB

Potential New Areas for CR

Potential Road Narrowing

Proposed Opportunities

1. Road Closure - FB
2. Full-body Infill - FB
3. Infill at Wide Aisles - CR only
4. Road Narrowing - CR + FB
5. Cremains Garden - CR only
6. Columbarium or Memorial Wall - CR
7. Receiving Tomb Rehab - CR
8. Reuse of Service Yard - CR
9. Expansion - FB and CR

Continue Providing Burials for Veterans in Established Sections

- Reconfigure Main Avenue (see Chapter 3.3) to reserve space for new in-ground veterans lots.
- Alternatively, develop free-standing columbaria reserved for veterans.

Develop a Policy for Full-Body Lot Phaseout

Even with the development of FB opportunities presented in this Master Plan, at the current rate sales of new FB lots may not last more than five to eight years. In order to continue offering new FB lots beyond the 5-year mark, consider the following policies and measures:

- Immediately cap the number of yearly FB lot sales, keeping some lots in reserve for future years. Sell FB lots only for first FB burials (while continuing to allow subsequent CR burials in FB lots).
- Explore arrangements with another cemetery for burial of Cambridge residents or establish a new cemetery on land outside the City limits.

Prioritize Cremated Remains Development

As the cremation rates continue to rise, providing attractive CR options can meet customer preferences and extend the Cemetery active span.

- Implement CR options as soon as possible, before the remaining FB options are used up.
- Incentivize CR choices with customers, emphasizing the quality of CR options and allowing slanted monuments in addition to flush markers.
- Consider pre-sale of CR family lots and niches.
- Combine the new CR development with a public informational campaign to familiarize local funeral professionals and customers with the new CR options.

Develop Cremated Remains Offerings

- **Cremated Remains Infill (see Chapter 3.3)**: The wide aisles on the north slope of the Cemetery are candidates for CR lots.
  - Provide clusters of CR lots (3'x3') in the middle of each of these wide aisles. Estimated yield = 400 CR (4-urn).
  - GPR investigation is recommended to determine the extent of underlying burials and confirm feasibility for CR lots.

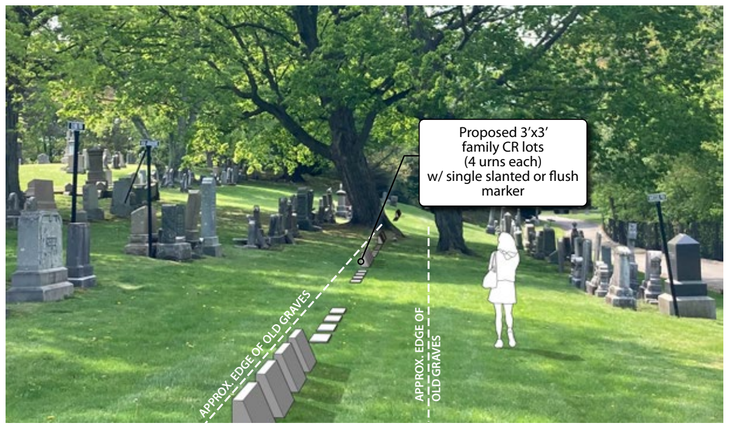


Figure 2. Visualization of cremated remains infill at wide aisles.

- **Cremation Gardens (see Chapter 3.4):** Create contemplative gardens for two types of CR burial: urn burial in purchased lots, with a stone memorial placed above; or CR burial in a community location with the option to add the name on a communal monument.
  - Greenwood Triangle Cremation Garden: Reconfigure to expand the green area and create a central CR burial lawn with a vertical communal monument, surrounded with CR lots set within lush landscape. Estimated yield =20 CR (4-urn) lots and 200+ CR burials.
  - Dell Path Cremation Garden: Plant the limits of the bowl-shaped surrounding landform and the adjacent lots with native groundcovers, while leaving a lawn in the middle for CR burial. Integrate communal monuments placed in aisles between existing lot lines. Estimated yield = 300+ CR burials.

Figure 3. Greenwood Triangle: Proposed cremation garden.

Figure 4. Dell Path: Proposed cremation garden.

- **Columbaria and Memorial Walls (see Chapter 3.5)**:
  - Exterior Columbarium at Chapel: Free-standing niche walls customized with stone-clad pillars and a small patio. Estimated yield = 160 niches.
  - Columbarium Wall at Greenough Avenue: Retaining niche wall with dynamic design. Estimated yield = 150 niches.
  - Columbarium Pavilion at Winchester Triangle: Pre-assembled columbarium pavilion with an internal ossuary. Estimated yield = 72 niches and 500+ in ossuary.
  - Riverview Avenue Memorial Walls and Columbaria: Garden-like environment with outdoor rooms and formal overlooks to Charles River, free-standing columbaria and low memorial walls. Convert Riverview Avenue to a pedestrian path and enhance with planting. Estimated yield = 96+ CR lots (4-urn) and 400 urn niches.

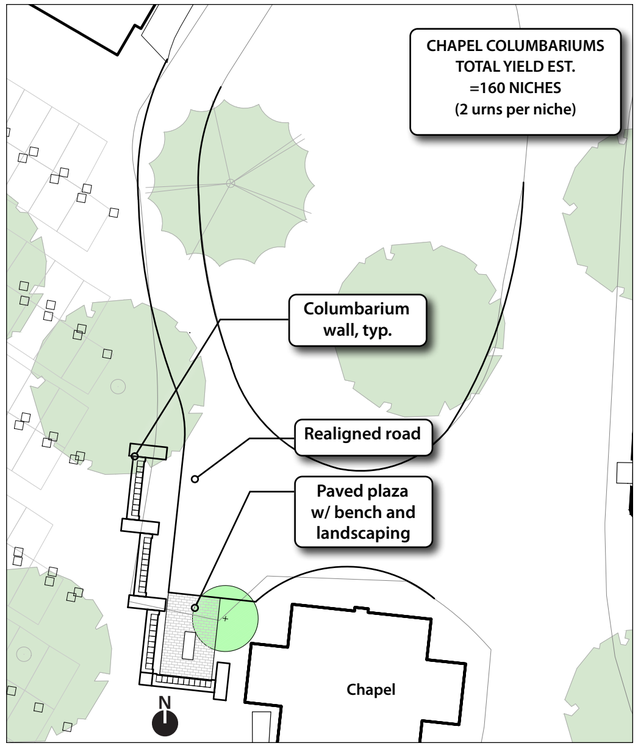


Figure 5. Proposed cluster of columbarium walls at the Chapel.

Rehabilitate the Receiving Tomb and Chapel

- **Receiving Tomb Rehabilitation (see Chapters 3.6 and 4.2):**
  - Seek CPA funding for structural restoration of the Receiving Tomb rehabilitation.
  - Remove crypts and install columbarium niches. Estimated yield = 230 niches.
- **Chapel Rehabilitation (see Chapter 4.2):**
  - Create an indoor columbarium or a visitor center, after the consolidation of current staff use in a new Maintenance Facility.

Consolidate the Service Function in Current Materials Yard

- **New Maintenance Facility (see Chapters 3.6 and 4.3):**
  - Upon decline in FB burials over the next decade and the corresponding reduction in service needs, consolidate staff amenities, vehicle garage, and materials storage into a single new Maintenance Facility located at the present Materials Yard area.
  - Restore the area presently occupied by the Garage into a new cremation garden or FB burial area.

Figure 6. Section-perspective of Receiving Tomb rehabilitation with indoor columbarium niches.

Goal Two:

Recognize the Cultural Value of Cambridge Cemetery

- Enhance and beautify the arrival areas.
- Preserve the historic buildings and site features via public commitment and private support for historic preservation.
- Publicize the history, beauty, and other information about the Cemetery.
- Facilitate public engagement and educational opportunities.
- Improve the visitor site experience and wayfinding.
- Increase public availability and ease of access to burial information.

2. RECOGNIZE THE CULTURAL VALUE OF CAMBRIDGE CEMETERY

The recommendations focus on highlighting the historic assets with preservation and public outreach, and enhancing the accessibility and visitor experience.

Enhance and Beautify the Arrival Areas

- At the main cemetery entrance / Admin Building reconfigure the parking lot and sidewalks to distinguish pedestrian from vehicular realm for a more graceful arrival and improved accessibility. (See Chapter 4.2)
- Extend the pedestrian zone to encompass the oval lawn and the Chapel. Refresh the landscape in the arrival area with new ornamental planting.
- Enhance the North Entrance with a new ornamental fence, gate, and a new entry sign.
- Longer-term, relocate the unsightly adjacent Garage Yard and restore the area to cemetery landscape and burial space.

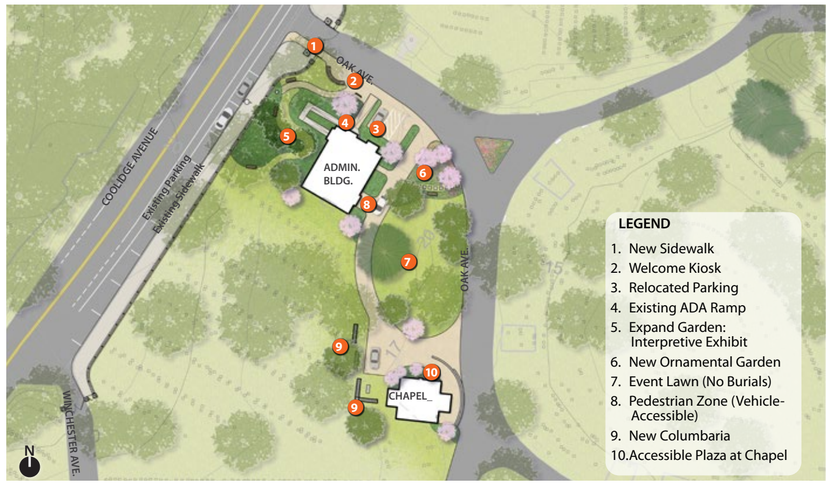


Figure 7. Main arrival area improvements plan.

Preserve Historic Buildings and Site Features via Public Funding and Private Support

- Seek CPA funding and grants for preservation evaluation studies, adaptive reuse studies, and historic preservation of the Chapel, Receiving Tomb, and the ornamental gates and fences. (See Chapters 4.2 and 4.3).
- Inventory private monuments requiring critical restoration, and work on their restoration in partnership with lot owner's descendants.

Publicize the History, Beauty, and other Information about the Cemetery

- Create programming for self-guided and organized tours in collaboration with Cambridge Historical Commission.
- Commission and publish original research of Cambridge Cemetery history.
- Evaluate the eligibility for nomination to the National Register of Historic Places.

Improve the Visitor Experience and Wayfinding

- Incorporate a visitor's welcome kiosk near the entrance, containing a map, rules and regulations, and QR codes for additional info.
- Develop interpretive signage in collaboration with the Cambridge Historical Commission with information on the Cemetery's history and notable permanent residents.
- Provide benches at key locations. Select attractive and durable benches and trash receptacles that complement the historic environment.

Encourage Public Engagement and Educational Opportunities

- Explore opportunities to encourage more people to visit the cemetery by promoting a wide range of cemetery events, such as school visits, arts programs, family events, etc. (See Chapter 4.2)
- Consider engaging volunteers for active community outreach.

Simplify Access to Burial Information.

- Contract with a commercial cemetery information management system (CIMS) provider to create digitized burial records.
- Create a grave locator app that can be accessed via mobile phone or computer. Many CIMS providers offer such apps as an additional service.

Infrastructure Improvements (see Chapter 4.4)

- Water Supply: Consider replacing existing plastic water barrels with ornamental vessels.
- Stormwater: Consider additional area drains or porous asphalt at Meadow Avenue.
- Sanitary Sewer: Convert from septic leach field to connection to municipal sewer, and rehabilitate the area as landscape.
- Electric Infrastructure: Upgrades to electric service, energy-related building upgrades,
- Phase-out of diesel fueling station in conjuction with Garage removal.

Goal Three:

Maintain the Grounds as an Open Space Resource

- Maintain the landscape integrity by balancing development with landscape preservation.
- Maintain and enhance the tree population via systematic management. Obtain Arboretum accreditation to promote its value.
- Enhance the landscape's ornamental value for visitor enjoyment and habitat value for pollinators, migratory birds, and other desirable wildlife.
- Allow passive recreation activities that are compatible with respectful visitation.
- Enhance pedestrian connectivity with Mount Auburn Cemetery and Greenough Boulevard.

3. MAINTAIN THE GROUNDS AS AN OPEN SPACE RESOURCE

The recommendations focus on preservation of landscape character, care for the tree collection, and other landscape improvements. See Chapter 4.1 for more information.

Maintain Landscape Integrity by Balancing Development with Landscape Preservation

- Retain a functional circulation network: Limit road closures to those detailed in Chapter 3.3. Road narrowing projects must be done carefully to allow vehicles to pass and park.
- Balance graves vs trees: Ensure that new infill preserves existing or integrates new trees. When a tree is removed, plant a new tree in its location rather than using the space for graves.
- Low-impact installation: Utilize planting techniques and smaller tree stock to minimize potential impacts to existing graves.

Maintain the Tree Collection

- Perform a tree Inventory and assessment. Implement systematic tree maintenance under the supervision of the City Arborist.
- Develop a list of recommended trees for future planting.
- Plant new trees to offset past and future tree loss. Aim for a yearly quantity equal to the number of planned tree removals plus five (5) trees.
- Replace hazardous and dying Norway maples over time, with diverse shade tree species.
- Offer a memorial tree option as an alternative to a headstone.

Pursue Arboretum Accreditation

- Apply for Level 1 or Level 2 arboretum accreditation.
- Seek partnerships related to arboretum education with nearby organizations: Mount Auburn Cemetery, Harvard University, and MIT.

Enhance the Landscape's Ornamental and Habitat Value

- Create a pollinator garden, in collaboration with local organizations such as the Pollinator Networks or Mount Auburn Cemetery.
- Plant steeper slopes with low shrubs and ground covers, to reduce the need for mowing and enhance the landscape beauty and biodiversity.
- Seek an agreement with DCR on invasive species management for enhanced river views.

Allow Suitable Passive Recreation

- Welcome passive recreation activities that are compatible with respectful visitation, such as walking, meditation, and bird watching.
- Develop a policy on dog-walking, bicycle use, and other potentially incompatible recreational activities.
- Clearly communicate the visitor rules, including allowed and non-permited activities.

Provide Connections with Adjacent Open Spaces

- Provide a crosswalk at Coolidge Avenue as a direct connection with Mount Auburn Cemetery's new pedestrian entrance.
- Study a pedestrian connection from Coolidge Avenue to Greenough Boulevard. The steep slopes between Meadow Avenue and Greenough Boulevard require a topographic survey to design an accessible connection. The implementation will require collaboration with DCR who owns a portion of the land.

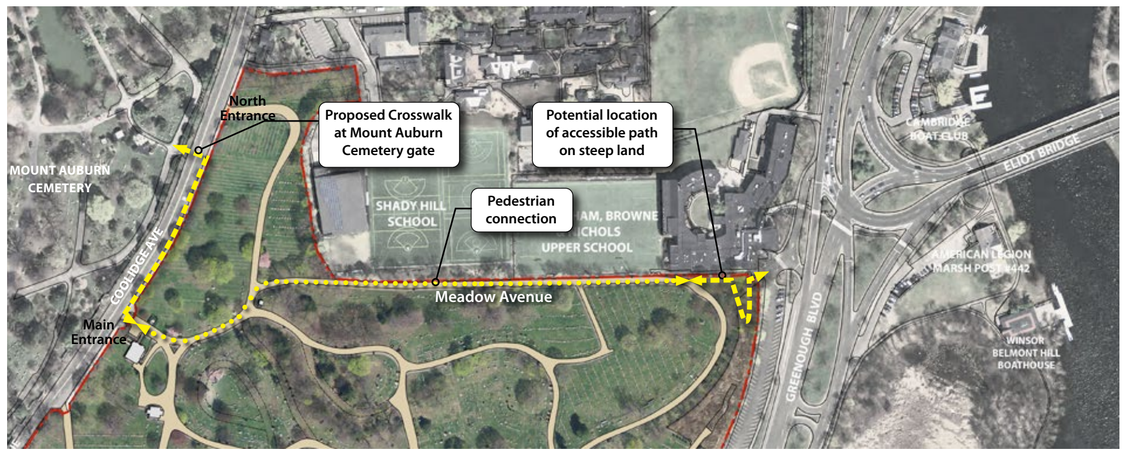


Figure 8. Potential connections with Mount Auburn Cemetery (to the west) and Greenough Blvd / Charles River (to the east).

1 | PROLONG THE ACTIVE CEMETERY USE - IMPLEMENTATION SUMMARY

	Project / Effort	Description / Action	Chapter	Timeframe
1.1	**Create Full-Body Lots in Select Areas**			
	SITE SURVEYING AND GPR	Prepare topographic surveys and GPR investigations		Early
	FB - BIRCH AVE LOT SALES	Aleady converted - start selling FB lots	3.2	Mid
	FB - LAUREL AVE FB LOT SALES	Already converted - install trees per Chapter 3.2 - start selling FB lots	3.2	Early
	FB - ELM AVENUE CONVERSION	Convert to burial space	3.2	Early
	FB - LAUREL AVENUE EXTENSION CONVERSION	Convert to burial space	3.2	Mid
	FB - MAIN AVE INFILL (NEXT TO KOREA WAR SECT.)	Convert to burial space	3.2	Early
	FB - GREENWOOD & WINCHESTER AVE NARROWING	Design and implementation	3.3	Mid
	FB - CASEY AVE. NARROWING	Design and implementation	3.3	Mid
	FB-EXPANSION ON CITY -OWNED LAND	Study the legal, permitting, and technical feasibility of expansion	3.6	Late
1.2	**Burials for Veterans in Established Sections**			
	FB-MAIN AVENUE NARROWING	Reconfigure Main Ave for new in-ground veterans lots.	3.3	Mid
1.3	**Develop a Policy for Full-Body Lot Phaseout**			
	POLICY FOR LIMITING FB SALES	Cap the number of yearly FB lot sales, keep lots in reserve, expolore arrangements with other cemeteries	3.1	Early
1.4	**Prioritize Cremated Remains Development**			
	DEVELOP POLICY TO INCENTIVIZE CR	Incentivize CR choices, consider pre-sale of CR family lots and niches, info campaign	3.1	Early
1.5	**Develop Cremated Remains Offerings**			
	CR- INFILL AT WIDE AISLES AT THE NORTH SLOPE	Sell lots (if determined to be feasible)	3.2	Early
	CR - GREENWOOD TRIANGLE CREMATION GARDEN	Design and implementation	3.4	Early
	CR - DELL PATH CREMATION GARDEN	Design and implementation	3.4	Early
	CR - EXTERIOR COLUMBARIUM AT CHAPEL	Design and implementation	3.5	Mid
	CR -COLUMBARIUM WALL AT GREENOUGH AVE	Design and implementation	3.5	Late
	CR - COLUMBARIUM AT WINCHESTER TRIANGLE	Design and implementation	3.5	Early
	CR - RIVERVIEW AVE MEMORIAL WALLS	Design and implementation	3.5	Late
1.6	**Infrastructure Improvements**			

1 | PROLONG THE ACTIVE CEMETERY USE - IMPLEMENTATION SUMMARY

	Project / Effort	Description / Action	Chapter	Timeframe
	WATER SUPPLY IMPROVEMENTS	Consider replacing existing plastic water barrels with ornamental vessels.	4.4	Early
	STORMWATER IMPROVEMENTS	Consider additional area drains or porous asphalt at Meadow Avenue	4.4	Mid
	SANITARY SEWER	Convert from septic leach field to connection to municipal sewer, and rehabilitate the area as landscape.	4.4	Early
	ELECTRIC UPGRADES	Upgrades to electric service, energy-related building upgrades,	4.4	Mid
	DIESEL FUEL	Phase-out of diesel fueling station	4.4	Late
1.7	**Rehabilitate the Receiving Tomb & Chapel**			
	RECEIVING TOMB REHABILITATION	Remove crypts and furnish with columbarium niches.	3.6, 4.2	Late
	CHAPEL REHABILITATION	Create indoor columbarium and visitor center, after the consolidation of current staff use in a new Maintenance Facility	4.2	Late
1.8	**Consolidate the Service Function in Current Materials Yard**			
	NEW MAINTENANCE FACILITY	Consolidate staff amenities, vehicle garage, and materials storage at the Materials Yard area (see Chapters 3.6 and 4.3).	3.6, 4.3	Late
	GARAGE REMOVAL	Demolish Garage and restore the area	3.6, 4.3	Late

2 | CULTURAL AND FACILITIES ENHANCEMENT - IMPLEMENTATION SUMMARY

	Project / Effort	Description / Action	Chapter	Timeframe
2.1	**Enhance and Beautify Arrival Areas**			
	MAIN ARRIVAL TO CHAPEL IMPROVEMENTS	Design and construction for accessibility, circulation, beautification	4.3	Mid
	NORTH ENTRANCE IMPROVEMENTS	Provide new ornamental fence, gate, and new entry sign	4.3	Early
	GARAGE YARD SCREENING – SHORT-TERM	Provide new ornamental screen fence.	4.3	Early
	GARAGE YARD REMOVAL – LONG-TERM	Remove / relocate Garage Yard, restore area to burial space	4.3	Late
2.2	**Preserve Historic Buildings & Site Features**			
	CPA FUNDING & HISTORIC PRESERVATION GRANTS	Seek CPA funding for preservation studies and implementation for (1) Chapel, (2) Receiving Tomb, (3) Ornamental fences & gates	4.2	Early, Mid
	MONUMENTS IN CRITICAL NEED OF PRESERVATION	Identify monuments; notify owner's contacts to facilitate preservation	4.2	Mid
2.3	**Publicize History and Beauty of Cemetery**			
	HISTORICAL TOURS PROGRAMMING	Create programming for cemetery tours. (Partnership with Cambridge Historical Commission (CHC) and Mt. Auburn Cemetery).	4.2	Early
	NEW HISTORIC RESEARCH	Commission and publish original research (Partnership w/ CHC, sponsored scholar, or consultant).	4.2	Mid
	ELIGIBILITY FOR NATIONAL REGISTER	Evaluate eligibility for National Register of Historic Places. (CHC or a consultant).	4.2	Mid
2.4	**Improve the Visitor Experience and Wayfinding**			
	VISITORS WELCOME KIOSK	Incorporate kiosk near the entrance (May be part of 2.1.1 above)	4.2, 4.3	Early
	INTERPRETIVE SIGNAGE	Develop interpretive signage (1 to 2 signs) in collab. w/ CHC.	4.2	Early
	AVENUE SIGNS IMPROVEMENTS	Reset or straighten leaning avenue signs.	4.2	Early
	BENCHES AND TRASH RECEPTACLES	Provide benches (8-10 total) and matching trash receptacles.	4.2	Early
2.5	**Encourage Public Engagement and Education - general recommendations - not associated with a project**		4.2	
2.6	**Simplify Access to Burial Information**		4.2	
	CEMETERY INFORMATION MANAGEMENT SYSTEM (CIMS)	Contract with CIMS provider to create and manage burials database	4.2	Early
	GRAVE-LOCATOR APP	Add-on a grave-locator app as offered by CIMS provider.	4.2	Early

3 | OPEN SPACE ENHANCEMENT - IMPLEMENTATION SUMMARY

	Project / Effort	Description / Action	Chapter	Timeframe
3.1	**Maintain the Landscape Integrity - general recommendations - not associated with a project**		4.1	
3.2	**Maintain and Enhance the Tree Collection**			
	TREE INVENTORY	Contract with arborist to perform tree inventory and assessment.	4.1	Early
	RECOMMENDED TREES LIST	Develop a list of replacement trees for various conditions. Use Preliminary Tree List in Ch.4.1 as interim list.	4.1	Early
	PLANT NEW TREES	Aim for 5 to10 new trees per year (or number of yearly removals + 5)	4.1	Every Year
	MEMORIAL TREES ALTERNATIVE TO HEADSTONES	Prepare memorial tree pricing for CR. Designate suitable locations.	4.1	Early
3.3	**Arboretum Accreditation**			
	ARBORETUM ACCREDITATION	Designate a person or hire a consultant to assist in the arboretum establishment and complete the application.	4.1	Early
	SEEK ARBORETUM PARTNERSHIPS	Reach out to Mount Auburn Cemetery to explore opportunities.	4.1	Early
3.4	**Enhance Landscape's Ornamental and Habitat Value**			
	POLLINATOR GARDEN	Create a pollinator garden, in collaboration with local organizations.	4.1	Mid
	PLANTING ON SLOPES	Plant terrace slopes with low shrubs and ground covers.	4.1	Early
	INVASIVE SPECIES ALONG RIVER'S EDGE	Seek an agreement with DCR on invasive species management	4.1	Early
3.5	**Allow Suitable Passive Recreation**			
	POLICY ON RECREATIONAL ACTIVITIES	Clarify policy on dog walking, bicycle use, and other recreational activities.	4.1	Early
	CLEARLY COMMUNICATE VISITOR RULES ON RECREATIONAL ACTIVITIES	Include rules and regulations on web site and on a sign near the cemetery entry. Sign may be integrated in Visitor Kiosk - see 2.4.1 and Chapter 4.2.	4.1	Early
3.6	**Enhance Connectivity with adjacent Open Spaces**			
	CROSSWALK AT COOLIDGE AVE.	Provide a crosswalk at Coolidge Avenue to connect with Mt. Auburn Cemetery'	4.1	Mid
	PATH FROM MEADOW AVE TO GREENOUGH BLVD	Obtain a topographic survey and prepare a design study for pedestrian connection from Coolidge Ave. via Meadow Ave. to Greenough Blvd.	4.1	Mid

Part Two:
SITE CONTEXT, HISTORY AND EXISTING CONDITIONS

2.1 | CONTEXT AND NOTABLE FEATURES

Cambridge Cemetery At-a-Glance

- Established in 1855 and expanded several times
- City of Cambridge's only active cemetery
- 66-acre site is adjacent to Charles River and Mount Auburn Cemetery
- Cemetery is fully developed and has been implementing road closures and infill since the early 2000s

LOCATION AND URBAN CONTEXT

Cambridge Cemetery is located in the southwest corner of the City of Cambridge on a plateau overlooking Charles River to the south. To the north of the cemetery are the grounds of two private schools: BB&N and Shady Hill; their playing fields and buildings are located immediately adjacent to the Cemetery fence. Mount Auburn Cemetery (established in 1831) is immediately across Coolidge Avenue to the west; at the time of establishment both cemeteries were on the rural outskirts, and today they are completely surrounded by the urban fabric of Cambridge and Watertown.

NOTABLE FEATURES

The Existing Site and Notable Features Map on the facing page identify the location of entrances, paved circulation network, buildings and facilities, and veteran areas. The following photos and descriptions correspond to the numbering on the map.

There are three entrances to Cambridge Cemetery, all from Coolidge Avenue. A fourth entrance near the west corner was closed and converted to lots several years ago. Steep topography along the south perimeter has prevented direct access from Greenough Boulevard.

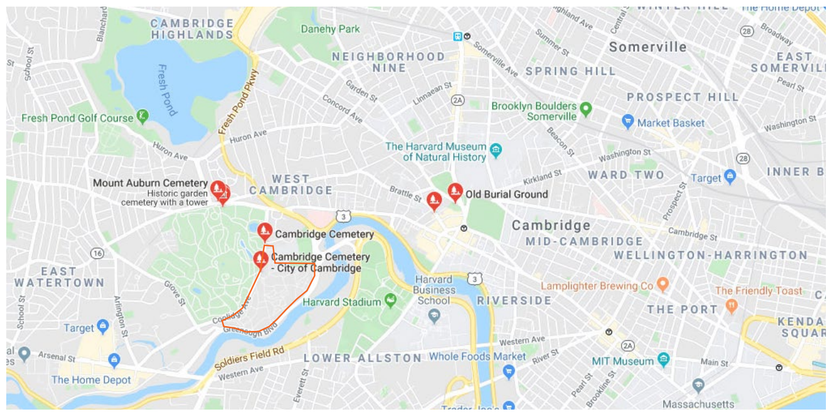


Figure 9. Cambridge Cemetery within the greater urban context (Google Maps).

Figure 10. Existing Site and Notable Features Map.

EXISTING SITE AND NOTABLE FEATURES MAP

2013 Orthophoto

Notable Features

1. Main Gate (1893)
2. Winchester Ave. Gate
3. North Entrance and Sign
4. Administration Building (1923)
5. Chapel (1868)
6. Receiving Tomb (1888)

Veterans and Service Member Plots

7. Spanish War
8. Civil War
9. Civil War Memorial
10. WW1
11. WW2
12. Korean and Vietnam Wars
13. Police Plot
14. Fire Department Plot

Service Facilities

15. Garages and Maintenance Enclosure
16. Service Yard

Cemetery Entrance

Main Gate

Winchester Avenue Gate

North Entrance

Administration Building

Chapel

Receiving Tomb

Civil War Veterans Plot and Memorial

Veterans Area

Fire Department Plot

Notable Features referenced on Existing Site and Notable Features Map on previous page.

1. Main Gate and Ornamental Fence

The Main Gate is the middle of the three entrances from Coolidge Avenue. It was constructed in 1893, replacing a former gate that burned down in 1867. The gate consists of granite pillars with decorative caps and an ornamental wrought iron double-swing gate. The ornamental fence consists of painted pickets with ornamental cast iron posts and a concrete curb at its base; it extends south to the Winchester Avenue gate and north half-way towards the North Entrance. The Main Gate and the ornamental fence are important character-giving elements with aesthetic and historic value.

2. Winchester Avenue Gate

The secondary entrance is located south of the Main Gate at Winchester Avenue. The gate consists of four concrete pillars with decorative caps, an ornamental wrought iron double-swing vehicular gate, and a matching pedestrian gate on the north side where the sidewalk ends. The Winchester Avenue Gate is much more restrained in style than that the ceremonial Main Gate, however it is still important from a historic preservation perspective.

3. North Entrance (Main Avenue Gate)

The Cemetery's 1942 expansion (veteran's section) is defined along Coolidge Avenue by a vinyl-coated chainlink fence and a double-swing chainlink gate. A free-standing sign next to this gate announces the Cemetery, while a rules-and regulation sign is mounted on the gate. For most visitors coming from Cambridge, via Fresh Pond Parkway and Mount Auburn Street, the utilitarian look of the North Entrance sets the first impression of the Cemetery, which stands in contrast to the attractive Main Gate further down the road. Improvements to the North Entrance would go along way to improve the visual appreciation of the Cemetery.

4. Administrative Building

Located next to the Main Gate, the one-story, brick Administrative Building was built in 1923. It is convenient and accessible to visitors that need to conduct Cemetery business; however, its frontage and parking area could benefit from landscape improvements. Recommendations on this area are discussed in Parts Three and Four of this report.

5. Chapel

The Chapel, a stone structure built in 1868, is a historic and architectural gem located near the entrance. Its current use is as an employee break facility. Discussion about the Chapel's restoration to visitor use is included in Part Four of this report.

6. Receiving Tomb

The Receiving Tomb, built in 1888, ceased its original funerary use a long time ago. Its attractive stone facade conceals a vaulted crypt in need of historic preservation. Ideas for restoration or rehabilitation of the Receiving Tomb are discussed in Parts Three and Four of this report.

7 - 14. Veterans and Service Member Plots

The Cemetery features several areas designated for war veterans. The Civil War Veterans plot, in the Cemetery's east corner, is an oval-shaped area with a prominent memorial in the center. The expansive lawn with flush markers along the Coolidge Avenue frontage is dedicated to the veterans of Spanish, World Wars I and II, Korean, and Vietnam Wars. The City's Fire and Police departments have dedicated burial areas as well.

15 -16. Service Facilities

The service facilities, the Garage Yard and the Materials Storage Yard, are a necessary part of the Cemetery's operations. While the Materials Storage Yard is tucked in a remote location and partially screened from view, the Garage Yard is unfortunately prominently placed in the entry precinct, where its utilitarian building and fence and parked maintenance vehicles conflict with the intended tranquility and historic character of the Cemetery. Opportunities and improvements related to the service facilities are discussed in Parts Three and Four of this report.

2.2 | HISTORIC DEVELOPMENT

CULTURAL VALUE

Nearing 170 years of existence, Cambridge Cemetery is a valuable cultural landscape that has evolved within an area rich with history. Established in 1854 in a then-rural edge of town, it embodied the Rural Cemetery movement's ideals that sought to create a place of beauty and comfort in harmony with nature. From the beginning, its mission was to serve people of all walks of life; today it is the City's only active cemetery continuing that mission. Its notable features include the Chapel, Receiving Tomb, Civil War Memorial, graves of well-known people, and note-worthy monuments. Its beautiful grounds are a testament to the City's growth and prosperity, as well as the changing cemetery styles and burial preferences.

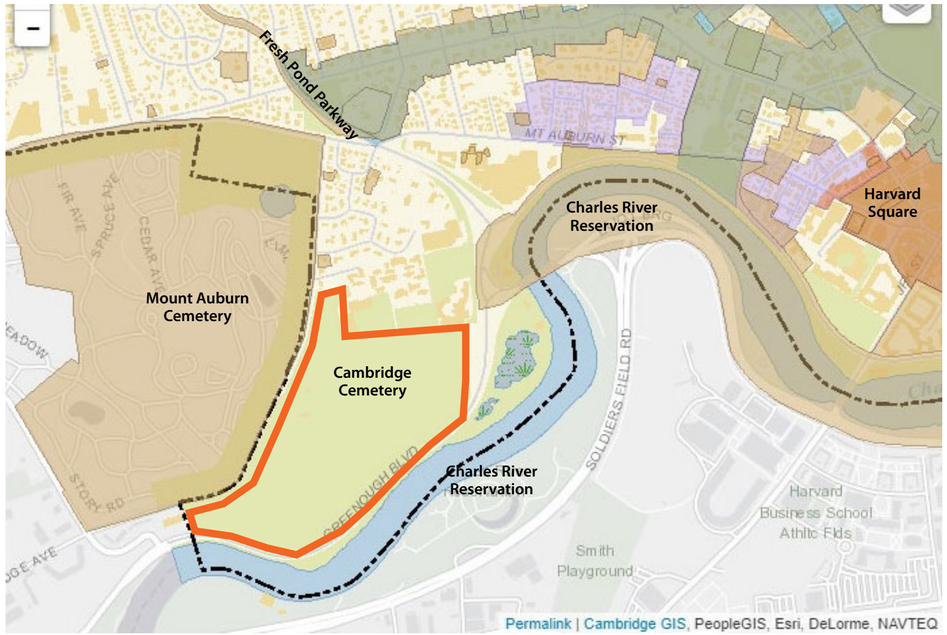
HISTORIC PRESERVATION EFFORTS

While Cambridge Cemetery has yet to be recognized with a designation on the National Register of Historic Places, the City has supported its preservation with substantial past investments. The City's Community Preservation Act (CPA) funding allocated a total of $563,000 from FY2004 to FY2016, which has been used for the following:

- Preservation of the ornamental iron fence ($125,000)
- Restoration of the Chapel exterior ($100,000)
- Repairs of granite stairs, curbs, and the Receiving Tomb facade (over 300,000)
- Creating a database of burials ($30,000)

Recommendations for future preservation efforts, as well as enhancing the visibility of the Cemetery in the wider community, are found in Part Four of this Report.

Figure 11. The Chapel (left) and Receiving Tomb (right) received CPA funds in 2004 and 2006 respectively for facade restoration.



MAP OF ADJACENT HISTORIC PRESERVATION DISTRICTS

www.cambridgema.gov

Historic Preservation Districts

- Half Crown-Marsh Conservation District
- Harvard Square Conservation District
- Old Cambridge Historical District
- National Register of Historic Places
- Overlap of the National Register and Old Cambridge Historic District

Figure 12. Historic preservation districts in the vicinity of Cambridge Cemetery.

CAMBRIDGE CEMETERY HISTORY

The historic overview presented here has been drawn primarily from the book "Building Old Cambridge" (Maycock & Sullivan, 2016), supported with electronic web resources. The intent of this overview is to provide a deeper understanding of the Cemetery's development over time and highlight its most valuable assets from a preservation point of view.

Establishment in 1854

Cambridge Cemetery was established in 1854 to replace the town's Cambridgeport burial ground, which was getting overcrowded. Two decades earlier, the privately owned Mount Auburn Cemetery was created on the then-rural outskirts of Cambridge, and its naturalistic design and immediate success quickly inspired many other cemeteries to follow into the countryside, therefore spearheading the American Rural Cemetery movement.

In 1854 Cambridge purchased 24 acres of the Stone farm adjacent to Mount Auburn Cemetery to create a new municipal cemetery. In the spirit of Mount Auburn's widely acclaimed design, the Cambridge Cemetery architects William Hovey Jr. and Calvin Ryder laid out meandering avenues and three small ponds, one of which had an island in the middle. In the more remote parts, towards the Charles River and its salt marsh, they laid out a simple grid for the public grounds for burial of the poor. The Historic Overlay Map CA 1855 on the following page identifies those site elements and the original Cemetery extent overlaid on the current Cemetery map. The map illustrates that the actual built layout is notably similar to the 1855 design plan, except that the ponds are no longer present.

The original Gothic style gate shown on the inset of the map burned down in 1867.

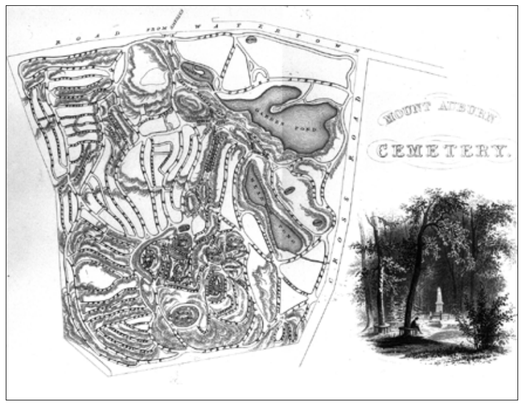


Figure 13. Mount Auburn Cemetery in Cambridge, MA, established in 1831, was the first Rural cemetery in the United States (Engraving by James Smillie, ca. 1848, From Mount Auburn Cemetery Illustrated).

Figure 14. The original design of Cambridge Cemetery, ca 1855, William t. Hovey Jr. and Calvin Ryder, architects (Image source Harvard Map Collection, *iiif.lib.harvard.edu*).

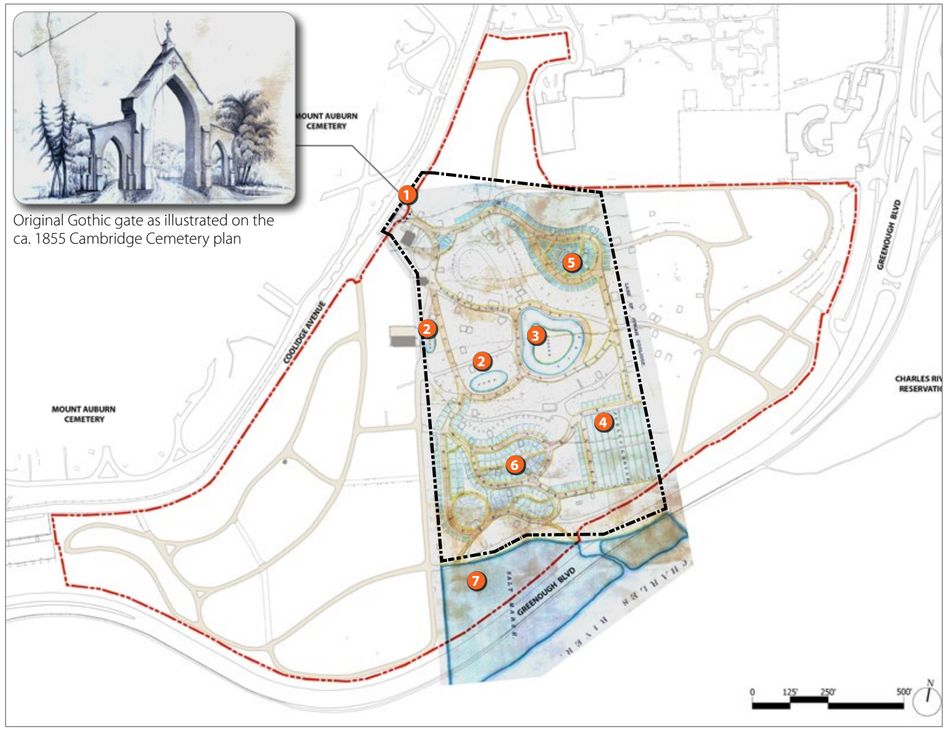


Figure 15. Historic Overlay Map showing original ca. 1885 design over the present Cemetery map.

HISTORIC OVERLAY MAP CA. 1855

Ca.1855 Plan overlay on 2019 GIS Base Map

Site Features

1. Gothic Gate (burned down in 1867)
2. Pond (presumed man-made)
3. Island and Pond (presumed man-made)
4. Public Grounds
5. Summit Avenue hill
6. Dell Path
7. Salt Marsh

Legend

- Cemetery Entrance
- Present Day Roads
- Present Day Boundary
- Original 1855 Tract (24 Acres)

1865 Expansion

A decade after its establishment, the Cemetery expanded on another 11 acres to the east, as illustrated on the 'Historic Overlay Map ca. 1882-1885' on the following page. Josiah Chase, a civil engineer, laid out the expansion in a simplified garden cemetery style.

The Chapel was built in 1868 to replace the original lodge that burned down. It was designed by an unknown architect in a modified Gothic revival style in ledgestone with granite trim. It originally contained the superintendent's office and a public waiting room; it was altered in 1897 and converted to a Chapel in 1923. Today it serves as a staff break room.

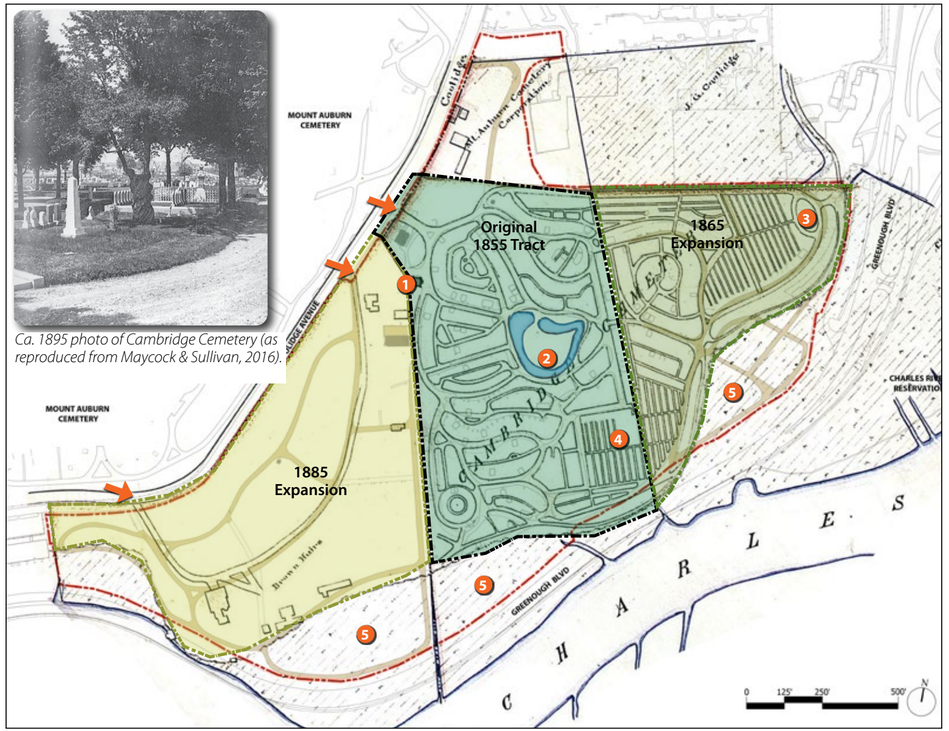
1885 Expansion

Another expansion followed in 1885, adding the 26-acre Winchester Estate to the west. Boston landscape architects Gray & Blaisdell laid out this area in the Lawn cemetery style, retaining the former estate's carriage way as the central boulevard (now Winchester Avenue). The City demolished the mansion in 1896 to provide more land for burials.

The present granite piers and iron gate were installed in 1893, and the Admissions Building was built in 1923. The Receiving Tomb was built in 1888 per design prepared by W.S. Barbour, City Engineer.

Figure 16. The Civil War memorial became a focal point on the bluff near the river, which was part of the 1865 cemetery expansion. Image ca. 1901-07 (as reproduced from Maycock & Sullivan, 2016).

Figure 17. Map ca 1882-85 (as reproduced from Maycock & Sullivan, 2016). The newly added area is to the left of the Cemetery. The existing carriage road became the Cemetery's Winchester Avenue.



Ca. 1895 photo of Cambridge Cemetery (as reproduced from Maycock & Sullivan, 2016).

Figure 18. Historic Overlay Map showing ca. 1882-1885 map over present-day Cemetery outline. The 1855 tract, the1865 expansion area, and 1885 expansion area are indicated with color overlay. (Source of ca. 1882-85 map: Cambridge Engineering Department, as reproduced from Maycock & Sullivan, 2016).

HISTORIC OVERLAY MAP CA. 1882-1885

Site Features

1. 1868 Chapel
2. Island and Pond
3. Civil War Memorial
4. Public Grounds
5. Salt Marsh

Legend

- Cemetery Entrance
- Present-Day Roads
- Present-Day Boundary
- Original 1855 Tract (26 Acres)
- 1865 Expansion (11 Acres)
- 1885 Expansion (26 Acres)

Figure 19. World War Memorial by Karl Skoog (above), and monument to the unknown dead soldiers (below) in the veteran's section.

20th Century Expansions and Changes

The City acquired an additional 5 acres from Mount Auburn Cemetery to the north of the main entrance in 1942. This area became the Veterans Grounds, including sections for the Civil, Spanish, World Wars, Korean, and Vietnam Wars, all unified by the use of flush markers. Memorials to the veterans of Spanish War, World War, and the unknown dead soldiers are vertical accents in this lawn area.

The 'Current Map with Historic Development Areas' on the following page identifies three more expansions that occurred in the 20th century. All are on land that was filled over former marshland. Aerial photos from 1947, 1969, 1978, and 1995, available at the Cambridge City Viewer, as well as aerial photos from 1930 and 1938, available at the Boston Planning & Development Mapjunction viewer, illustrate the stages of development in these areas. The last area to be developed was the east corner around Memorial Avenue, added in the early 1980s and already fully populated with graves by the early 2000s.

During the 1970s there were a number of changes that negatively impacted the appearance and historic integrity of Cambridge Cemetery.

- At the Civil Memorial oval, the paved surrounding path was removed, and monuments were replaced with flush markers; this has diminished the prominence of this monument that originally served as a focal point.
- Until the 1970s, the present-day Garage area was a courtyard defined by two buildings, accessed from Winchester Avenue and screened towards Cedar Avenue (the main avenue); there was also a circular turnaround in front of the Receiving Tomb. This configuration allowed a better visitor experience in the main arrival area. In the late 1970s the courtyard was replaced with the present-day Garage and Equipment Yard, and the turnaround in front of the Receiving Tomb was converted to grave lots. The utilitarian look of the Garage and its prominence along the main avenue have greatly diminished the aesthetics of the entry precinct.

2005 Evaluation Report and Implementation

A hundred and fifty years after its establishment and several expansions later, by the early 2000s the Cemetery was running out of burial space. The Cemetery engaged a planning consultant in 2004 to provide recommendations for how to integrate future burial opportunities within the outlines of the present Cemetery. The resulting Evaluation Report (BSC Group, 2005) proposed a range of options that would extend the full-body burials for another 17 to 25 years, and cremated remains burials another 100 years.

The options included converting multiple roads and paths to full-body burial lots (a.k.a. "Road closures" or "infill"), and creating space-saving options for cremated remains such as cremation gardens, freestanding and retaining wall columbaria, and indoor niches in the Receiving Tomb and Chapel. As of 2023 most of the road conversions have been implemented and sold; however, cremation options have not been realized, remaining limited to in-ground cremation lots.

Some of the unrealized recommendations of the 2005 Evaluation Report, regarding burial options, are still relevant today and have been revisited in this Master Plan.

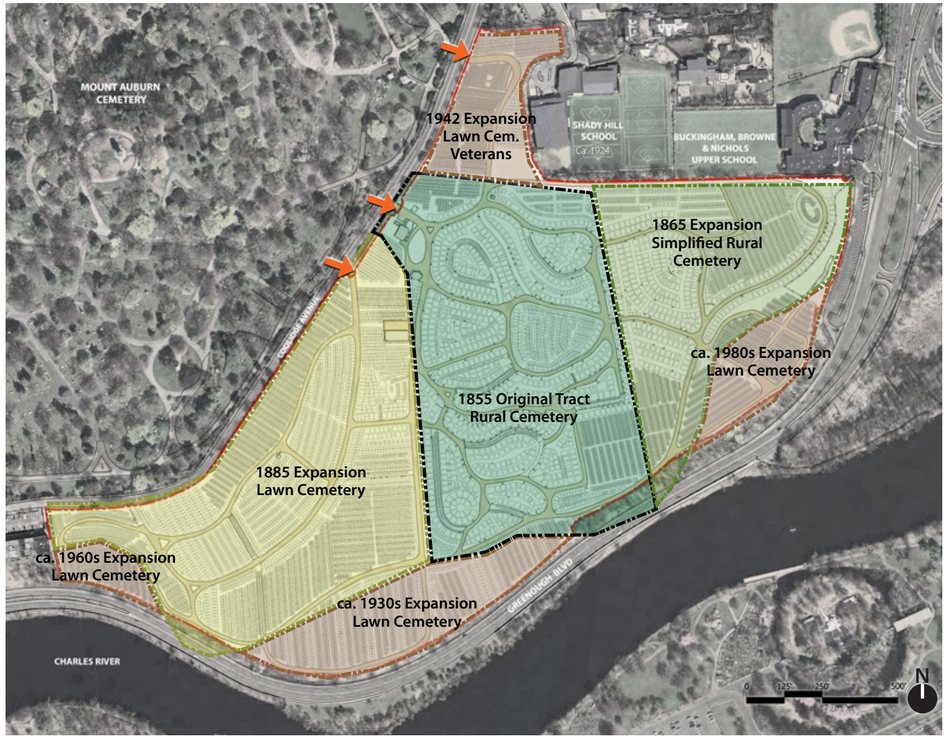


Figure 20. Diagram of historic development areas overlaid on current Cemetery map.

CURRENT MAP WITH HISTORIC DEVELOPMENT AREAS

Legend

- Cemetery Entrance
- Present-Day Roads
- Present-Day Boundary
- Original 1855 Tract - RURAL CEMETERY
- 1865 Expansion - SIMPLIFIED RURAL
- 1885 Expansion -LAWN CEMETERY
- 20th-Cent. Expansions -LAWN CEMETERY

2.3 | GEOLOGY AND TOPOGRAPHY

The study of topography and underlying soils was a necessary step in building our understanding of the factors that shaped the development of Cambridge Cemetery, as well as issues that need to be considered in the master plan recommendations.

SOILS

The look "beneath the surface" has confirmed observations on the 20th century expansion by filling beyond the Cemetery's original outlines, which were presented in the Historic Development chapter. Cambridge Cemetery was originally established on an elevated plateau that overlooked the tidal estuary of Charles River to its south. The 'Soils Map' on the following page delineates the approximate edge of this plateau and the former salt marsh, as well as the outlines of the major soil map units within the area of interest, as derived from the Custom Soils Resource Report for Middlesex County (Soil Survey) by the USDA Natural Resource Conservation Service.

The map of the underlying soils reflects the Cemetery's expansion history: the well-drained sandy loam types (254B and 420C) correlate with the older Cemetery parts, while the Udorthents types (653 and 655) are generally consistent with the areas of 20th century fill. The Cemetery was able to fill and develop additional sections towards the river after the Charles was converted from a tidal estuary into a regulated basin with the 1910 installation of the Charles River Dam. The underlying wet substrate of the of the filled section near Memorial Avenue possibly contributes to the high ground water and poor drainage that have been noted in this area.

Middlesex County, Massachusetts (MA017)

Middlesex County, Massachusetts (MA017)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	56.6	66.7%
420C	Canton fine sandy loam, 8 to 15 percent slopes	7.3	8.6%
602	Urban land	2.3	2.7%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	3.1	3.6%
653	Udorthents, sandy	4.3	5.0%
655	Udorthents, wet substratum	11.4	13.4%
Totals for Area of Interest		**84.9**	**100.0%**

Figure 21. Soil map units within the Cemetery's area, USDA Soil Survey.

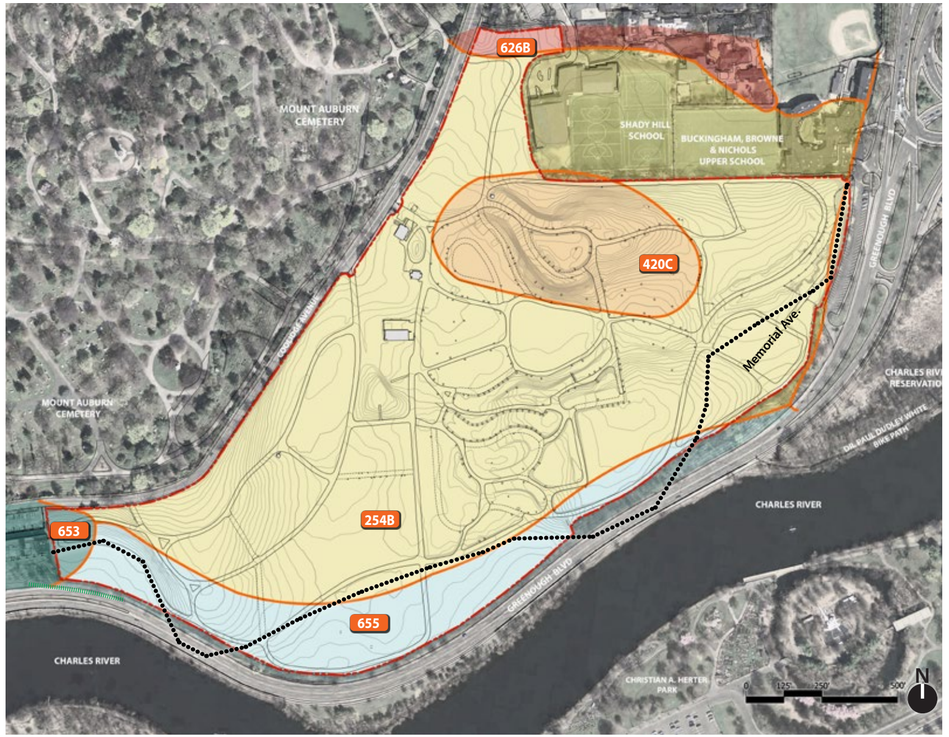


Figure 22. Soils Map from the USDA Soil Survey.

SOILS MAP

USDA Soil Survey overlay

Soil Map Units

- 254B — Merrimac fine sandy loam, 3 - 8 % slopes
- 420C — Canton fine sandy loam, 8 -15% slopes
- 626B — Merrimac-Urban land complex, 0-8% slopes
- 653 — Udorthents, sandy
- 655 — Udorthents, wet substratum
- Historic edge of salt marsh

TOPOGRAPHY

Landforms and the Landscape

The topography at Cambridge Cemetery is an important character-defining landscape feature. The contour lines on the 'Topography and Drainage Map' on the following page highlight the most prominent topography in the central, oldest Cemetery sections. The organic Cemetery layout of these areas embodies the Rural Cemetery ideals — with a path encircling the high landforms (Summit Avenue) and looping around depressions (Island Avenue, Crescent Avenue). Monuments placed at high points, and subtle slope terracing, accentuate the effect of topography in the landscape.

Along the River's edge, an abruptly sloping transition down to Greenough Boulevard denotes the extent of filled Cemetery areas. The slope height along this perimeter ranges from a few feet to about 30-feet. On the one hand, the dense vegetation on this slope helps retain the soil and reduce erosion. On the other hand, it screens attractive views of the Charles River that can be seen on old photos.

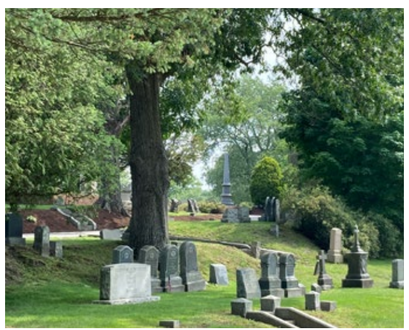


Figure 23. Summit Avenue encircles the top of highest Cemetery landform (left). Characteristic terracing with stairs built into the slopes (right).

TOPOGRAPHY AND DRAINAGE MAP

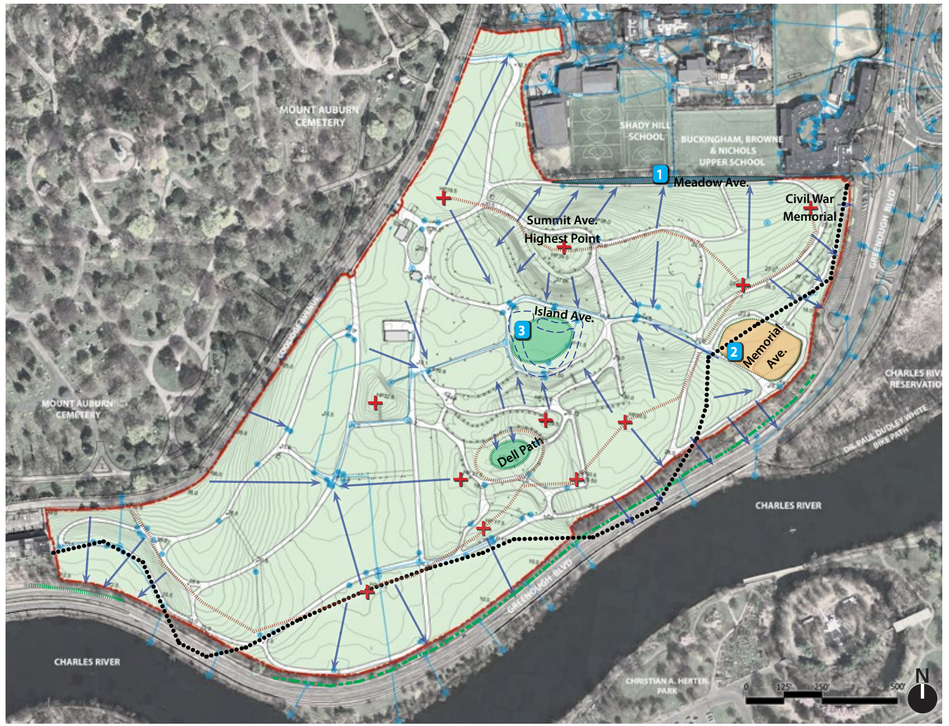


Figure 24. Topography and drainage map.

Topography and Planting

Steep slopes present in several locations of the Cemetery are a special challenge for vegetation maintenance and new planting. Some slopes that are too steep for mowing have been mulched instead — which could be a temporary solution but is not visually appealing longer-term.

Steep slopes make it challenging to plant new trees because of the technical challenge of creating a level area for planting and retaining the soil behind it. The stone "tree wells" seen along Coolidge Avenue are not a desirable solution. The use of bare-root and nursery stock that has smaller rootballs will make the task of planting on a slope less challenging.

Figure 25. Tree well at the Coolidge Avenue perimeter.

Topography and Accessibility

Within the context of this historic Cemetery that was created on hilly terrain, there are segments of the circulation paths that are steeper than the current accessibility standards and are therefore a challenge to accessibility. Yet attempting to regrade or modify existing roads could impact existing graves and the integrity of historic landscape. Within the context of cultural landscapes, the National Park Service discusses "equal access to the experience of a cultural landscape" that is achieved when the experience is equally available to all visitors or users, while retaining the integrity of landscape characteristics and features (NPS, no date).

Figure 26. Steep gradient at Summit Avenue can be an accessibility challenges for some visitors.

The paved circulation network at Cambridge Cemetery provides the ability for vehicular access, and equal experience of the landscape, throughout the Cemetery. As the Cemetery continues to convert roads to burial lots, this equal access could get diminished; it is therefore critical to retain a core functional paved road network for continued ability to reach steeper and more remote parts of the Cemetery.

Stormwater and Drainage

The stormwater drainage is managed by collecting the runoff in a network of catch basins and underground stormwater sewer lines. The 'Topography and Drainage Map' on the preceding pages illustrates the GIS records on the stormwater infrastructure. Many of the catch basins are dry-well structures that infiltrate the runoff directly. This has been largely adequate except in a few locations, which are also identified on the map, and which are largely the result of the existing topographic features, steep slopes, and soil compaction.

- Along Meadow Avenue at the north Cemetery perimeter, the grade drops off to the adjacent BB&N sports fields. An asphalt berm that was installed along this edge helps to keep stormwater on the Cemetery property, however because of the insufficient number of catch basins there is often puddling along the berm.
- Poor drainage / high ground water is encountered in the ranges around Memorial Avenue. As described in the Soils chapter, this area was filled over a wet substratum, which most likely contributes to the issue.
- Puddling has been observed at avenue corners and in areas compacted by vehicles along the edges of the avenues.

Figure 27. Asphalt berm along Meadow Avenue / BB&N property line.

2.4 | TREES AND LANDSCAPE

Figure 28. The considerable tree diversity contributes to the beauty of the landscape.

Figure 29. European Copper Birch near Lawn Avenue is one of the largest Cemetery trees (54" DBH).

LANDSCAPE CHARACTER ZONES

The trees of Cambridge Cemetery are among its most valuable asset, contributing beauty and ecological benefits. The dappled canopy of the Rural central area is complemented with large allée trees and specimens scattered over the lawn cemetery fields.

This diversity of landscape at Cambridge Cemetery can be understood better when seen from the lens of historic context in which cemetery styles changed over time. As the Cemetery evolved and expanded, each of its additions reflected the landscape styles dominant at the time of its establishment. For instance, when seen on an aerial photo, Cambridge Cemetery has a much more open canopy in comparison to its older neighbor the Mount Auburn Cemetery, which was created in a Rural style. The reason for this is that large areas of Cambridge Cemetery were developed at a much later date, when the Lawn cemetery typology replaced the Rural cemetery's forest — like aesthetics with wide sections of lawn and fewer trees.

The diagram of 'Landscape Character Zones' and corresponding landscape character images, shown on the following pages, illustrate the differences in various Cemetery parts that contribute to the visual interest and overall character.

TREE INVENTORY AND KEY FINDINGS

The Cambridge Cemetery landscape character is shaped by an impressive number of trees of various ages, types, and species. The following analysis of the existing tree population reflects the City's GIS Tree Inventory database as provided in 2019, which was based on an earlier inventory that had been updated over time. (A database update was not available at the time of writing this report in 2023.)

- A total of 822 trees were mapped:
  - Of those, 100 (12% of total) were classified as "retired" (removed), "dead," or "stumps."
- A total of 73 species were identified:
  - Deciduous: 60 species, 576 quantity.
  - Coniferous /Broad leaf Evergreen: 13 species, 135 quantity.
  - 11 unknown species.
- Norway Maple (99) is the most populous tree, followed by Sugar Maple (72) and Cherry (48).
- Austrian pine (43) is the most represented conifer.
- There is a significant quantity of ornamental / flowering trees, especially in the central Rural cemetery area.

As seen on the 'Existing Trees Map by Type' on the following page, which is a depiction of the tree inventory database, there are areas along avenues that have a typical linear pattern of allée planting, alternating with bare gaps; this is most likely a result of tree loss over time.

Figure 30. Existing trees map by type: deciduous, coniferous, and ornamental.

EXISTING TREES MAP BY TYPE

City of Cambridge GIS

Tree Type

- Deciduous Shade Tree
- Deciduous Flowering Tree
- Coniferous Tree

RURAL CEMETERY

- Greatest number and concentration of trees as well as species diversity
- Top 5 Species: Austrian Pine, Sugar Maple, Black Cherry, Red Oak, Norway Maple

RURAL MODIFIED

- More open than Rural, with large shade trees along avenues and scattered across grave lots
- Top 5 Species: Norway Maple,Sugar Maple, Red Maple,Black Cherry, Crabapple

LAWN CEMETERY - 19TH CENTURY

- Mostly open lawn, with shade trees along avenues and paths
- Top 5 Species: Norway Maple, Sugar Maple, Red Maple, Norway Spruce, White Pine

LAWN CEMETERY - 20TH CENTURY

- Open lawn with very few trees along edges
- Top 5 Species: Honeylocust, Arborvitae, Norway Maple, Green Ash, Hawthorn

LAWN CEMETERY - VETERANS

- Sparse tree canopy; few trees along edges
- Top 3 Species: Norway Maple, Crabapple, Cherry

RIVER'S EDGE

- Wooded edge with dense woody vegetation
- Large quantity of invasive species present

LANDSCAPE CHARACTER ZONES

Figure 31. Diagram of Landscape Character Zones. The zones correspond to various stages of the Cemetery's development.

SORTED BY COUNT

Species	Common	Dec/ Evg	Tree Count
Acer platanoides	Norway Maple	Dec	99
Acer saccharum	Sugar Maple	Dec	72
Prunus sp	Cherry sp.	Dec	48
Prunus serotina	Black Cherry	Dec	38
Gleditsia triacanthos	Honeylocust	Dec	36
Acer rubrum	Red Maple	Dec	27
Quercus palustris	Pin Oak	Dec	18
Malus sp	Crabapple	Dec	16
Quercus rubra	Red Oak	Dec	16
Fraxinus pennsylvanica	Green Ash	Dec	15
Acer pseudoplatanus	Sycamore Maple	Dec	12
Cornus florida	Flowering Dogwood	Dec	11
Quercus bicolor	Swamp White Oak	Dec	11
Tilia americana	American Linden	Dec	10
Pyrus calleryana	Callery Pear	Dec	9
Acer saccharinum	Silver Maple	Dec	9
Cotinus sp	Smoketree	Dec	8
Fraxinus americana	White Ash	Dec	7
Cornus kousa	Kousa Dogwood	Dec	6
Platanus acerifolia	London Planetree	Dec	6
Ulmus americana	American Elm	Dec	5
Ulmus sp	Elm sp.	Dec	5
Ginkgo biloba	Ginkgo	Dec	5
Aesculus hippocastanum	Horsechestnut	Dec	5
Magnolia sp	Magnolia	Dec	5
Quercus velutina	Black Oak	Dec	4
Prunus virginiana	Chokecherry	Dec	4
Cercis Canadensis	Eastern Redbud	Dec	4
Fagus sylvatica	European Beech	Dec	4
Crataegus sp	Hawthorn	Dec	4
Syringa reticulata	Japanese Tree Lilac	Dec	4
Amelanchier sp	Serviceberry	Dec	4
Acer nigrum	Black Maple	Dec	3
Prunus serrulata	Japanese Flowering Cherry	Dec	3
Styphnolobium japonicum	Japanese Pagoda Tree	Dec	3
Catalpa speciosa	Northern Catalpa	Dec	3
Quercus stellata	Post Oak	Dec	3
Ailanthus altissima	Tree of Heaven	Dec	3
Fagus grandifolia	American Beech	Dec	2
Phellodendron amurense	Amur Cork Tree	Dec	2
Betula pendula	European White Birch	Dec	2
Betula populifolia	Gray Birch	Dec	2
Cercidiphyllum japonicum	Katsura Tree	Dec	2
Tilia cordata	Littleleaf Linden	Dec	2
Quercus lyrata	Overcup Oak	Dec	2
Prunus pensylvanica	Pin Cherry	Dec	2
Tilia tomentosa	Silver Linden	Dec	2

SORTED BY COUNT

Species	Common	Dec/ Evg	Tree Count	
Populus grandidentata	Bigtooth Aspen	Dec	1	
Robinia pseudoacacia	Black Locust	Dec	1	
Koelreuteria paniculata	Golden Raintree	Dec	1	
Celtis occidentalis	Hackberry	Dec	1	
Acer palmatum	Japanese Maple	Dec	1	
Gymnocladus dioicus	Kentucky Coffeetree	Dec	1	
Sorbus alnifolia	Korean Mountain Ash	Dec	1	
Morus rubra	Red Mulberry	Dec	1	
Sassafras sp	Sassafras	Dec	1	
Liquidambar styraciflua	Sweetgum	Dec	1	
Acer buergerianum	Trident Maple	Dec	1	
Liriodendron tulipifera	Tuliptree	Dec	1	
Morus alba	White Mulberry	Dec	1	
Total Deciduous Trees			**576**	**Deciduous species count 60**
Pinus nigra	Austrian Pine	Evg	43	
Thuja occidentalis	Arborvitae	Evg	23	
Picea abies	Norway Spruce	Evg	19	
Tsuga canadensis	Eastern Hemlock	Evg	13	
Picea pungens	Blue Spruce	Evg	11	
Pinus strobus	White Pine	Evg	10	
Picea glauca	White Spruce	Evg	6	
Pseudotsuga menziesii	Douglas Fir	Evg	3	
Ilex opaca	American Holly	Evg	2	
Pinus sylvestris	Scotch Pine	Evg	2	
Picea mariana	Black Spruce	Evg	1	
Ilex aquifolium	English Holly	Evg	1	
Taxus sp	Yew	Evg	1	
Total Evergreen Trees			**135**	**Evergreen Species Count 13**
Total Trees with Known Species			**711**	**Total Species Count 73**
Trees with Unknown Species			11	
Retired (removed)			76	
Stumps			19	
Dead			5	
Total Mapped Trees			822	

Figure 32. Tree inventory sorted by species count. The two top trees are Norway Maple (99) in the deciduous category, and Austrian Pine (43) in the evergreens category.

TREE POPULATION ISSUES AND CHALLENGES

Tree Decline and Loss

The 2019 GIS tree inventory presented a concerning statistic: about 100 trees, or over 12% of the total tree count, was either dead or already removed. Since then, there has been additional tree loss that was evident on recent site visits. Accelerated climate change, weather extremes, disease, and pests will continue to impact the tree population at Cambridge Cemetery.

There is also a visible decline of Norway maples, the Cemetery's most represented species, many of which are located along the Cemetery avenues. As they are

approaching the end of their life, their replacement must be proactively planned for, so that the historic pattern of shade trees along avenues can be preserved.

Graves vs Trees

A tree trunk growing around an old tombstone is not rare in historic cemeteries, but in some cases freeing the impacted headstones requires tree removal. The large copper beech near Lawn Avenue is an example that should be addressed while it is still possible to extract the monuments and preserve this valuable specimen.

A larger issue is that maximizing grave lots in some areas has taken precedence over trees. For instance, the ranges around Monument Avenue omitted trees altogether, resulting in a bare look that stands in contrast to the rest of the Cemetery. There are also instances when a tree was removed, that grave lots took its place rather than replanting a new tree. It is difficult to plant Cemetery trees in areas already occupied by grave lots, and therefore preservation of existing trees has a great importance.

Invasive Vegetation

The Cemetery grounds are well managed and there are few instances of volunteer invasive vegetation, with the exception of Norway maples that were intentionally planted a long time ago and that are now considered invasive. The problem areas are located right outside the Cemetery fence on the slope towards Greenough Boulevard, where noted invasive species include black locusts, Japanese knotweed, and oriental bittersweet. The area is mostly under DCR ownership, but the Cemetery would benefit from their management and enhanced views of the Charles River.

Recommendations related to the preservation and improvement of the Cambridge Cemetery trees and other vegetation are included in Part Four of this report.

Urban Forest Master Plan

The City of Cambridge is heavily invested in protecting and promoting a healthy and sustainable urban forest for its many benefits. The City of Cambridge Urban Forest Report, published in 2020, (Urban Forest Master Plan) outlined a series of recommendations and an action plan to strengthen, expand, and diversify the tree canopy on public as well as private land. The Cambridge Cemetery can play a significant role in these efforts. Future work at the cemetery should follow the goals and recommendations of the Urban Forest Master Plan.

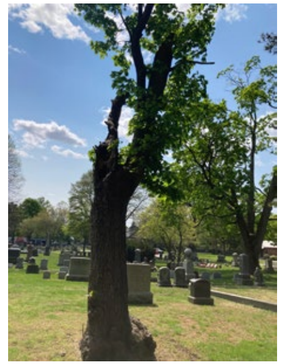


Figure 33. Tree decline due to aging and environmental stress is a concerning issue.

Figure 34. The copper beech near Lawn Avenue is growing around an old monument.

2.5 | BURIAL SERVICES AND STATUS

ROAD CLOSURES AND INFILL STATUS

Cambridge Cemetery is reaching its capacity for conventional (full-body) burials. Expanded several times over its existence, by the early 2000s the Cemetery filled up the last of the ranges near Memorial Avenue and has since then relied on road closures to provide new grave lots, most of which are fully sold out:

- Summit Avenue
- Fountain Avenue
- Central Avenue
- Fir Avenue
- Oak Avenue between Laurel and Elm
- Dell Avenue
- Halcyon Avenue
- River Avenue from Pine to Crescent
- Crescent Avenue from Laurel to Oak
- River Avenue from Greenwood to Coolidge (south entrance closed)
- Birch Avenue (not selling yet)
- Laurel Avenue (not selling yet)

The road closures and the currently active areas for new lots are illustrated on the Existing Development and Infill Map on the following page.

BURIAL OFFERINGS SUMMARY

Lots in the Cemetery are limited to Cambridge residents and are available for immediate burial arrangements only. Pre-sales of new lots are not available for either full-body or cremated remains burials.

- Single grave lots (typically 3' wide x 8' long) can accommodate 2 full-body interments, with a choice of upright, slanted, or flat granite memorials. The lot owners can choose to use these lots for a combination of full-body and cremated remains burial.
- Veterans lots are for single burials and use flat markers.
- Cremation lots are offered for 2 or 4 urn burials and can only use flat markers. An area along the south perimeter towards the river is dedicated to cremated remains burials. The intent for this location was to offer river views, however dense vegetation outside of the fence obscures views most of the year.
- There are currently no cremation niches, columbaria, cremation gardens, ossuaries, or scattering opportunities for cremated remains.
- In recent years the number of new lots sold has been around 65 lots for full-body and much fewer for cremated remains. This low number of cremated remains burials is disproportionate to the Massachusetts statistics that cited 52.7% cremation rate in 2022 (CANA, 2023) and a continuously rising trend. The potentially unmet need for cremated remains burials is an opportunity for Cambridge Cemetery to extend its active operations even after new full-body burial spaces cease to be offered.

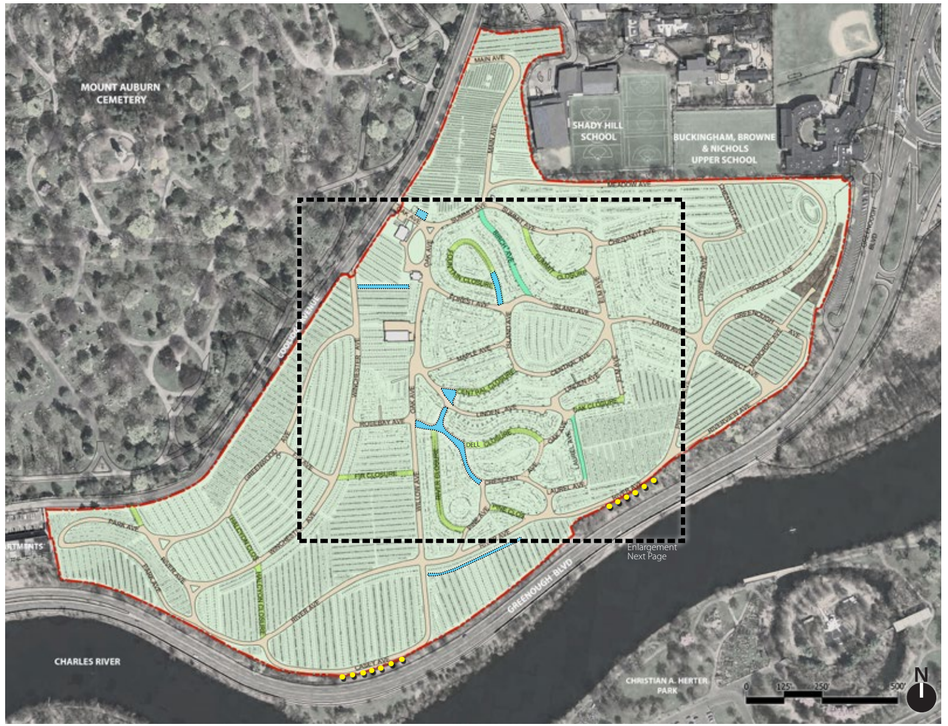


Figure 35. Road closures and active burial areas map.

ROAD CLOSURES AND CURRENT ACTIVE BURIAL AREAS MAP

Legend

- Cemetery Entrance
- Paved Road (Asphalt)
- Road Closure - Developed
- Road Closure - Undeveloped
- Family Lots
- Individual Lots
- Current Area for Cremated Remains Burial
- Current Active Burials Area (New Lot Sales)

Latest infill area adjacent to the Chapel - foundation for headstones has been installed.

Central Avenue closure expansion.

Dell Avenue closure - conventional headstones at base of slope.

Crescent Avenue closure - the new headstones turn their back to the Dell Path oval area (left).

Cremated remains area at River Avenue. Views of the Charles River are obscured by invasive vegetation.

Laurel Avenue closure - foundations installed, not selling yet.

Figure 36. Recent infill and road closure areas as referenced on Existing Infill Areas Map Enlargement on the following page.

EXISTING INFILL AREAS MAP ENLARGEMENT

Legend

- Cemetery Entrance
- Paved Road (Asphalt)
- Road Closure - Developed
- Road Closure - Undeveloped
- Family Lots
- Individual Lots
- Current Area for Cremated Remains Burial
- Current Active Burials Area (New Lot Sales)

Figure 37. Existing infill areas map enlargement.

Part Three:
DEVELOPMENT RECOMMENDATIONS

3.1 | OVERALL DEVELOPMENT RECOMMENDATIONS

The recommendations in Part Three support the goal of prolonging the active Cemetery function for as long as possible. As full-body burial options are getting depleted due to lack of space, a shift to cremated remains offerings would ensure longevity beyond the next decade.

Develop a Policy for Full-Body Lot Phaseout

Even if most of the FB opportunities presented in this plan are developed, the sales of FB lots at the current rate of 65 per year may not last more than 5 to 8 years.

- Road Closures: =240 FB
- Full-Body Infill: = 36 FB
- Road Narrowing: =150 FB
- New Veterans Lots (reserved): =110 FB
- Expansion (unlikely): =132 FB

  Total Estimated FB Potential =668 FB

While second FB burials in already occupied lots will continue for some time, the sale of new lots will end soon. In order to continue offering new FB lots beyond the 5-year mark, the City must consider the following policies and measures:

- Immediately cap the number of yearly FB lot sales, keeping some lots in reserve for future years.
- Sell FB lots only for first FB burials (second burials may be CR).
- Make arrangements with other cemeteries to designate areas for Cambridge residents, or establish a new cemetery on land outside the City limits.

Prioritize and Diversify CR Options

At Cambridge Cemetery the breakdown of interments has traditionally favored full-body burials (FB) with less demand for burials of cremated remains ("cremains" or CR). In contrast the Massachusetts cremation rate was 52.7% in 2022 and is projected to grow to 57.9% by 2032 (CANA, 2023). There could be various reasons for the discrepancy in cremation rate vs. demand for CR burials, such as families choosing to keep cremains at home or scattering them in non-cemetery settings. But the lack of demand might also indicate that customers are not familiar with the possibilities at the Cemetery or desire different options than currently being offered. This suggests that more could be done in developing and marketing the CR opportunities to fill this niche.

Furthermore, the CR options are the key to extending the Cemetery's active function. CR options can be fitted in the landscape more easily, and can provide much greater yield than FB.

- Invest in CR options as soon as possible, before the remaining FB options are used up.
- Develop attractive CR options with incentives for customers to choose them. Emphasize quality and beauty, such as verdant cremation gardens, well-crafted columbaria, and allowing slanted-upright monuments.
- Combine the new development with a public informational campaign to familiarize the local funeral professionals and customers with the new options
- Consider allowing pre-sale of CR family lots and niches.

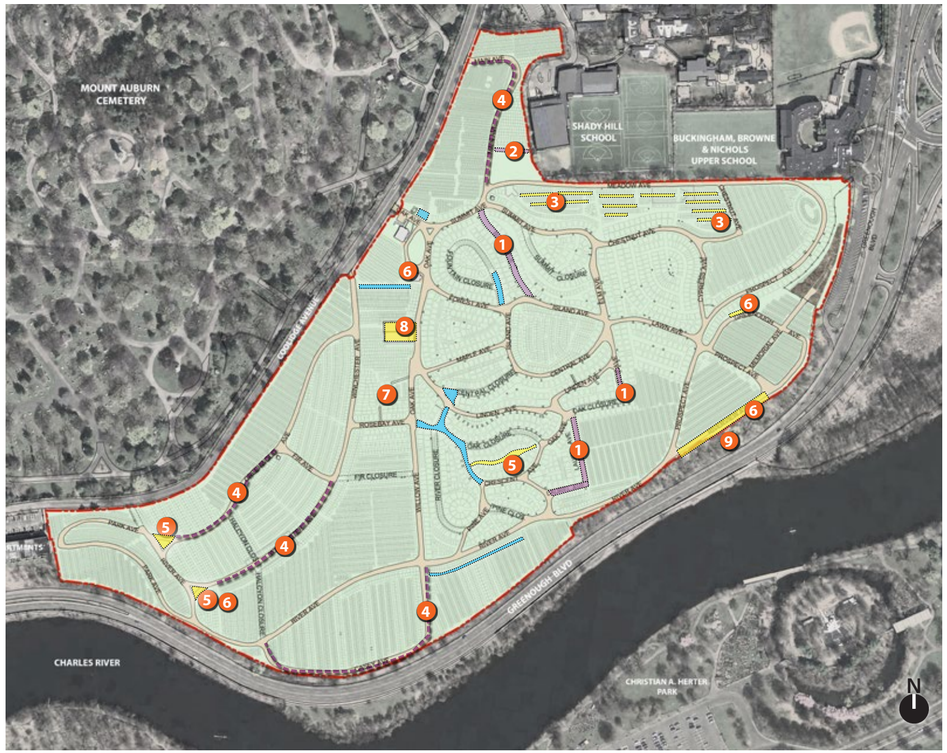


Figure 38. Existing active burial areas and proposed development opportunities map.

DEVELOPMENT OPPORTUNITIES: OVERALL

Legend

FB = Full-Body Burial

CR = Cremains Burial

- Current Active Area for FB
- Potential New Areas for FB
- Potential New Areas for CR
- Potential Road Narrowing

Proposed Opportunities

1. Road Closure - FB
2. Full-body Infill - FB
3. Infill at Wide Aisles - CR only
4. Road Narrowing - CR + FB
5. Cremains Garden - CR only
6. Columbarium or Memorial Wall - CR
7. Receiving Tomb Rehab - CR
8. Reuse of Service Yard - CR
9. Expansion - FB and CR

3.2 | ROAD CLOSURES AND INFILL

ROAD CLOSURE - REMAINING OPPORTUNITIES

The Evaluation Report (BSC Group, 2005) recommended conversion of several Cemetery roadways into full-body burial sites (a.k.a "road closures"). Most of the feasible road closures have already been implemented. The map on the following page shows the few remaining opportunities along with an estimated number of burial spaces for each.

- Birch Avenue has been converted; not selling yet.
- Laurel Avenue has been converted to green space and ground beam foundations have been installed for headstone placement; not selling yet.
- Elm Avenue may be more challenging for lots due to its steep slope.
- Laurel Avenue extension between Laurel and River Avenue will be needed for access to Laurel Avenue and should be developed last.

Additional road closures are not recommended as they would impair the Cemetery circulation.

Development Guidelines

- Interrupt the long array of proposed graves at Laurel Avenue with new trees at about 60'-70' spacing and a staggered pattern, to create a more attractive setting and expand the tree population.
- At Birch Ave the graves should be clustered to allow uninterrupted access to the existing stone stairs.

Estimated Yield

- Based on a layout with 3' x 8' lots and no unforeseen obstacles, the potential total FB lot yield in the remaining road closures is about 240 new graves.
- Considering the current demand for about 65 new FB graves per year, this will result in approximately 3.5-4 years of FB lot sales.

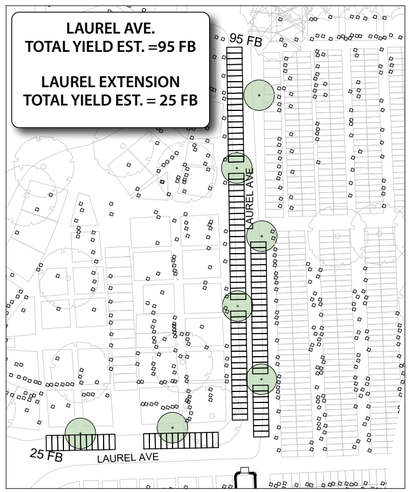


Figure 39. Conceptual layout study for Laurel Avenue incorporates trees to break the long expanse of graves.

ROAD CLOSURE: NEW FULL-BODY LOTS ESTIMATE

Figure 40. Map of remaining road closure opportunities and estimated yield

Figure 41. Birch Avenue lot layout must preserve access to the existing stairs and family lots.

Figure 42. Laurel Avenue is already prepared with footings for headstones.

Cremated v.s. Full-Body Infill

In-ground interment of cremated remains ("cremains" or CR) takes up much less space than full-body (FB) burial and therefore allows greater opportunities for infill. As a comparison:

- Each FB lot is typically 3' x 8' and requires a 3' minimum wide aisle at one end of the lot. It can accommodate two FB burials.
- CR in-ground lot is typically 3'x3' and can accommodate four urn burials with a single monument. The same square foot area could accommodate eight times more CR than FB burials.
- Single cremation lots could be as small as 18"x18;" however, the consequence of this could be the clutter of multiple small headstones. Single cremation lots should be associated with a communal monument such as a tablet, upright monument, coping element, or memorial wall, which would provide space for multiple names.
- Excavation for CR burials is typically fairly shallow, and there are few concerns about hazard to Cemetery equipment from soil settlement and less impact to tree roots than excavation for FB graves.

FULL-BODY INFILL AT MAIN AVE.

There are very few remaining infill opportunities for full-body lots.

- A potential FB infill area is a wide aisle next to Main Avenue and the Korea and Vietnam Veterans section; the space is tight and therefore requires extra precautions and possibly GPR survey. Estimated yield=36 FB.

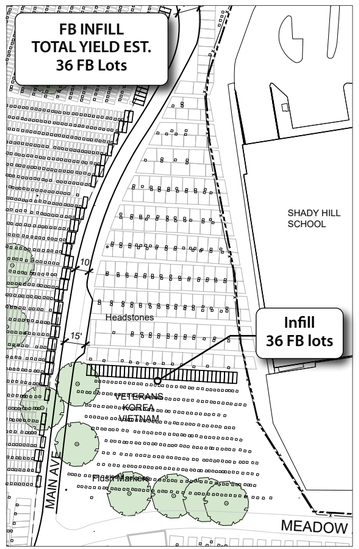


Figure 43. Study of full-body infill at Main Avenue.

CREMAINS INFILL AT WIDE AISLES

The north slope of the Cemetery contains several ranges between Summit, Chestnut, and Meadow Avenues, which have a much wider spacing between the headstones on each side than the typical spacing in other ranges. The Cemetery's preliminary investigations indicate that burials extend closer to the middles of these aisles than would be expected from the headstone locations, and therefore FB infill could not be accommodated.

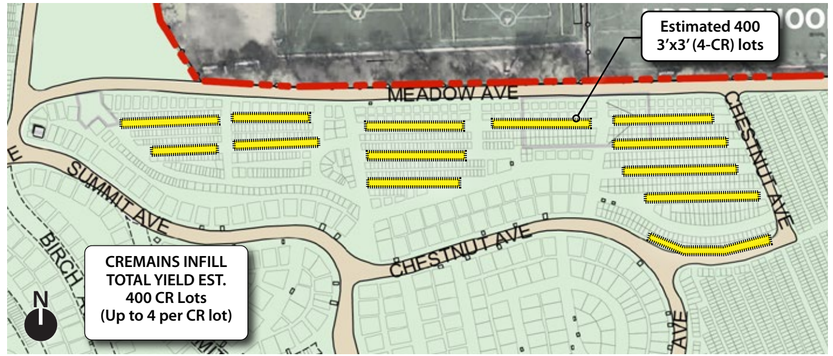
However, based on a layout study it appears that there would be enough space for a single row of CR lots (3'x3') in each of these wide aisles. A conceptual diagram of where those CR lots could be located is shown on the Cremains Infill Planon the following page.

- This infill could provide a significant yield for CR burials: a conservative estimate of about 400 4-urn CR lots.

Development Guidelines

- Provide 3'x3' lots for burial of up to 4 CR each. Cluster the CR lots in smaller groups for visual relief.
- Each lot should have a single monument, which could be flush or slanted.

Cremains Infill at Wide Aisles: Plan



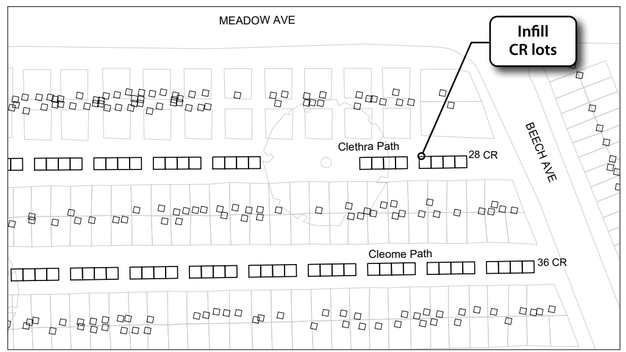


Figure 44. Wide aisles may accommodate CR infill. Key plan of wide aisle areas (above);. conceptual layout of CR lots in smaller clusters (below).

Cremains Infill at Wide Aisles: Prototype

Figure 45. Visualization of cremated remains infill at wide aisles.

INFILL STUDY LIMITATIONS

The preceding infill studies were performed on a conceptual level, using the existing GIS plan base. This base does not have the precision necessary for implementation, and therefore further investigation is needed to confirm the extent of burials and the feasibility of infill. Ground Penetrating Radar (GPR) is a non-invasive technology that could help in achieving this aim.

Next Steps

- Utilize GPR to investigate the wide aisles proposed for infill at the north Cemetery edge.
- Start with an area of 50'x 120' that includes Mimosa and Verbena paths (located adjacent to Beech Ave). If there are consistent findings within these two paths, this will inform if there is a need for further GPR investigations in other segments.
- Consider applying for CPA funds if more widespread subsurface investigations are required.

Ground Penetrating Radar

- Technology: GPR is a non-intrusive method for investigating subsurface conditions, which uses electromagnetic radiation to detect subsurface objects, changes in material properties, and voids. A GPR transmitter emits electromagnetic energy into the ground; when the energy encounters a buried object or a boundary between materials having different permittivities, it returns to the surface. A receiving antenna can then record the variations in the return signal (Wikipedia).
- Method: The GPR antenna is attached onto a carrier that resembles a push lawnmower. The operator records the subsurface conditions by moving back and forth along a predetermined transect or grid at determined intervals (e.g. 1/2-meter interval). The data is presented on the screen in real time; however, processing the data in a lab often provides more useful information.
- Deliverables: Visualization software typically presents a series of sections as well as plans that could be overlaid with a GIS base / aerial.

(Source: Interview with Marty Dudek and David Gutbrod from Chronicle Heritage)

3.3 | ROAD NARROWING

ROAD NARROWING: PROS AND CONS

Once the remaining road closures in the previous chapter are implemented, additional road closures would impair the circulation and are not recommended. Road narrowing in select areas has the potential to gain space for burials and planting while retaining a functional site circulation.

The Proposed Circulation Map on the following page illustrates the few identified road narrowing opportunities. A key finding was that most of the avenues are already narrow and that their further narrowing would not yield burial lots. It is also important to keep the main circulation two-way for ease of getting around, which leaves only four road segments as candidates for narrowing.

Below are the pros and cons of road narrowing that must be taken into consideration.

Pros:

- Expand available land for burials and tree planting.

Cons:

- One-way circulation might be confusing for visitors.
- Road narrowing reduces parking capacity for funerals and impacts the ease of visitation.
- Road narrowing may cause vehicles to drive and park on adjacent land, causing lawn compaction and other damage.

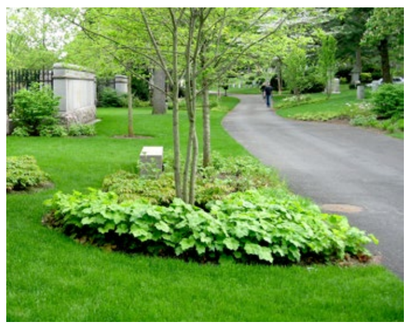


Figure 46. Road narrowing at Mount Auburn Cemetery: 9' wide path with a pullover area

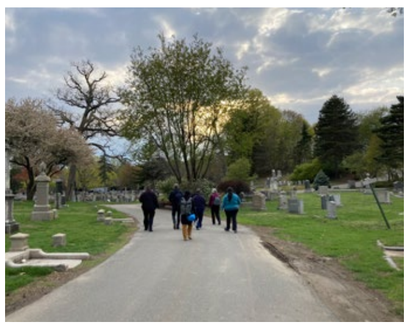


Figure 47. Lawn damage from vehicles at an already narrow existing road at Cambridge Cemetery

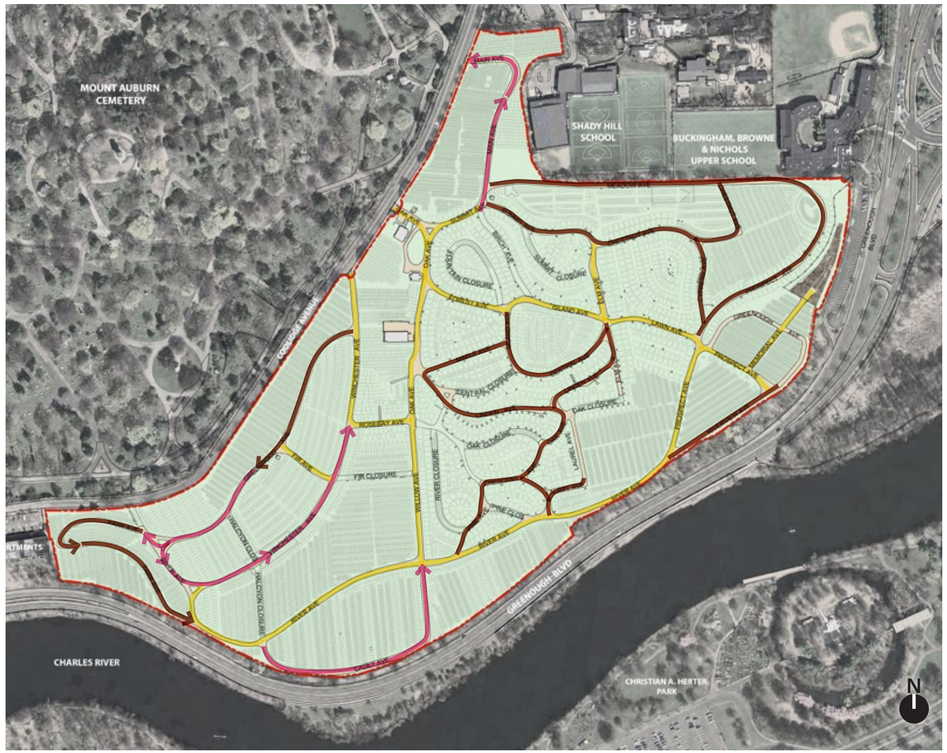


Figure 48. Proposed circulation map identifying main two-way roads and potential one-way roads.

PROPOSED CIRCULATION MAP

Legend

- Main Two-Way Circulation - keep as is
- Narrowing Possibility (One-way 9'-wide with Passing Areas)
- Roads Already Narrow (<13') - No benefit in further narrowing

ROAD NARROWING GUIDELINES

The suitable candidates for road narrowing and one-way circulation are typically in the range of 13’ to 16’ wide. The following guidelines should be followed to establish the one-way narrowed roads:

- The width of narrowed pavement should be 9’ minimum.
- Pullovers should be 7’ wide minimum and should be provided at several locations along the length of the roadways. These pullovers will serve as parking areas and to allow passing of vehicles.
- Retain one of the road edges in its present alignment, keeping the existing buffers between the lot lines and the road. Trees have historically been planted in those buffer areas.
- On the side where the road pavement is removed, lay out burial lots. Take special care to provide adequate clearances between the new lots and existing graves, as well as buffers to the edges of roads (see Road Narrowing Prototype diagrams on the following pages):
  - At cremation lots the buffer between the CR lot and the road edge should be 3’ minimum.
  - At full-body lots the buffer between the FB lot and the road edge shall be 4’ minimum.

Road Narrowing Prototype with Cremated Remains lots

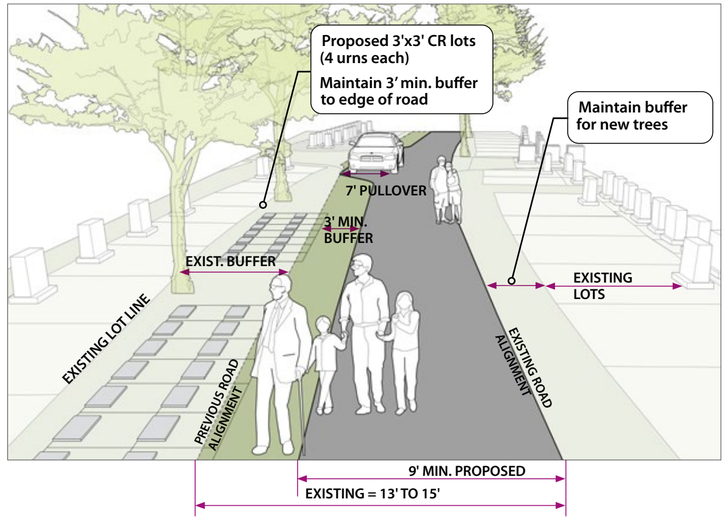
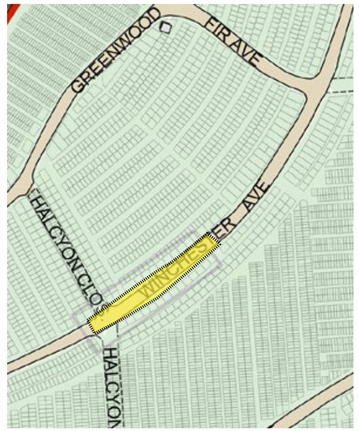


Figure 49. Road narrowing prototype / guidelines with cremated remains lots.

Road Narrowing Prototype with Full-body lots



Plan Key

Location of prototype at Winchester Avenue

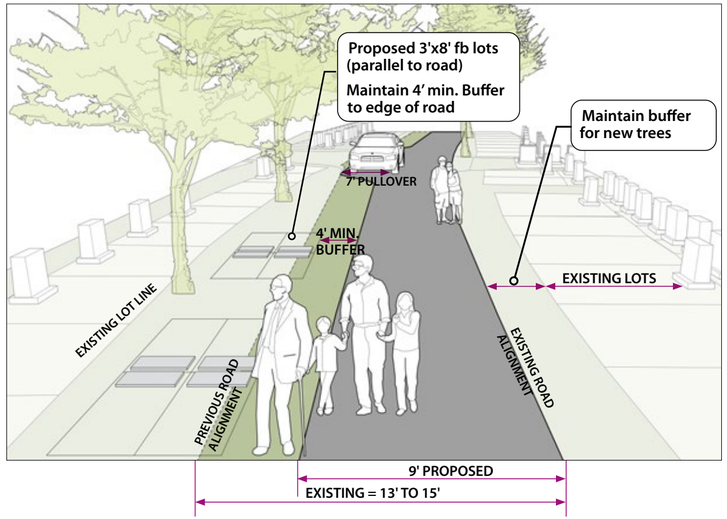


Figure 50. Road narrowing prototype / guidelines with full-body lots.

1. GREENWOOD AND WINCHESTER AVENUE NARROWING STUDY

Greenwood and Winchester Avenues create a circulation loop significant for the west part of the Cemetery. They are currently about 14-15’ wide, so their narrowing to 9’ could provide FB and CR lot opportunities. However, the estimated yield must be weighed against the circulation impact and reduced amenity of the narrowed roadways. Therefore, the Greenwood and Winchester narrowing should be a low-priority intervention.

- Reconfigure Greenwood and Winchester Avenues as a counter-clockwise one-way 9’ wide loop. Provide vehicle pullovers at several locations.
- On Greenwood, align the new lots with existing range lots.
- On Winchester, allow only flush markers to minimize visual impact on adjacent family lots.
- Restore the tree allée with shade trees planted at about 50’ spacing while removing the dying Norway maples. Ensure that new trees are not in conflict with existing graves and access aisles.

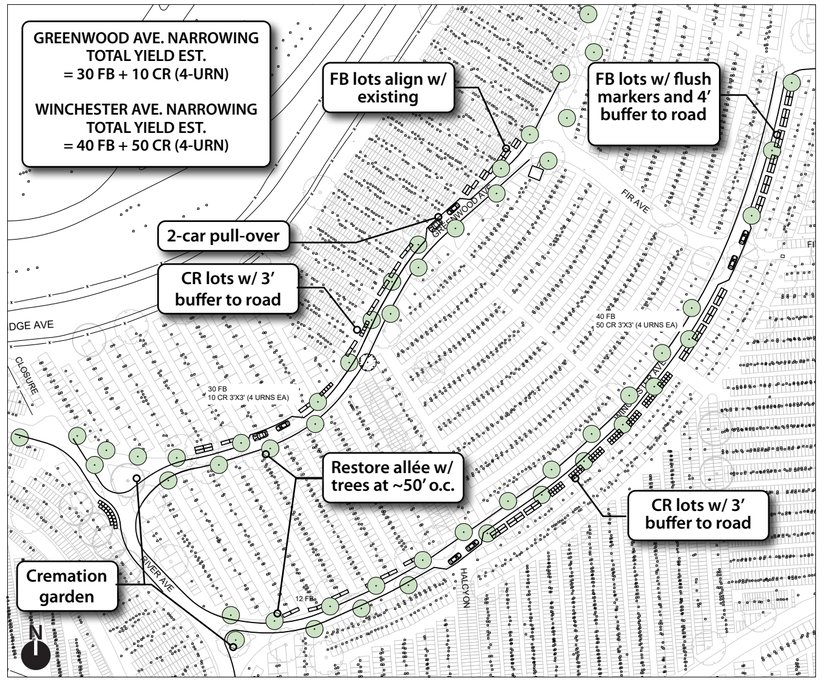


Figure 51. Conceptual plan study for Greenwood and Winchester Avenues narrowing including proposed lot layout and new trees.

2. CASEY AVENUE NARROWING STUDY

Casey Avenue is currently about 15’-6” wide. It is not a critical road for overall Cemetery circulation and therefore it can be converted to one-way, 9’ wide pavement to provide FB or CR opportunities. The narrow buffer between the road and the Cemetery fence is actively used for cremated remains burials.

- The potential FB yield shown on the concept plan must be confirmed with an actual site survey and current Cemetery records.
- Depending on actual conditions, the Casey Avenue narrowing could provide added CR instead of FB lots.
- Plant new trees at the edges of adjacent ranges as illustrated, to restore the allée on River Avenue and enhance the landscape.

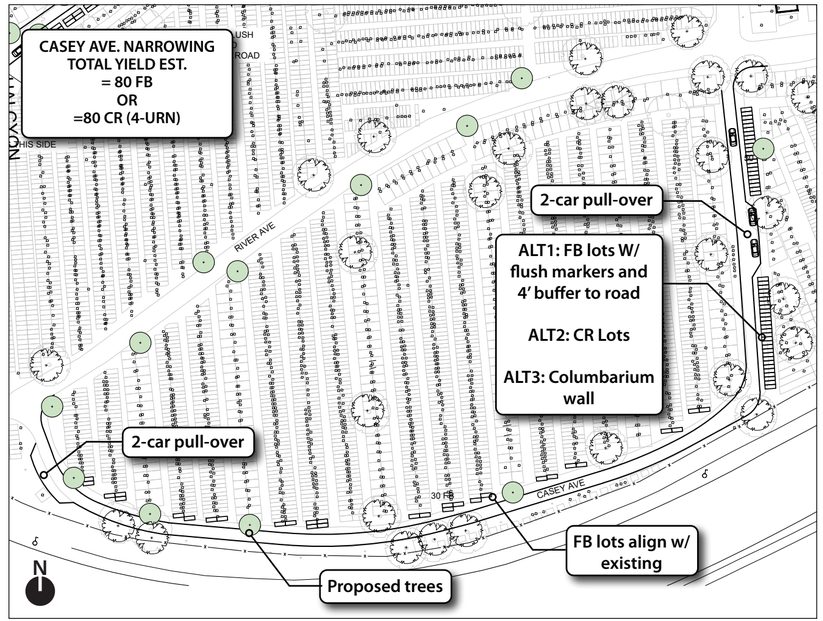


Figure 52. Conceptual plan study for Casey Avenue narrowing including proposed lot layout and new trees.

3. MAIN AVE NARROWING STUDY (NEW VETERANS LOTS)

The Main Avenue road narrowing has a good potential to provide added FB lots as it will not have significant circulation impacts and is therefore recommended as a higher-priority intervention.

- Narrow Main Ave to one-way road as shown on the concept plan; reconfigure the north Cemetery gate for the decreased width. Utilize the gained space from the road narrowing for veteran's graves.
- Estimated Yield = 110 FB

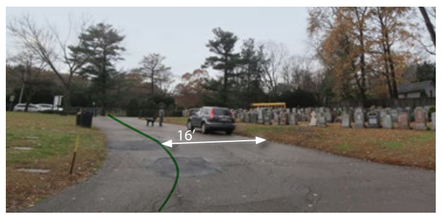


Figure 53. Main Avenue E-W segment looking west (above); N-S segment looking south (below).

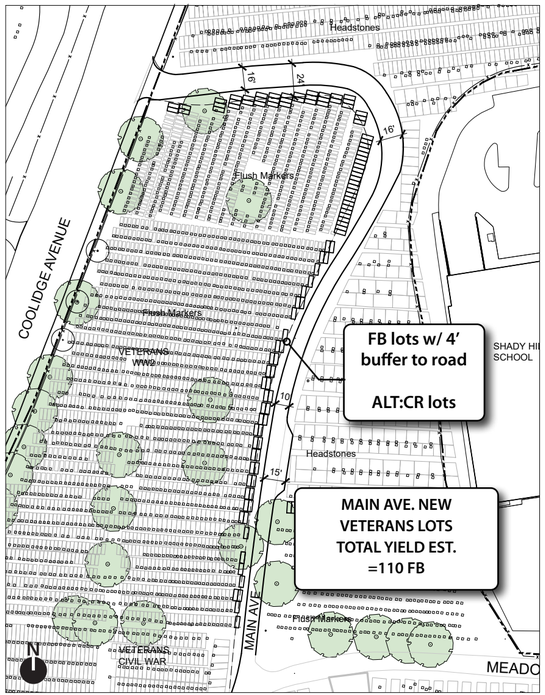


Figure 54. Main Avenue narrowing concept plan to expand the Veterans area.

Road Narrowing Study Limitations

The case studies of road narrowing presented in this chapter were performed on a conceptual level, using the existing GIS plan base. This base does not have the precision that is needed in the context of such a densely developed Cemetery. Furthermore, the GIS base does not represent the most recent burial lot information, which has not been digitized. Therefore, more precise base information is required to adjust the estimated yields for actual site conditions.

Recommended Next Steps

- Perform a site survey of the areas that were recommended for road narrowing and infill (Greenwood, Winchester, Casey, and Main Avenues). The survey should document surface conditions including existing road edges, monuments, lot and perpetual care markers, and trees, withing approximately 15' from road edges or to the first row of grave monuments.
- Cross-check and show the up-to-date burial records in these areas.
- Based on the site survey and Cemetery records, reassess where and what type of infill could be accommodated (FB or CR).
- In areas where extents of burials are not certain, use Ground Penetrating Radar (GPR) to confirm if new lots can be sold there.

3.4 | CREMATION GARDENS

The creation of desirable cremated remains opportunities is among the top objectives to help extend the active operations and meet the growing consumer preferences. Cremation gardens are among the top-priority solutions that can be implemented quickly and with relatively modest investment, to start offering an attractive landscaped setting for CR. These gardens could provide two types of CR burial:

- CR urn burial in a purchased lot, with a stone memorial placed above. The lots could accommodate up to 4 urns with a single monument. In our recent experience many customers prefer upright over flush markers, so these lots could offer slanted uprights as an additional incentive.
- CR burial in a community location (no purchased lot), sometimes referred to as "scattering" although for environmental reasons cemeteries prefer that remains are deposited in a dug hole rather than spread on the surface. No individual markers would be allowed with this type; instead, names could be placed on a nearby communal memorial such as a tablet / ledger stone or an upright monument.

In the densely populated grounds of Cambridge Cemetery cremation gardens could be located at the following areas:

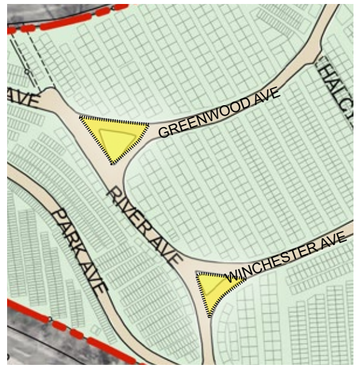
1. The two triangular islands at the west ends of Greenwood and Winchester Avenues. Only the Greenwood Avenue triangle conceptual design is shown, as Winchester Avenue triangle is similar (see also Chapter 3.5 for an alternative with a columbarium pavilion).
2. The Dell Path.

Figure 55. Cremation garden example with CR lots and slanted-upright markers (Swan Point Cemetery, Providence RI)

Figure 56. Cremation Garden with communal tablet markers (Mount Auburn Cemetery, Cambridge MA)

1. GREENWOOD TRIANGLE CREMATION GARDEN

- Remove the paving on the north side of the existing triangle and convert it to green space as part of the cremation garden. Round the south corner of the triangle for ease of tuning northbound on River Avenue.
- Create a central CR burial lawn surrounded with family CR lots (3'x3' lots for 4 urns each and a single lot marker). Provide a vertical communal monument for the lawn CR burials. The number of single CR burials in the lawn can be unlimited, however the number of names that can be commemorated on the communal monument is finite.
- Provide benches and lush vegetation for a contemplative experience.



Plan Key of Greenwood and Winchester triangles.

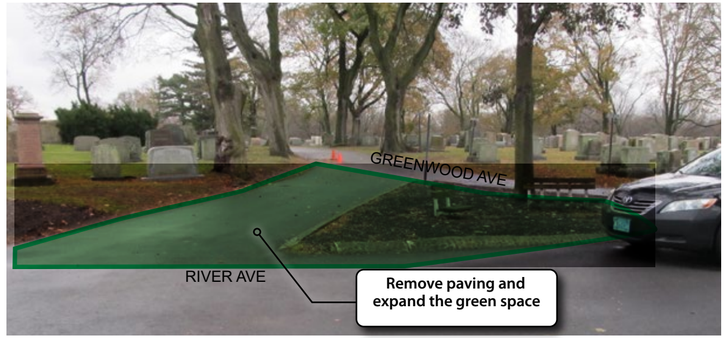


Figure 57. Diagram of pavement removal and green space expansion at Greenwood Avenue triangle.

Greenwood Triangle Cremation Garden Plan

CR lot markers:
Slanted uprights in plant bed.

Communal monument example from Cambridge Cemetery.

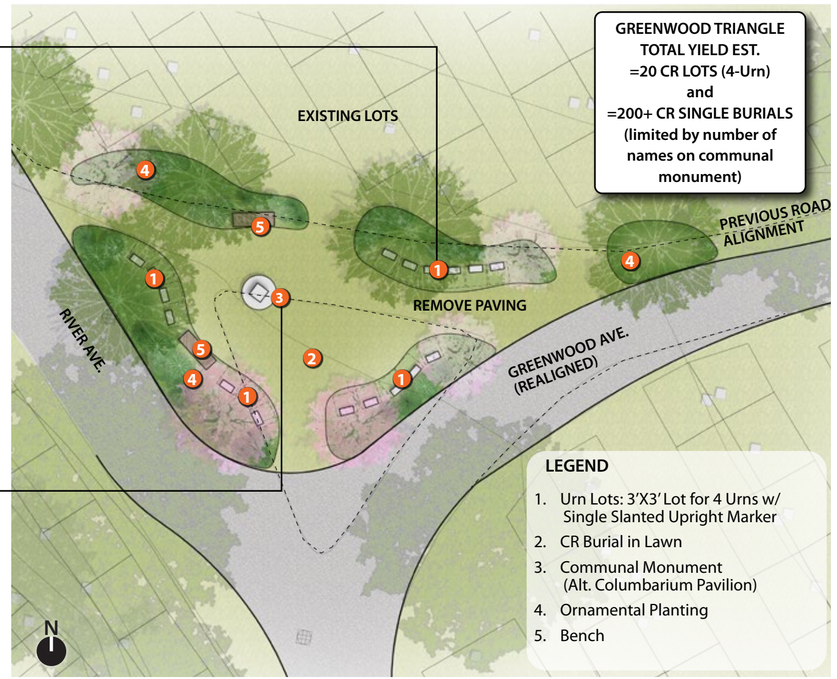


Figure 58. Greenwood Triangle cremation garden proposed design.

Greenwood Triangle Cremation Garden - Existing and Proposed

Existing view of the Greenwood Triangle

Figure 59. Greenwood Triangle: Existing conditions and proposed cremation garden.

2. DELL PATH CREMATION GARDEN

The Dell Garden is intended for burial of CR in a community area - commonly referred to as "scattering." However, for environmental reasons such as detriment to plant life due to high alkalinity, Cambridge Cemetery prefers that remains are deposited in an excavated hole in lawn or planting bed areas rather than surface-scattering

The Dell Path is an excellent location to provide this type of service. It is one of the Cemetery's oldest and most attractive areas, composed of an oval bowl landform surrounded by old grave monuments and shaded by specimen trees. While most of the bowl is occupied with old private lots, the middle part is available and suitable for in-ground CR burial.

- Create an attractive landscaped setting for cremated remains burial. Plant the limits of the oval with native shade-tolerant groundcovers such as Pennsylvania Sedge, Common alum-root (Heuchera americana), Tiarella, Barren Strawberry, and native ferns, while leaving a lawn path with benches in the middle.
- Respect the limits of existing lots when burying CR. Define the lot limits with restored lot markers and native groundcover planting, while retaining the areas available for burials as lawn.
- Integrate communal monuments: an upright monolith near the entrance to the garden from Crescent Avenue and several flat memorial tablets placed in aisles between existing lot lines.

Plan Key

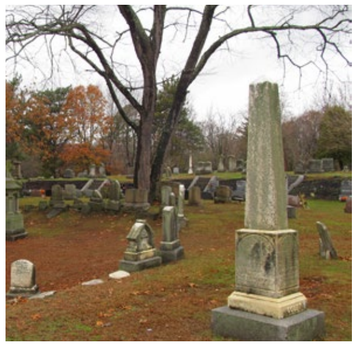


Figure 60. Panorama of the Dell Path bowl. The middle area is available for CR burials.

Dell Path Cremation Garden Plan


Examples of upright and on-ground communal monuments

Figure 61. Dell Path cremation garden proposed design.

Dell Path Cremation Garden - Existing and Proposed

Existing view of the Dell Path

LEGEND

1. Lawn for In-Ground Cremains Burial
2. Upright Communal Memorial
3. Memorial Tablets on Ground
4. Bench
5. Groundcover Planting

Figure 62. Dell Path: Existing conditions and proposed cremation garden.

Recommended Next Steps

- Perform a site survey of the Dell area identifying all stone monuments, lot markets, family lot enclosures, and existing trees. Cross-reference the lot layout with Cemetery records.
- This is the oldest Cemetery area so some stone markers may have been lost or dislocated over the decades. If sufficient records exist, restore the lot markers to visually delineate the private lots vs. the public aisles.
- Notify known descendants of lot owners about the proposed landscape beautification and proposed groundcovers to be planted on their lots.
- During construction ensure that proposed elements such as memorial tablets, trees, and benches, are installed outside of private lots.
- Assist families to ensure CR burials are done outside of private lots and in-ground rather than scattered.

Figure 63. Family lot planted with native groundcovers, at Mount Auburn Cemetery.

3.5 | COLUMBARIA AND MEMORIAL WALLS

Cremation niche walls, aka. columbaria are structures that store funerary urns, while memorial walls serve to display names of persons buried nearby. There are many columbarium products on the market, including pre-assembled and customizable modules that allow cemeteries to select attractive choices that fit their aesthetics and budget.

At Cambridge Cemetery there are presently no columbaria or memorial walls. The Proposed Columbarium and Memorial Wall Locations Map on the following page highlight several suitable locations:

- Columbarium Walls at Chapel
- Retaining Columbarium Wall at Greenough Avenue
- Columbarium Pavilion at Winchester Triangle
- Memorial Walls at Riverview Avenue
- Columbarium Cluster and Cremation Garden at Garage, After Relocation - See Chapter 3.6.

Figure 65. Example of memorial wall with in-ground burials in front of it and names engraved on the wall surface.

Figure 64. Examples of columbaria: pre-assembled model (left) and custom (right).

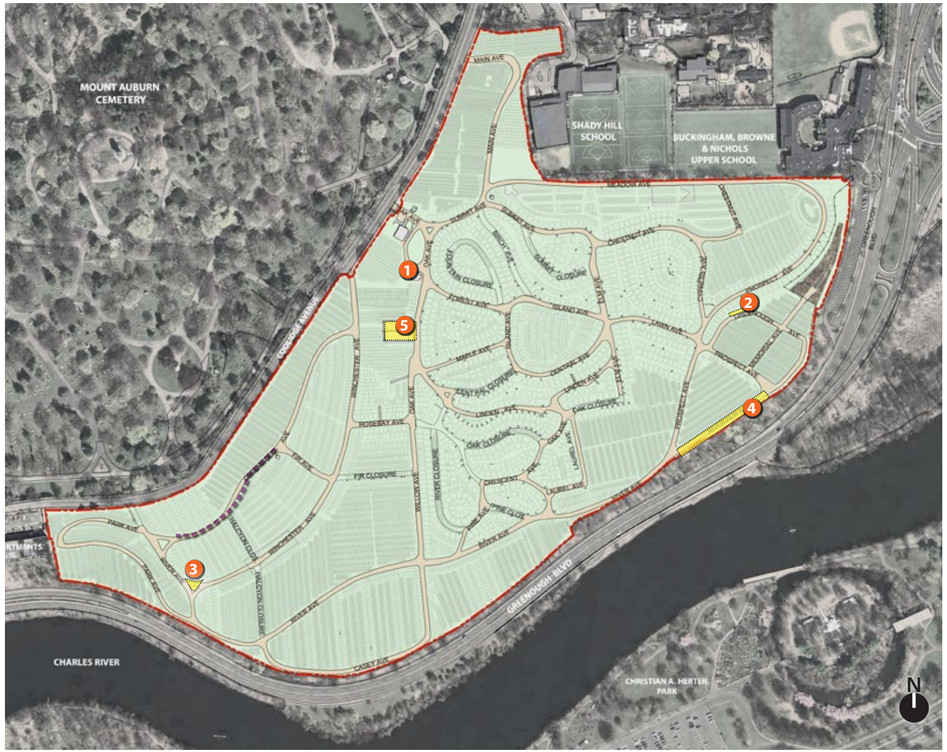
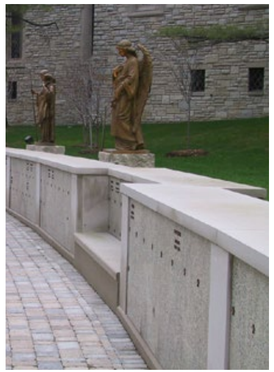


Figure 66. Map of proposed columbaria and memorial wall locations.

MAP OF PROPOSED COLUMBARIUM AND MEMORIAL WALL LOCATIONS

Legend:

1. Columbarium Walls at Chapel
2. Retaining Columbarium Wall at Greenough Avenue
3. Columbarium Pavilion at Winchester Triangle
4. Memorial Walls at Riverview Avenue
5. Columbarium Cluster and Cremation Garden at Garage, After Relocation - See Chapter 3.6



The stonework on the low columbaria walls complements the color of the rustic church stonework behind it without imitating the texture

1.COLUMBARIUM CLUSTER AT CHAPEL

The area next to the Chapel is suitable for a cluster of columbarium walls, in conjunction with the proposed entrance improvements recommendations in Part 4.

- Due to the prominence of the area, custom design is recommended, which will complement the adjacent Chapel's stonework.
- Urn niches should face the driveway.
- Integrate a small accessible plaza with ornamental paving, a bench, and attractive planting.
- Yield = 160 niches (assuming 40 on each wall segment.)

Figure 67. Area next to Chapel is a prime location for columbarium walls

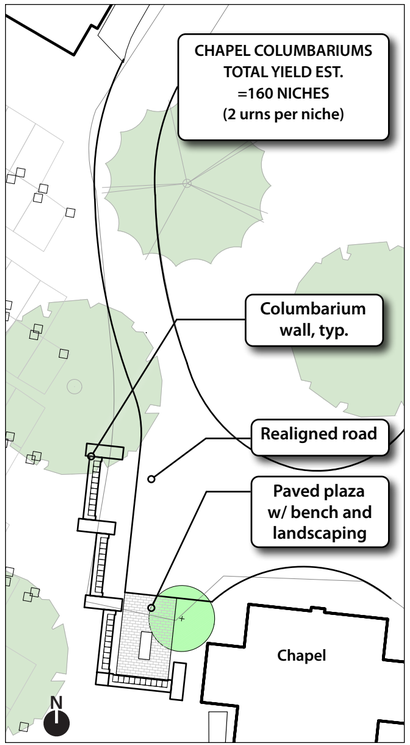


Figure 68. Proposed cluster of columbarium walls at Chapel

2. COLUMBARIUM WALL AT GREENOUGH AVE

The sloped land between Greenough and Prospect Avenue could accommodate a retaining wall columbarium.

- Create a retaining wall with built-in urn niches facing Greenough Avenue. The top of this wall should be low enough to allow views of the adjacent memorials on Prospect Avenue (3-niche height plus a decorative base and coping). Vary the layout and height for a more dynamic design.
- Set back the columbarium wall from the road with a lawn buffer. Adjust the layout as necessary to protect existing trees.
- Estimated yield = 150 urn niches

Figure 69. Proposed columbarium retaining wall at Greenough Avenue

Figure 70. Greenough Avenue, looking north. The slope to the left could be retained with a low columbarium wall.

Figure 71. Retaining wall columbarium at Lakewood Cemetery, Minneapolis, MN.

3. COLUMBARIUM PAVILION AT WINCHESTER TRIANGLE

The two triangles at the ends of Greenwood and Winchester Avenues are recommended locations for cremation gardens (see chapter 3.4). Alternatively, one of these gardens could accommodate a free-standing columbarium pavilion.

- Remove the paving on one side to expand the green space and create a cremation garden.
- Incorporate a round columbarium pavilion, set in a contemplative lawn and surrounded with a vegetated buffer around the garden edges.
- The lawn can be used for in-ground burial of CR, with memorial tablets set in the buffer vegetation.

Figure 72. Winchester Avenue triangle could accommodate a cremation garden w/ columbarium pavilion.

Figure 73. Example of a similar condition: proposed cremation garden with a free-standing columbarium pavilion (from Mount Hope Cemetery Master Plan, Rochester NY).

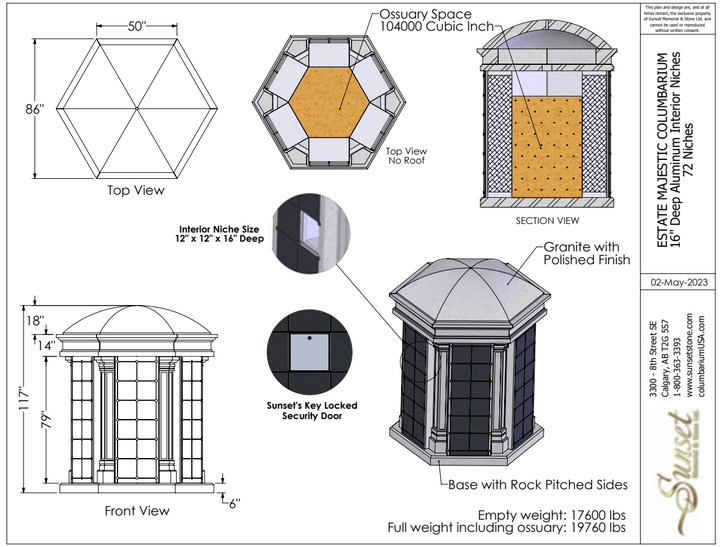


Figure 74. Columbarium pavilion with a compact footprint, suitable for small areas such as the Winchester Triangle. The interior is an ossuary space, accessed via a door in one of the niches (Product by Sunset Memorial & Stone, LTD).

Prefabricated Products

- There are various columbarium products of the market. Advantages of prefabricated options include:
  - Choice of designs / models to fit the site
  - Customization options: design features, type of granite, and finish
  - Prefabricated and durable niche modules in either aluminum or plastic, that can be locked / secured
  - Assembled and delivered in one piece
  - Interior behind the urn niches can serve as an ossuary — a low-cost option for communal storage of hundreds of cremated remains
- Once a model is selected and customized, the Cemetery will most likely need to retain an engineer to design and stamp drawings for the columbarium footings.

4. RIVERVIEW AVENUE MEMORIAL WALLS AND COLUMBARIA

Riverview Avenue segment between Prospect and Greenough Avenue is a narrow (12' wide) road with about 10' wide green buffer to the perimeter chainlink fence. It overlooks the Charles River, but the views are screened by dense wooded vegetation on the steep slope that extends to Greenough Boulevard, some 20' below.

In this area, columbaria and memorial walls can be laid out along the top of slope to create a dynamic garden with a series of outdoor rooms, formal overlooks, and substantial CR opportunities.

- Convert Riverview Avenue to a pedestrian path and expand the green space. Enhance the landscape planting on both sides of the path for a garden-like experience.
- Provide low (up to 42" height) memorial walls along the perimeter, in combination with clusters of taller columbaria and segments of transparent fence / overlooks to the river.
- Enhance / manage views from the overlook areas. Develop an agreement with the DCR to allow the City to perform vista pruning and invasive plants control.
- Estimated Yield= 96+ CR lots (4-urn) and 400 urn niches.
- Alternatively, expand the area with tall retaining walls and fill: a significant engineering project that could yield FB lots. See Chapter 3.6 for details.

Plan Key

Figure 75. Riverview Ave (looking west) could become an attractive garden with river views and significant in-ground and niche CR options.

Figure 76. Birch Gardens at Mount Auburn Cemetery illustrate the design possibilities for Riverview Avenue in a comparable edge condition.

RIVERVIEW AVENUE MEMORIAL WALLS AND COLUMBARIA

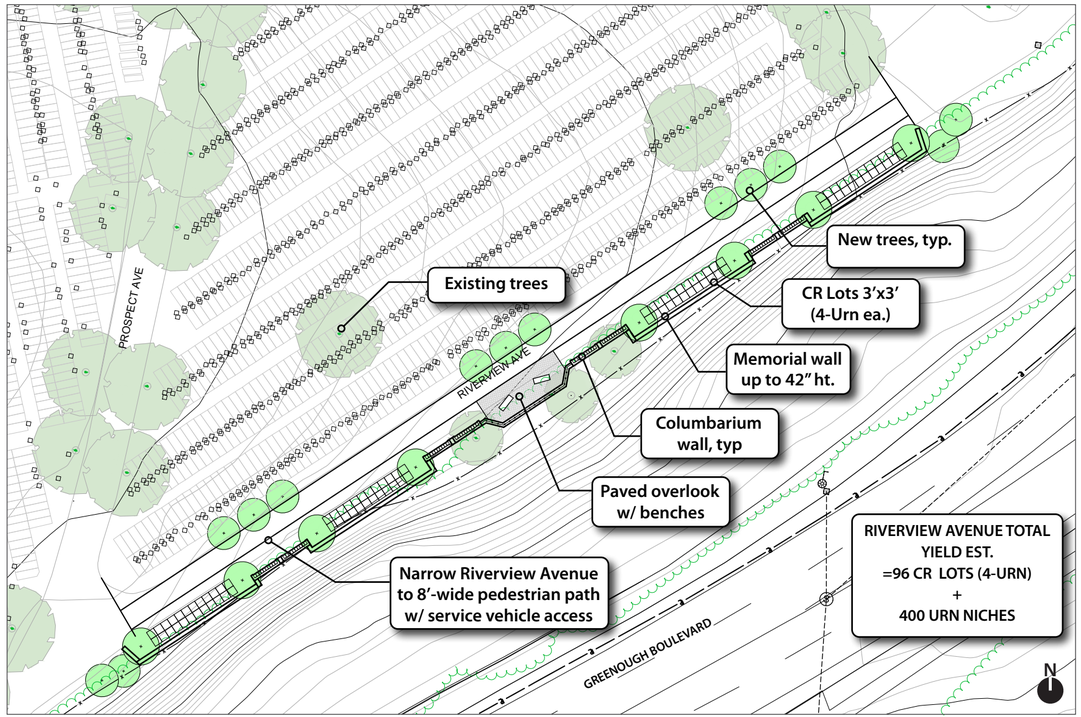


Figure 77. Riverview Avenue proposed improvements include memorial walls, columbaria, and overlooks to the Charles River.

3.6 | OTHER DEVELOPMENT CONSIDERATIONS

The recommendations in this chapter are options that require larger investment and are at present considered low priority. It is important to include these studies in the Master Plan as the City may wish to reconsider them in the future. These include:

1. Riverview Area Expansion
2. Receiving Tomb Rehabilitation
3. Reuse of Garage Yard after facility relocation to the Materials Service Yard

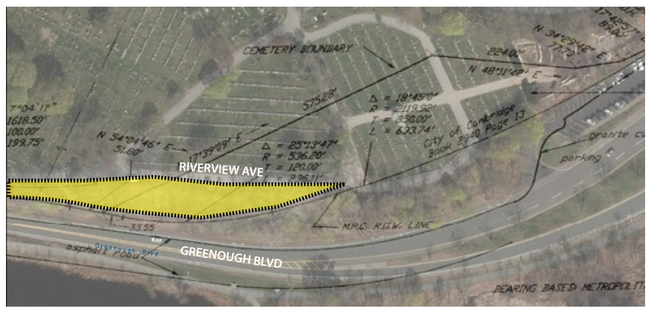


Figure 78. City-owned land south of Riverview Avenue (area shown in yellow).

1. RIVERVIEW AVENUE EXPANSION

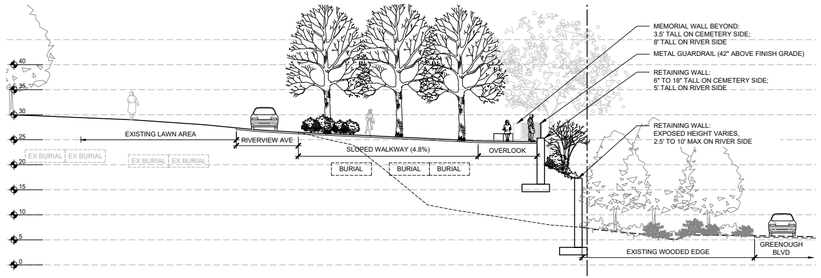
According to property records, the City of Cambridge owns about 0.56 acres of land to the south of Riverview Avenue. However, this is steeply sloping land, with elevation changes of about 20 to 25 feet between the top of slope and the bottom of slope. Significant fill and tall retaining walls are required to make it usable for Cemetery development. Yet this area is the Cemetery's last remaining expansion opportunity with FB lot development potential.

- Terrace the land to reduce the overall height of walls. FB lots and a formal overlook are on the upper terrace.
- Create a garden-like experience with planted ornamental buffers along Riverview Avenue.
- Define the perimeter with a low memorial wall for adjacent CR and FB burials.

Additional Challenges

- Survey is necessary to confirm the property line and the actual topographic conditions.
- The high construction cost might not be justified in proportion to the lot yield.

RIVERVIEW AVENUE EXPANSION



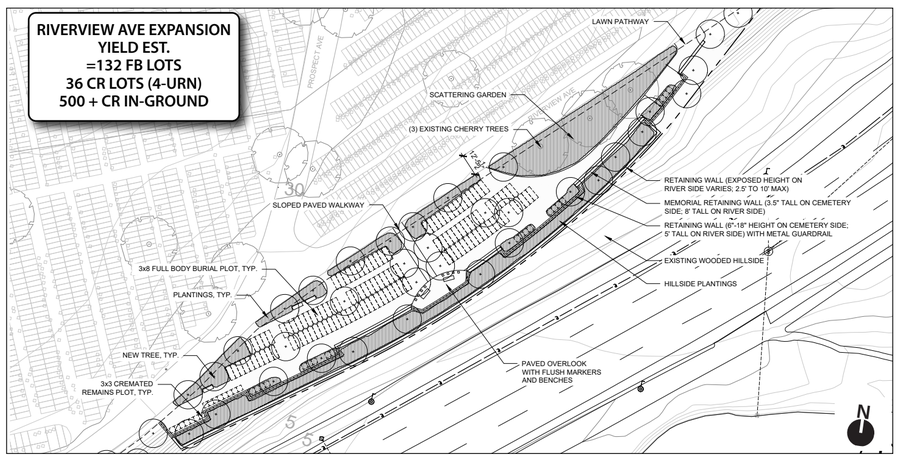


Figure 79. Riverview Avenue conceptual expansion plan and site section.

2. RECEIVING TOMB REHABILITATION

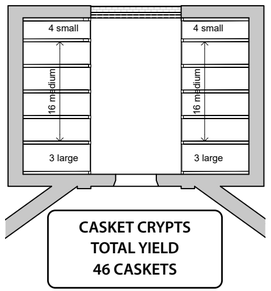
The Receiving Tomb, currently in deteriorating condition, is a valuable historic feature in need of preservation treatment. Required interventions will likely include drainage, waterproofing, and masonry repair, which could be funded with CPA funds.

We recommend that the City takes a step further and rehabilitates the Receiving Tomb with adaptive reuse as a columbarium. This will provide additional burial opportunities and ensure a suitable continued use and maintenance of the structure.

- The use of a prefabricated modular niche system with customization upgrades could be a cost-effective solution with significant yield
- The studies presented on the following pages assume 15"x15" prefabricated modules with marble face covers to complement the original face plate material.
- Each niche can store 2 urns. Double-depth niches can store 4 urns.
- The reuse of existing casket niches for mausoleum crypts is not recommended due to the low yield, and enhanced technical requirements that would make it cost prohibitive.

Receiving Tomb facade to remain in all options.

Reuse of Casket Niches for Mausoleum Crypts



Pros:

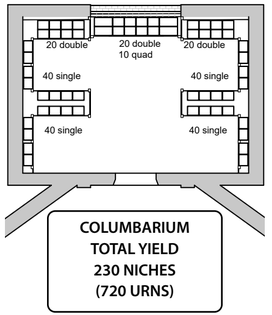
- Preserves the original internal look

Cons:

- Low yield
- Requires significant and costly structural restoration to support weight of caskets
- Requires enhanced ventilation, drainage and other specialized needs

Figure 80. Study of reuse of existing casket niches for mausoleum crypts.

Adaptive Reuse as Columbarium - Opt. 1



- Single Niche = 2 urns
- Double-depth niche = 4 urns
- Quad niche = 8 urns

Pros:

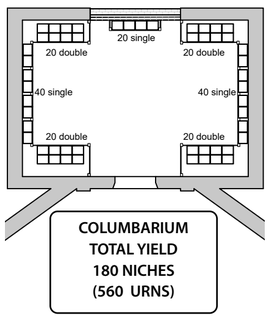
- Highest yield
- Preserves the look of middle existing crypt column

Cons:

- Lack of visibility upon entering

Figure 81. Section-perspective Columbarium Option 1.

Adaptive Reuse as Columbarium - Opt. 2



- Single Niche = 2 urns
- Double-depth niche = 4 urns

Pros:

- Creates a central open area for good visibility
- Preserves the look of first and last existing crypt columns

Cons:

- Structural support of ceiling might be needed at middle span

Figure 82. Section-perspective Columbarium Option 2.

3. RE-USE OF GARAGE YARD

The Garage Service Yard, located in a prominent location between the historic Chapel and Receiving Tomb, is a utilitarian facility with practical benefits but negative aesthetic impact on its surrounding. The Garage Yard's chainlink fence abuts right against the existing headstones, which impairs the sense of dignity for those lots.

The Cemetery prefers to keep the facility at its present location for the time being. Cosmetic improvements such as a solid screen fence and repainting or cladding the building could be done as temporary solutions, but our recommendation is that the Garage Yard is ultimately relocated.

Relocation to Materials Storage Area

The existing Materials Storage area in the east corner of the Cemetery appears to have adequate space for a similar-sized building and consolidated materials storage (see the diagram study on the next page).

- As full-body lot capacity depletes and second burials in existing lots inevitably decline, the equipment needs will change. The City should reevaluate reducing the number of Cemetery vehicles and garaging less frequently used equipment elsewhere.
- Fewer vehicles along with employee amenity space could then be consolidated within a new maintenance facility. This will also enable the restoration of the Chapel from an employee break room to a visitor facility.
- For more recommendations on the proposed maintenance facility, see Part Four of this report.

Restoration of Garage Yard to Burials

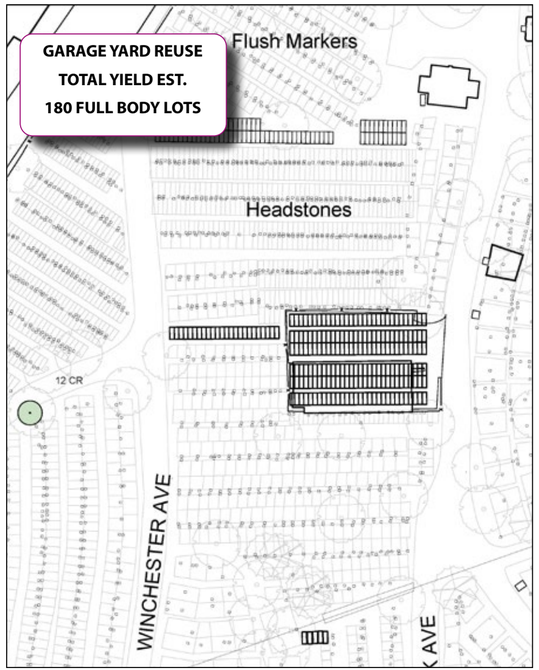
The diagram on the following page illustrates how the Garage Yard area could be laid out with FB lots.

- The FB yield of 180 lots could extend the FB offering for 3 years.
- Alternatively, a much greater yield can be achieved with a cremation garden with plant beds and memorial walls. The investment into this garden could extend the Cemetery's active operations for decades.

Figure 83. Decorative screen fence (right) could be a temporary solution for the Garage Yard (left).

Figure 84. Cremation garden defined with low walls.

Garage Yard Reuse: Full-Body Lots Study



Materials Storage Yard Reuse: New Maintenance Facility

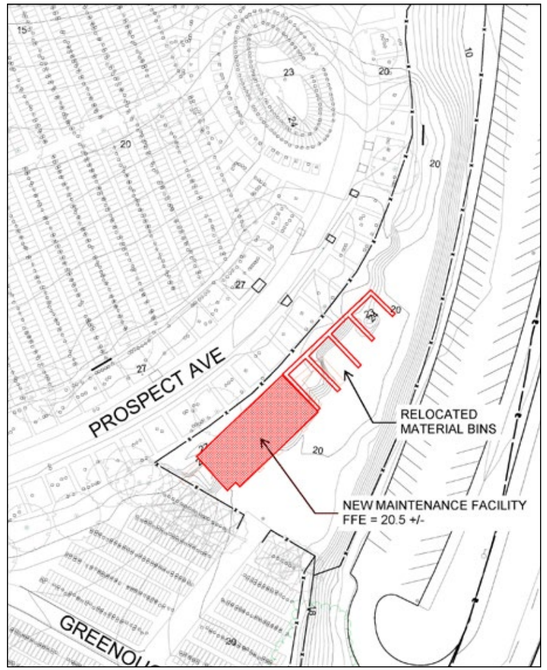


Figure 85. Study of Garage Yard and Materials Storage Yard reuse.

Part Four:
CULTURAL LANDSCAPE RECOMMENDATIONS

4.1 | LANDSCAPE CHARACTER IMPROVEMENTS

The recommendations in this chapter aim to support and enhance the value of Cambridge Cemetery as an open space resource. The recommendations focus on preservation of landscape character, care for the invaluable tree collection, and landscape improvements.

MAINTAIN LANDSCAPE INTEGRITY BY BALANCING DEVELOPMENT WITH LANDSCAPE PRESERVATION

Retain a Functional Circulation Network

- Limit road closures to those detailed in Chapter 3.2. Other road closures are not recommended as they would impair circulation and access.
- Road narrowing, if implemented, must be done carefully to allow areas for cars to pass and park.

Balance Graves vs Trees

- Ensure that all infill preserves existing or integrates new trees. For example, at the Laurel Avenue closure include trees to interrupt the arrays of grave lots and blend with surrounding landscape (See Chapter 3.2)
- When a tree is removed, plant a new tree in its location rather than using the space for grave infill.

Low-Impact Installation Approach

- Plant small trees with compact root balls or bare root trees to minimize impact to graves from digging.
- For tree installation at historic cemeteries, the National Park Services recommends a narrower hole for the root ball than typically recommended with traditional horticultural practices (Smith, 2009).

MAINTAIN THE TREE COLLECTION

Perform New Tree Inventory and Assessment

- It is critically important to take stock of the current tree collection and put measures in place to maintain and enhance this invaluable asset.
- Perform an tree inventory and condition assessment and update the City's GIS database. Include locations, species, DBH, and an assessment of condition along with prioritized maintenance recommendations. The tree inventory shall be done by a licensed arborist.

Invest in Systematic Tree Maintenance

- Maintain and grow the tree canopy to preserve the historic integrity, beauty and value of the landscape. Robust canopy will also contribute towards the City's climate mitigation strategy in which urban trees play a vital role.
- Based on the tree inventory and assessment, create a maintenance regimen to be implemented under the supervision of the City Arborist.
- Seek sufficient annual funding to support a rotational pruning cycle, especially as new tree plantings are added to the landscape.
- Implement best management practices for monitoring, prevention, and treatment of diseases and pests.

Plan for Tree Succession

- Develop a list of recommended trees for future planting. Strive for diversity and ornamental value. A proposed preliminary list of trees is included on the following page.

Recommended Tree Species

Acer x fremanii | Freeman Maple

Nyssa sylvatica | Black Tupelo

Ulmus parvifolia | Lacebark Elm

Cornus alternifolia | Alternate-leaved Dogwood

Cornus kousa x florida 'Rutgers' | Stellar Pink Dogwood Rutgers Dogwood Hybrid

Halesia carolina | Silverbell

PRELIMINARY TREE LIST

Shade Trees

- Acer x fremanii, Freeman Maple
- Nyssa sylvatica; Black Tupelo
- Quercus species; Various Oaks
- Ulmus parvifolia, Lacebark Elm
- Ulmus americana, American Elm (disease- resistant introductions such as 'Princeton' or 'New Harmony')

Ornamental Trees:

- Amelanchier species; Various serviceberries
- Cornus x 'Rutgan', Stellar Pink Dogwood
- Cornus alternifolia, Alternate-leaved (Pagoda) Dogwood
- Halesia carolina, Silverbell

Evergreen Trees

- Chamaecyparis, False Cypress
- Ilex opaca, American Holly
- Pincus strobus 'Fastigiata', Fastigiate Eastern White Pine

Figure 86. Selection of recommended tree species to diversify the cemetery landscape.

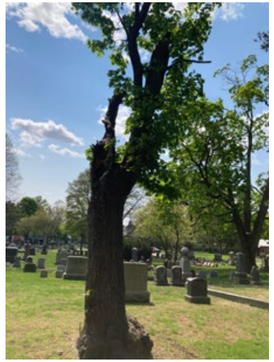


Figure 87. The decline of the Norway maples is an opportunity to replace them with non-invasive shade trees

Replace Declining Norway Maples

Significant proportion of the Cemetery's Norway maples serve as avenue trees, as shown on the 'Map of Norway Maple Locations' on the following page. Many of them are in varying stages of decline.

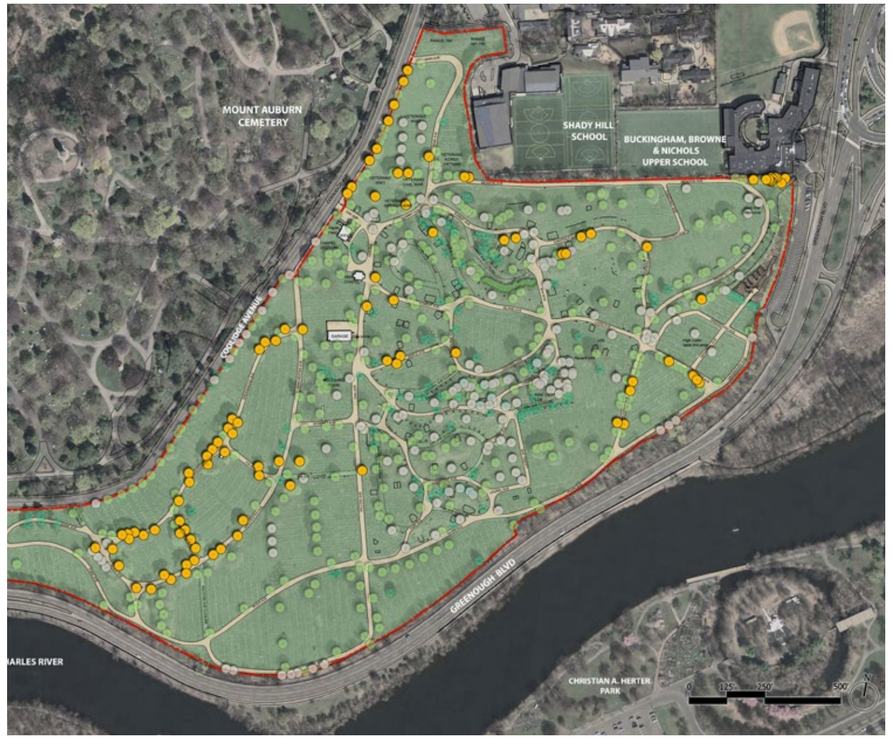
- Replace the hazardous and dead Norway maples over time. Replace with shade tree planting along the avenues to add beauty and diversity.

Promote Memorial Trees

- Provide options for a families to sponsor memorial trees in lieu of headstones for CR burials.

ENHANCE THE LANDSCAPE'S ORNAMENTAL AND HABITAT VALUE

- Enhance the established flower beds including the colorful annuals at the entrance area and perennial beds at select avenue corners. Prioritize pollinator-friendly, drought tolerant, and long-season interest plants.
- Create a pollinator garden, in collaboration with local organizations such as the Pollinator Networks or Mount Auburn Cemetery.
- Plant designated areas with low shrubs and ground covers, to reduce the need for mowing and enhance the landscape beauty and biodiversity. The land over the Receiving Tomb and the slopes at terraced landforms are good candidates for this type of landscape treatment.
- Enhance the "Public Face" of the Cemetery with landscape improvements along its Coolidge Avenue frontage.
  - Plant new shade and ornamental trees and shrubs to enhance the views into the Cemetery.
  - Replace the free-standing entry sign and chainlink fence and gate at the north entrance (Main Avenue entrance) with more attractive features, such as built gate posts, steel picket fence and gate, and an attractive Cemetery sign.
- Seek an agreement with DCR on invasive species management and vista pruning along the cemetery's south perimeter to maintain more attractive views towards the river. A similar arrangement has been made on other properties where the City maintains vegetation on DCR-owned land.



MAP OF NORWAY MAPLE LOCATIONS

Tree Type

- Deciduous Shade Tree
- Deciduous Flowering Tree
- Coniferous Tree
- Norway Maple:

99 Norway Maples out of 711 living trees (14%)

Figure 88. Map of Norway maple locations showing their importance to the landscape character especially along the avenue in the west cemetery part..

Local Cemetery Arboreta

There are currently 29 accredited arboreta in Massachusetts, six of which are at cemeteries, including Mount Auburn Cemetery in Cambridge, Knollwood Memorial Park in Sharon, and Greenlawn Cemetery in Salem, MA.

- F. Caroll Sargent Arboretum at Greenlawn Cemetery is a Level 1 Arboretum accredited in 2020. Its establishment and management have been a collaboration between the City of Salem, Friends of Greenlawn Cemetery, and Salem State University. The accreditation application was a student project guided by botany professor Lisa DiLissio.
- The Knollwood Memorial Park Arboretum is a Level 1 Arboretum accredited in 2022. Davey Tree's consulting division helped develop the accreditation application, and the *WebCemeteries.com* platform was used to develop a self-guided tour of the collection as a printed brochure and a mobile app.

(Source: Interviews with Lisa Dilissio, PhD, Salem State University, and Fred Lappin, President and CEO of Sharon & Knollwood Cemeteries)

PURSUE ARBORETUM ACCREDITATION

ArbNet, the Interactive Community of Arboreta, created its Arboretum Accreditation Program to establish and share a recognized set of standards for the purpose of unifying the arboretum community (*https://www.arbnet.org/*). Benefits of accreditation include earning distinction and recognition, attracting a wider set of visitors, and using the accreditation as an advocacy tool for enhanced tree care.

- Apply for at arboretum accreditation. Level 1 may be readily achievable as it requires 25 documented woody species as well as a yearly public event, such as a walking tour. At present the number of species (per the existing inventory) is about 70 species.
- Level 2 accreditation requires a larger collection of 100 documented woody species along with requirements for professional management, enhanced educational and public programming, and having one or more arboretum employees. Achieving Level 2 accreditation would be a more ambitious undertaking that would require Cambridge Cemetery to strategically expand its roster of woody plants to achieve the species quantity requirement.
- Consider engaging an arboretum consulting service (such as Davey Tree) to assist with the arboretum setup and the accreditation application.
- Seek partnerships related to education with nearby organizations: Mount Auburn Cemetery, Harvard University, and MIT.
- Consider WebCemeteries or other commercial platforms to create an arboretum map and an interactive mobile phone app.

ALLOW SUITABLE PASSIVE RECREATION

- Welcome passive recreation activities that are compatible with respectful visitation, such as walking, meditation, and bird watching by individuals and groups.
- Develop a policy on dog-walking, bicycle use, and other potentially incompatible recreational activities.
- Clearly communicate the visitor rules including allowed and non-permited activities.

ENHANCE CONNECTIVITY WITH ADJACENT OPEN SPACES

- Coordinate with Mount Auburn Cemetery on the location of a proposed crosswalk at Coolidge Avenue that would provide a direct connection between the two cemeteries. Mount Auburn Cemetery is considering reactivating its entrance from Coolidge Avenue, located in close proximity to Cambridge Cemetery's main and North entrances. Linking the two cemeteries with a crosswalk would allow the public to seamlessly extend their visit from one to the other, also enabling joint themed events and enhanced collaboration.
- Study a pedestrian connection, which is envisioned as a contemplative walk from Coolidge Avenue to Greenough Boulevard. A logical connection is via Meadow Avenue as shown on the Plan on the following page. An in-depth study is required, based on a topographic survey, to provide an accessible connection and minimize impacts to existing lots and BB&N facilities. . The implementation will require collaboration with DCR who owns a portion of the land.

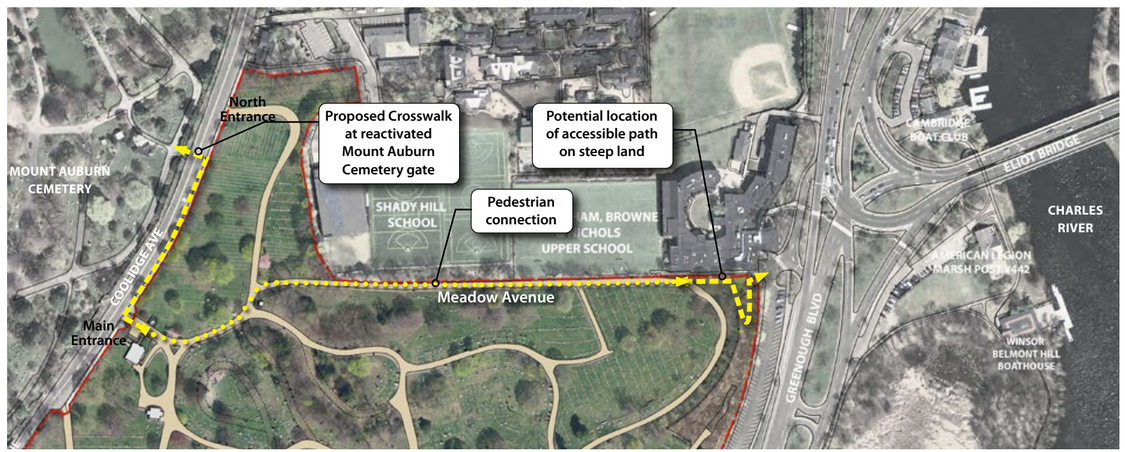


Figure 89. Potential connections with Mount Auburn Cemetery (to the west) and Greenhough Blvd / Charles River (to the east).

4.2 | ELEVATING THE CULTURAL PROFILE

The recommendations in this chapter support the goal of recognizing and popularizing Cambridge Cemetery as a cultural resource. The recommended initiatives focus on expanding the knowledge about the Cemetery's history and notable persons, inviting public engagement and visitation, enabling easier access to burial info, and continuing support for historic preservation.

Publicize the History, Beauty, and other Information about Cambridge Cemetery

- Provide accessible historical information and interpretation.
  - Organize self-guided walking tours of graves of persons associated with black history, abolition, literature, sports etc. These can be printed brochures or mobile apps.
  - Collaborate with Mount Auburn Cemetery on creating joint guided tours.

Scholar in Residence at Forest Hills Cemetery

In 2005, the Forest Hills Educational Trust received a grant from the Massachusetts Foundation for the Humanities to fund a four-month Scholar in Residence program with cultural and design historian Elise Ciregna, PhD. Some of the results of her research are incorporated into a self-guided Scholar's Tour.

http://www.foresthillstrust.org/

- Commission and publish original research of Cambridge Cemetery history. The primary objective of this research will be to define the values and associations that make Cambridge Cemetery historically significant:
  - Historic studies could be performed by the Cambridge Historical Commission staff, consultants, or in collaboration with higher-ed institutions. CPA funds or grants could be used to underwrite such research.
  - Support scholarly research by providing primary sources of information such as Cemetery and DPW documents and archival materials.
  - Publicize ongoing research efforts and findings on the Cemetery web site.
- Evaluate the eligibility for nomination to the National Register of Historic Places:
  - A cemetery is eligible for consideration if it derives its primary significance from age, distinctive design features, graves of persons of transcendent importance, or association with historic events. (National Park Service, 1992 & 1995).
  - The nomination requires that the cultural values have been documented and evaluated, and that it retains the historic integrity of the period of significance.

Figure 90. Welcome kiosks: Bryant Park NY (above) includes printed brochures slots; Cambridge Common (below) features an orientation map.

Improve the Visitor Experience and Wayfinding

- Incorporate a visitor's welcome kiosk near the entrance. Include a Cemetery map, visitor rules and regulations, and historic highlights. Use QR codes to provide additional information and multilingual content.
- Develop interpretive signage in collaboration with the Cambridge Historical Commission with information on the Cemetery's history and notable permanent residents.
- Straighten up the leaning avenue signs. This simple effort can contribute to a well-kept cemetery look.
- Provide several benches as an amenity to visitors: in the Main arrival area, near the Chapel, and at a few locations along main avenues where space allows.
- Select a bench that complements the historic environment. The bench should be of high quality and durability, such as the 'Plainwell' bench (*www.Landscapeforms.com*), which has also been used at Cambridge Common.
- Provide matching trash receptacles.

Figure 91. Site bench example at Cambridge Common and a matching trash receptacle.

Encourage Public Commitment and Private Support for Preservation

- Seek CPA funding and preservation grants to restore the Chapel, Receiving Tomb, historic gates and fences.
- Encourage private donations for new trees and landscape improvements.
- Identify private monuments requiring critical restoration, such as leaning monuments or copings with undermined foundations. If necessary, CPA funds or preservation grants might be used for specialized restoration of select prominent monuments, in agreement with the monument owners.

Encourage Public Engagement and Educational Opportunities

- Explore opportunities to encourage more people to visit the cemetery by promoting a wide range of cemetery events, such as school visits, arts programs, family events, etc. Potential actions may include:
  - Amateur photography contests to capture the beauty of the Cemetery.
  - Sponsored "Artist in Residence" – i.e. providing a small stipend for photographers, painters, poets - to create projects inspired by the Cemetery and present them to the public.
  - Family-oriented events. For example, Mt. Hope Cemetery in Rochester, NY, featured a "Path through History" event with costumed performers and refreshments.
  - Social media profiles and posts.
- Consider efforts for active community outreach. Some cemeteries rely on associated volunteer organizations (Friends groups) to manage volunteer opportunities, organize events, and help with social media. In the absence of a Friends group, City staff or volunteers may provide limited public outreach.

Figure 92. Examples of QR code markers that users can scan to access information.

Figure 93. Event at the Mount Hope Cemetery in Rochester, NY, included family activities (Image credit: Rochester Communications Bureau).

Simplify Access to Burial Information

- Digitize the burial records. The Cemetery received CPA funding in FY 2016 to digitize paper records, which has been partially done and needs to be completed.
- Contract with a commercial cemetery information management platform. Some of these include *CIMS, WebCemeteries, Chronicle* etc.
- These platforms typically offer burial info services to the general public. Some established grave locator apps include *Find a Grave, Burial Search, Find a Loved One, Interment,* etc.

Commercial Grave-Finder Apps

- **'Find a Grave'** is a free online database of cemetery records populated by volunteers, genealogists, and cemetery associations. (*www.Findagrave.com*)
- **'Burial Search'** is an online grave locator for cemeteries that use the *CIMS* software. The site enables searching burials by name or by browsing cemetery maps, along with a mobile app with walk-to-grave navigation. (*www.Cimscemeterysoftware.com*).
- **'Find a Loved One'** is an online grave locator associated with *WebCemeteries* software. The platform offers burial searches, creating virtual tours, and a mobile app with walk-to-grave directions. There's also an option for families to add information about their loved one thereby building a repository of genealogical info. (*www.Webcemeteries.com*)

4.3 | FACILITIES IMPROVEMENTS

The recommendations below focus on accessibility and improving the visitor experience. An in-depth evaluation of existing facilities was outside of the planning scope.

ARRIVAL AREA

Frontage of Admin building is in need of landscape improvements

Mt. Auburn's Admin Building greets visitors with intense planting

Existing Conditions

- Administration Building: The building and interior conditions were not evaluated as part of this Master Planning effort.
- Accessibility: The Admissions Office is ADA accessible via a ramp. There is no separation of pedestrian and vehicular access at the main gate – the driveway is a shared-use surface.
- Presentation: The frontage is in need of a refreshed design and more ornamental planting.

Recommendations

- Accessibility: Reconfigure the main arrival pavement to designate pedestrian vs. vehicular circulation and to break down the expanse of asphalt. This could be accomplished with a change in material, with flush or angled curbs between the sidewalk and driveway. Reconfigure the accessible parking area.
- Visitor Experience: Expand the ornamental landscaping. Include an information kiosk as well as displays of interpretive content. Enhance the oval lawn for events such as Memorial Day assembly - see 'Arrival Area Improvements Plan' on the following page.

ARRIVAL AREA IMPROVEMENTS PLAN

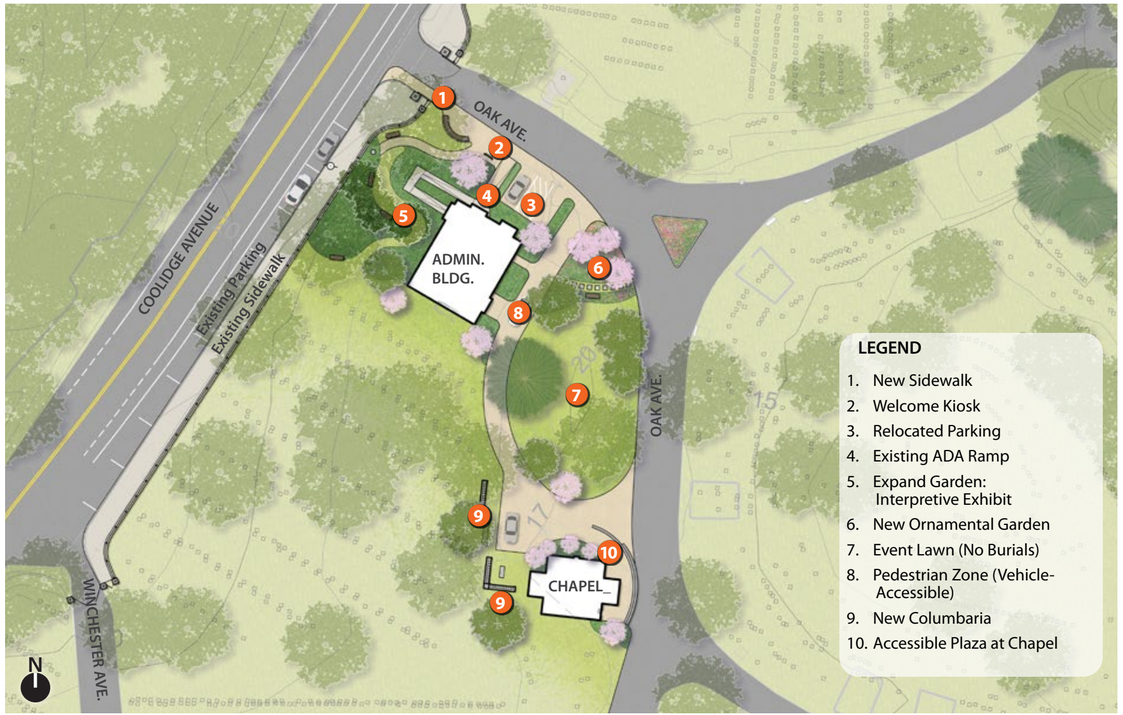


Figure 94. Arrival area improvements plan.

CHAPEL

The Chapel entrance is not pedestrian friendly.

Example of a chapel entrance that was enhanced with an accessible path (Image source Flickr, Stephen St-Denis)

Existing Conditions

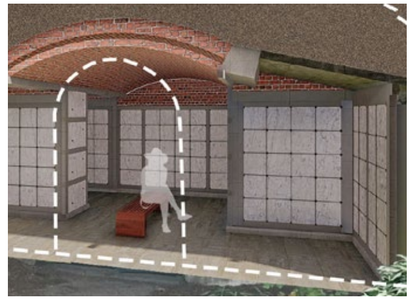
- Building Conditions: Stone building with shingle roof. Exterior was renovated in recent years using CPA funds.
- Use: Interior is divided into rooms for staff use.
- Accessibility: Not ADA-accessible.
- Presentation: A historic architectural gem. There's no buffer between driveway and entrance; cars can come right to the building.

Recommendations

- Historic Preservation: Perform a building evaluation study and identify prioritized improvements.
- Use: Study the reconfiguration of the Chapel interior. Options may include:
  - Creation of a visitor interpretive center
  - Use for memorial services'
  - Outfit with indoor cremation niches
- Accessibility: Reconfigure the Chapel entrance to be ADA accessible. This can be accomplished with grading changes and / or ADA-compliant ramp.
- Visitor Experience / Beautification: Create a pedestrian entry plaza to distinguish between the vehicular and pedestrian realm (see 'Arrival Area Improvements Plan' on the previous page).

RECEIVING TOMB

Receiving Tomb interior is deteriorated and underused.



Recommended rehabilitation of the interior as a columbarium.

Existing Conditions

- Structure Conditions: Stone façade was restored in 2009. Interior is deteriorated, with broken face plates on the crypt niches.
- Use: Currently used for storage of deicers and plastic barrels.
- Accessibility: N/A - currently not open to the public.
- Presentation: The Receiving Tomb is a valuable historic feature. However, the interior is not presently safe for public access.

Recommendations

- Historic Preservation: Perform structure evaluation study and recommend preservation treatment for the structure.
- Use: Consider adaptive reuse of the structure as a columbarium with modular niches - see Chapter 3.6 for a conceptual study. This rehabilitation would create a publicly accessible space that meets sanitary and safety requirements. Security concerns could be alleviated by providing controlled access to the interior, which is typical of indoor columbaria.
- Visitor Experience: Provide interpretive signage or QR code to access historical information about the building.

GARAGE YARD

The Garage yard is a negative presence in the entrance zone.

Tall decorative screen fence could help improve visitor experience.

Existing Conditions

- Building Conditions: The Garage is a utilitarian building with painted cinder block walls, flat roof, and metal garage doors. Its surrounding fence is chain-link with plastic privacy strips; the fence in some areas abuts the back of adjacent headstones.
- Use: The Garage and adjacent yard serve the present operations needs for equipment and storage.
- Accessibility: N/A
- Presentation: The dated 1970s structure, maintenance equipment, and the surrounding fence all detract from the historic landscape surroundings and negatively impact the visitor experience.

Recommendations

- Short-term: Provide visual screening consisting of a tall screen fence and gate, in neutral or dark color. Set back the fence from existing headstones to create a 3'-4' wide buffer that could be planted with shrubs. The Cambridge Historic Commission should review and provide an opinion on proposed fencing.
- Long-term: Relocate the Garage to a new Maintenance Building to be located in the current Materials Storage Yard area. Restore the Garage area to a landscape memorial garden for cremated remains (see also Chapter 3.6).

MATERIALS STORAGE YARD

Materials Storage Yard is deteriorated and unkempt.

A new maintenance facility combined with materials storage area.

Existing Conditions

- Facility Conditions: Storage bays are constructed of deteriorated concrete blocks over compacted dirt ground. A narrow parcel to the north is occupied by construction debris, equipment, and cut up tree trunks. The steep side slopes are kept in place by existing vegetation, including invasive species.
- Use: Storage for excavated soil, mulch, and vegetation debris. The narrow area has been used by a site contractor for material storage.
- Accessibility: N/A
- Presentation: Unkempt conditions, muddy ground plane, drainage issues, waste. The Yard is partially screened with vegetation.

Recommendations

- Visitor Experience: Enhance vegetation in the buffer around the yard for improved visual screening.
- Use:
  - Vacate and clean up the site contractor's area.
  - Stabilize the side slopes to the DCR parking lot in cooperation with DCR. Manage invasive species.
  - Short-term: Replace the deteriorated storage bays and pave with asphalt. Provide erosion control to prevent runoff of sediment and other undesirable materials off site.
  - Long-term: Provide a new Maintenance Building and consolidated materials storage. The new facility should include garages, staff break room, lockers, restroom w/ shower, and indoor and outdoor storage. This area requires further study.

Maintenance Building Program

The Maintenance Building typically supports interment operations and ground maintenance. In the building, employees may perform workshop repairs, park and maintain vehicles and equipment, and store spare parts and tools. The building may provide lockers, showers, lunchroom, and a foreman's office. A service yard is typically adjacent.

Typical Components:

- Workshop (with Parts and Tools Storage)
- Maintenance Bays for Vehicles and Equipment
- Vehicle Wash Bay and Wash Equipment Room
- Equipment (Compressor, Lifts, Tire Changer, etc.)
- Storage Space/mezzanine
- Foreman's Office
- Lunchroom w/ Kitchen + Vending
- Janitor Closet
- Locker Room w/ Toilet + Shower
- Boot Vestibule with storage
- Mechanical Room

https://www.cem.va.gov/cem/grants/maintenance_bldg.asp

4.4 | UTILITY INFRASTRUCTURE IMPROVEMENTS

The present utilities infrastructure in general meets the Cemetery's needs. Below is a brief overview of the present systems along with improvement recommendations.

WATER SUPPLY

Existing simple water spigots, located along the main avenues, are generally used by visitors to water their plantings. In areas lacking water spigots the City has installed plastic watering barrels that have functioned well, but appear unsightly in the historic cemetery context.

Recommendations:

- Expanding the water lines and spigots may not be a priority intervention due to the high capital investment cost in relationship to the limited expected usage.
- Consider upgrading the water barrels to more attractive vessels such as cast stone urns with faucets.

STORMWATER INFRASTRUCTURE

The stormwater infrastructure includes catch basins and underground stormwater sewer lines (see Chapter 2.3 for map). Other than localized issues with ponding after storms, the stormwater infrastructure is generally adequate.

Recommendations:

- Consider installing additional area drains with a subsurface infiltration feature at the north Cemetery perimeter along Meadow Avenue to alleviate puddling.
- Alternatively consider porous paving on Meadow Avenue.
- Routinely de-compact and overseed soil along problem spots at road edges and corners to enhance infiltration.

Figure 95. Existing utilitarian watering barrels (left) and a proposed ornamental cast stone upgrade (right).

SANITARY SEWER

The Cemetery has a septic field located between the Administration Building and Coolidge Avenue. The City has imminent plans to extend sanitary sewer lines on Coolidge Avenue, which will enable the Cemetery to connect to this system, remove the septic field and rehabilitate the area. This work is anticipated for 2024.

Recommendations:

- After the removal of the septic leach field, rehabilitate the area as an ornamental landscape with historic interpretive elements, as shown on the 'Arrival Area Improvements Plan' in Chapter 4.3.
- Alternatively this could become another cremation garden.

Figure 96. The septic field at the Admin Building could be rehabilitated as an ornamental or cremation garden.

ELECTRICAL INFRASTRUCTURE

The present electrical infrastructure serves the Administration Building, Chapel, and Garage. There is no site lighting. The Cemetery's electrical infrastructure is sufficient for the current needs.

However as the City is working towards achieving carbon neutrality in buildings by 2050, this may affect the power requirements for the Cemetery's buildings. Additionally, in FY23 the City issued a Clean Fleet Policy to accelerate the transition to electric vehicles which could include the cemetery's maintenance fleet.

Recommendations:

- Upgrade the electric service to meet the increased electrical demand associated with energy-related building upgrades and the transition to electric maintenance equipment.
- Phase out the existing diesel fueling station located at the Garage, in conjunction with the City's transition to electric vehicles.
- Consider on-site generated electricity such as solar photo-voltaic roof panels - only in conjunction with the long-term recommendation for a new Maintenance Building at the Materials Storage area.
- On-site generated power is not considered appropriate elsewhere in the Cemetery.

Part Five:
IMPLEMENTATION

5.1 | IMPLEMENTATION PLAN

The master plan recommendations could take ten to fifteen years to implement. The Cambridge DPW and the Cemetery will have the primary responsibility to seek funding and coordinate the implementation of capital efforts, as well as pursue additional inter-departmental partnerships such as with Historical Commission and City Arborist for particular actions. An annual interdepartmental City staff meeting is recommended to review the status of the implementation of Master Plan recommendations, as well as to discuss upcoming steps and actions.

IMPLEMENTATION OF THE CULTURAL LANDSCAPE RECOMMENDATIONS

The implementation of the recommendations for landscape character and cultural profile improvements will require ongoing collaboration between the Cemetery and other DPW staff, with engagement of the Historical Commission, City Arborist, public relations / media department, and consultants, as required.

- Some of the recommendations are administrative in nature (e.g. developing policies, creating an arboretum entity and applying for accreditation, applying for CPA and preservation grants, programming for historic tours);
- Other require municipal funding to retain vendors or to construct the work (the tree inventory, a cemetery information management system setup and maintenance, various landscape and infrastructure improvements).

Higher-Priority Items:

- **Landscape Character Enhancement**:
  - Tree Inventory and assessment, with a prioritized maintenance plan.
  - Arboretum accreditation.
  - Planting new trees (5- 10 per year) to offset recent and ongoing tree loss due to aging.
- **Facilities Improvements:**
  - Entry experience improvements: Main entry reconfiguration, North Entry beautification, and Garage yard screening.
  - Applying for CPA funding and other grants for preservation of Chapel, Receiving Tomb, historic fences and gates, and landscape improvements.
- **Cultural Profile Enhancement**:
  - Implement a Cemetery Information Management System to compile existing and future records and provide a grave-finder app.
  - Provide Cambridge Cemetery info (history, notable people buried there) to the public, including but not limited to guided tours and / or themed walks led by the Historical Commission (and potentially others).
  - Additional study and publication of various aspects of the Cemetery's history.

Other High-Impact Items (Longer-Term):

- Agreement with DCR on invasive vegetation management beyond the Cemetery fence.
- A study to investigate the possibility of opening the cemetery to cremate remains burial of long-term (but not current) Cambridge residents.
- A study to investigate the possibility of a pedestrian connection from Coolidge Avenue to Greenough Boulevard.
- Facilities consolidation at the Materials Yard area: conceptual feasibility study.

DEVELOPMENT IMPLEMENTATION SCENARIOS

Cambridge Cemetery has historically emphasized accommodation of full-body (FB) lots and in-ground CR, which over the past two decades have been in infill areas due to lack of space. This Master Plan recommends a range of opportunities for both FB and CR development.

- Some opportunities are easier to implement "the low-hanging fruit" - such as road closures and infill projects that the Cemetery is well versed in doing.
- Other recommendations require additional studies such as site surveys, GPR investigation, and design. These include the proposed road narrowing, infill at wide aisles, cremation gardens and columbaria.
- The most technically complex and expensive options are unlikely to be implemented in the next 10 years. These include the Riverview Avenue expansion, Garage Yard relocation and the Receiving Tomb rehabilitation.

Below are two comparative scenarios on the development implementation:

Scenario 1: "Business as Usual" (Not Recommended)

"Business as Usual" continues to focus on FB needs, without immediate investment into new CR opportunities. Below is an assumed timeline of implementation:

- The "low hanging fruit": Laurel Avenue and Birch Avenue, which are already prepared, would sell among the first.
- Next would be the more challenging Elm Avenue closure and the three road narrowing projects: Greenwood, Winchester, and Casey Avenue. (These road narrowing projects will require prior site surveys and / or GPR investigations to confirm their capacities, at which time a decision would need to be made if the yield justifies the implementation.)
- The narrowing of Main Avenue would gain new lots to be kept in reserve for veterans and not counted in yearly and total FB sales quantities.
- No new CR options (columbaria or cremation gardens) would be implemented in the next five years, continuing sales of in-ground single lots only.
- In this scenario the Cemetery would run out of FB lots in five to six years (by 2029). After 2030 there would only be second FB burials in already sold lots.

Scenario 1: “Business as Usual” - Focused on FB:
FB lot sales projected to end by 2029

Timeframe	Development Area	Work required	FB Lots Sales (65 per year)	Notes
Early	**LAUREL AVE**	Install trees, sell FB lots	95	
	MAIN AVE INFILL	Prepare area, sell FB lots	36	
	ELM AVE	Remove paving, prepare area, sell FB lots	30	
	BIRCH AVE	Sell FB lots	35	Total yield 80 FB, 45 remaining
Mid	**BIRCH AVE**	Sell FB lots	45	
	GREENWOOD AVE NARROWING	Site Survey, CDs, installation	30	Best case yield 30 FB
	CASEY AVE NARROWING	Site Survey, CDs, installation	80	Best case yield 80 FB
	WINCHESTER AVE NARROWING	Site Survey, CDs, installation	40	Best case yield 40 FB
Late	**NO NEW FB LOTS**		0	
		Total FB sold	**391**	**Approx. 6 years of FB sales**
		After approx. 6 years	0	Second FB burials only

Legend

Sell FB (already prepared)

Prepare area for FB:
(Survey; construction; planting)

Prepare area for CR:
(Survey; construction; planting)

Assumptions

- Focus on FB lots development & sales: 65 new FB per year
- CB lots : in-ground lots only, double-urn or quad-urn, along Casey Ave
- Reserve New veterans lots (not counted in 65 / year & total sales)
- Exclude Riverview Ave expansion & opportunities from Garage removal

Figure 98. Implementation Scenario 1: “Business as Usual” focused on FB burials; FB lot sales projected to end by 2029.

Scenario 2: “Prioritize CR Development”:
FB lot sales projected to end in 2034

Timeframe	Development Area	Work required	FB lots sales (40 per year)	Notes
Early	**LAUREL AVE**	Install trees, sell FB lots	95	Total yield 95 FB
	TRIANGLE CREMATION GARDEN #1	Site Survey, CDs, installation		
	CR INFILL AT WIDE AISLES	GPR, layout & sell CR lots		
	TRIANGLE CREMATION GARDEN #2	Site Survey, CDs, installation		
	DELL CREMATION GARDEN	Site Survey, CDs, installation		
	ELM AVE	Remove paving, prepare, sell FB lots	30	Total yield 30 FB
	MAIN AVE INFILL	Prepare area, sell FB lots	36	Total yield 36 FB
Mid	**BIRCH AVE**	Sell FB lots	80	Total yield 80 FB
	COLUMBARIA AT CHAPEL	Site Survey, CDs, installation		
	GREENWOOD AVE NARROWING	Site Survey, CDs, installation	30	Best case yield 30 FB
	WINCHESTER AVE NARROWING	Site Survey, CDs, installation	40	Best case yield 40 FB
	CASEY AVE NARROWING	Site Survey, CDs, installation	80	Best case yield 80 FB
Late	**NO NEW FB LOTS**		0	
	RIVERVIEW AVE OR GREENOUGH AVE COLUMB.	Columbaria / memorial wall construction		
		Total FB sold	**391**	**Approx 10 years or more of FB sales**
		After approx. 10+ years	0	Second FB burials only

Legend

Sell FB (already prepared)

Prepare area for FB:
(Survey; construction; planting)

Prepare area for CR:
(Survey; construction; planting)

Assumptions

- Focus on CR development / promote sales (est 80 sales per year)
- Limit FB to 40 new lots / year (38%reduction)
- Reserve New veterans lots (not counted in 65 / year & total sales)
- Exclude opportunities from Garage removal

Figure 99. Implementation Scenario 2: “Prioritize CR Development”: FB lot sales projected to end in 2034.

Scenario 2: "Prioritize CR Development" (Recommended)

"Prioritize CR Development" scenario will require investment into attractive CR opportunities as soon as possible. At the same time the number of yearly FB lot sales would be capped to extend the time horizon in which they continue to be offered. Below is an assumed timeline of implementation

- In the early years, develop three attractive CR opportunities: cremation garden, columbarium, and expanded in-ground lot areas. Provide choices favored by customers, such as slanted-upright markers for purchased CR lots, and a beautiful landscape area for in-ground CR burial (a.k.a "scattering"). The intent is to establish Cambridge Cemetery as a desirable destination for CR burial.
- Cap FB lot sales at 40 per year (38% reduction from current rates). This would allow focusing development efforts to CR in the early years and could extend the FB lot sales to about 2033 (10 years).
- New veterans lots gained with the narrowing of Main Avenue are to be kept in reserve and not counted in yearly and total FB sales quantities.
- After several years of CR sales in the already established cremation gardens and columbaria, CR opportunities may be expanded - e.g. another cremation garden and columbaria after Year 5.
- The City's marketing is a key requirement in this scenario, to familiarize the local funeral industry with the new CR options and encourage them to recommend Cambridge Cemetery as the first choice to those considering CR burial.

The two development scenarios are not meant as definitive implementation plans but an illustration of how the development decisions can affect the longevity of the cemetery's active use. In both instances, the availability of new FB lots will cease within the time frame of this master plan. The cemetery will continue to offer second burials in existing lots, as well as CR burials.

A more comprehensive suggested implementation plan is illustrated at the end of this chapter.

SUGGESTED IMPLEMENTATION TABLE FOR ALL RECOMMENDATIONS

The Suggested Implementation Table on the following pages is intended to assist the City in organizing the implementation process and seeking funding. It is suggested that the City updates this table annually.

SUGGESTED IMPLEMENTATION TABLE

Timeframe	No.	Project / Effort	Description / Action	Chapter
Early	1	**DEVELOP POLICY FOR LIMITING FB SALES**	Cap the number of yearly FB lot sales, keep lots in reserve, explore arrangements with other cemeteries	**3.1**
	2	**DEVELOP POLICY TO INCENTIVIZE CR**	Incentivize CR choices, consider pre-sale of CR family lots and niches, info campaign	**3.1**
	3	**FB - LAUREL AVE LOT SALES**	Already converted - install trees - sell lots	**3.2**
	4	**SITE SURVEYING AND GPR**	Prepare topographic surveys and GPR investigations	**3.2**
	5	**CR - INFILL AT WIDE AISLES**	Lot sales (if determined to be feasible)	**3.2**
	6	**CR - GREENWOOD TRIANGLE CR GARDEN**	Design and implementation	**3.4**
	7	**TREE INVENTORY**	Contract with arborist to perform tree inventory and assessment.	**4.1**
	8	**RECOMMENDED TREES LIST**	Develop a list of replacement trees for various conditions. Use Preliminary Tree List in Ch.4.1 as interim list.	**4.1**
	9	**CEMETERY INFORMATION MANAGEMENT SYSTEM (CIMS)**	Contract with CIMS provider to create and manage burials database	**4.2**
	10	**GRAVE - LOCATOR APP**	Add-on a grave-locator app as offered by CIMS provider.	**4.2**
Early	11	**CR - EXTERIOR COLUMBARIUM AT CHAPEL**	Design and implementation	**3.5**
	12	**PLANT NEW TREES**	Aim for 5 to10 new trees per year (or number of yearly removals + 5)	**4.1**
	13	**OFFER MEMORIAL TREES ALTERNATIVE TO HEADSTONES**	Prepare memorial tree pricing for CR. Designate suitable locations.	**4.1**
	14	**DEVELOP POLICY ON RECREATIONAL ACTIVITIES**	Clarify policy on dog walking, bicycle use, and other recreational activities.	**4.1**
	15	**CLEARLY COMMUNICATE RULES ON RECREATIONAL ACTIVITIES**	Include rules and regulations on web site and on a sign at cemetery. Sign may be integrated in Visitor Kiosk - see Chapter 4.2	**4.1**
	16	**CPA FUNDING & PRESERVATION GRANTS - CHAPEL**	Apply for CPA funding & preservation grants for Chapel preservation studies	**4.2**
	17	**HISTORICAL TOURS PROGRAMMING**	Create programming for cemetery tours. (Partnership with Cambridge Historical Commission (CHC) and Mount Auburn Cemetery).	**4.2**
	18	**INTERPRETIVE SIGNAGE**	Develop interpretive signage (1 to 2 signs) in collab. w/ CHC.	**4.2**
	19	**AVENUE SIGNS IMPROVEMENTS**	Reset or straighten leaning avenue signs.	**4.2**
	20	**NORTH ENTRANCE IMPROVEMENTS**	Provide new ornamental fence, gate, and new entry sign	**4.3**

Figure 100. Implementation Scenario 2: "Prioritize CR Development": FB lot sales projected to end in 2034.

SUGGESTED IMPLEMENTATION TABLE

Timeframe	No.	Project / Effort	Description / Action	Chapter
Early	21	**FB - MAIN AVE INFILL AT AISLE NEXT TO KOREA WAR SECTION**	Convert to burial space.	**3.2**
	22	**CR - DELL PATH CREMATION GARDEN**	Design and implementation.	**3.4**
	23	**PLANT NEW TREES**	Ongoing.	**4.1**
	24	**LEVEL 1 ARBORETUM ACCREDITATION**	Designate a person or hire a consultant to assist in the arboretum establishment and complete the application.	**4.1**
	25	**SEEK ARBORETUM PARTNERSHIPS**	Reach out to Mount Auburn Cemetery to explore opportunities.	**4.1**
	26	**CROSSWALK AT COOLIDGE AVE.**	Provide a crosswalk at Coolidge Avenue to connect with Mt. Auburn Cemetery.	**4.1**
	27	**VISITORS WELCOME KIOSK**	Incorporate kiosk near the entrance (May be part of 2.1.1 above).	**4.2, 4.3**
	28	**MAIN ARRIVAL TO CHAPEL IMPROVEMENTS**	Design and construction for accessibility, circulation, beautification.	**4.3**
	29	**GARAGE YARD SCREENING – SHORT-TERM**	Provide new ornamental screen fence.	**4.3**
	30	**SANITARY SEWER**	Convert from septic leach field to connection to municipal sewer, and rehabilitate the area as landscape.	**4.4**
Early	31	**FB - ELM AVENUE CONVERSION**	Convert to burial space.	**3.2**
	32	**POLLINATOR GARDEN**	Create a pollinator garden, in collaboration with local organizations.	**4.1**
	33	**PLANTING ON SLOPES**	Plant terrace slopes with low shrubs and ground covers.	**4.1**
	34	**INVASIVE SPECIES ALONG RIVER'S EDGE**	Seek an agreement with DCR on invasive species management.	**4.1**
	35	**BENCHES AND TRASH RECEPTACLES**	Provide benches (8-10 total) and matching trash receptacles.	**4.2**
	36	**CPA FUNDING & PRESERVATION GRANTS - FENCES & GATES**	Apply for CPA funding for preservation studies and implementation for Fences and Gates.	**4.2**
	37	**WATER SUPPLY IMPROVEMENTS**	Consider replacing existing plastic water barrels with ornamental vessels.	**4.4**

SUGGESTED IMPLEMENTATION TABLE

Timeframe	No.	Project / Effort	Description / Action	Chapter
Mid	38	**FB - BIRCH AVE LOT SALES.**	Already converted - start selling lots.	**3.2**
	39	**FB - MAIN AVE NARROWING (VETERANS LOTS)**	Reconfigure Main Ave for new in-ground veterans lots.	**3.3**
	40	**CR - COLUMBARIUM AT WINCHESTER TRIANGLE**	Design and implementation.	**3.5**
	41	**ELIGIBILITY FOR NATIONAL REGISTER**	Evaluate eligibility for National Register of Historic Places. (CHC or a consultant).	**4.2**
	42	**NEW HISTORIC RESEARCH**	Commission and publish original research (Partnership w/ CHC, sponsored scholar, or consultant).	**4.2**
	43	**MONUMENTS IN CRITICAL NEED OF PRESERVATION**	Identify critical monuments; notify owner's contacts to facilitate preservation.	**4.2**
	44	**CPA FUNDING & PRESERVATION GRANTS - RECEIVING TOMB**	Apply for CPA funding and preservation grants for Receiving Tomb preservation studies and implementation and other preservation needs.	**4.2**
	45	**ELECTRIC UPGRADES**	Upgrades to electric service, energy-related building upgrades.	**4.4**
	46	**STORMWATER IMPROVEMENTS**	Consider additional area drains or porous asphalt at Meadow Avenue.	**4.4**
Mid	47	**FB - LAUREL AVENUE EXTENSION CONVERSION**	Convert to burial space.	**3.2**
	48	**FB - GREENWOOD AND WINCHESTER AVE NARROWING**	Design and implementation.	**3.3**
	49	**FB - CASEY AVE. NARROWING**	Design and implementation.	**3.3**
	50	**PLANT NEW TREES**	Ongoing.	**4.1**
	51	**PATH FROM MEADOW AVE TO GREENOUGH BLVD**	Obtain a topographic survey and prepare a design study for pedestrian connection from Coolidge Ave. via Meadow Ave. to Greenough Blvd.	**4.1**

SUGGESTED IMPLEMENTATION TABLE

Timeframe	No.	Project / Effort	Description / Action	Chapter
Late	52	**CR - COLUMBARIUM WALL AT GREENOUGH AVE**	Design and implementation	**3.5**
	53	**CR - RIVERVIEW AVE MEMORIAL WALLS & COLUMBARIA**	Design and implementation	**3.5**
	54	**FB - EXPANSION ON CITY -OWNED LAND**	Study the legal, permitting, and technical feasibility of expansion	**3.6**
	55	**RECEIVING TOMB CONVERSION TO COLUMBARIUM**	Remove crypts and furnish with columbarium niches.	**3.6, 4.2**
	56	**CHAPEL REHABILITATION**	Create indoor columbarium and visitor center, after the consolidation of current staff use in a new Maintenance Facility	**4.2**
	57	**NEW MAINTENANCE FACILITY**	Consolidate staff amenities, vehicle garage, and materials storage at the Materials Yard area	**3.6, 4.3**
	58	**GARAGE REMOVAL**	Demolish Garage and restore the area	**3.6, 4.3**
	59	**GARAGE YARD IMPROVEMENTS – LONG-TERM**	Remove / relocate Garage Yard, restore area to burial space	**4.2**
	60	**DIESEL FUEL STATION PHASEOUT**	Phase-out of diesel fueling station	**4.4**

Legend

- Cemetery Development Recommendations
- Landscape Improvement Recommendations
- Cultural and Facilities Improvement Recommendations

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5.2 | OPINION OF PROBABLE COST

ASSUMPTIONS AND QUALIFICATIONS

- The Opinion of Probable Construction Cost represents the consultant's best judgment, utilizing recent materials costs or product quotes, and the Consultant's recent experience.
- The Opinion excludes design and yearly escalation costs.
- The Opinion assumes that services will be provided by contractors, including site surveying and GPR, site preparation, and installation of footings, hardscape, and planting.
- For non-construction projects the included cost is a vendor or consultant fee estimate.

PROJECT AREAS

For planning purposes, order of magnitude Opinions of Probable Construction Cost (OPCC) for select higher priority projects are shown on the chart on the following page.

- For some of these projects (e.g. Greenwood Avenue Triangle and Greenwood Avenue Narrowing) we developed the OPCC based on material quantities and recent per-unit median costs, as published by Massachusetts Department of Transportation. We used the calculated project cost to determine a total cost per square foot; and used that cost to estimate the probable cost range for projects of similar scope.
- For the Columbaria projects the probable cost range was based on actual vendor quotes.
- Note that combining smaller project areas to be designed and built as a single project, could provide construction efficiencies and cost savings.

CAPITAL FUNDING

The proposed capital improvement projects can be implemented using the City's typical capital funding and procurement processes. For historic preservation projects the cemetery can apply for Community Preservation Act (CPA funding).

OPINION OF PROBABLE CONSTRUCTION COST* FOR SELECT PROJECTS (IN 2024 DOLLARS)

Chapter	Development Area / Project	OPCC	Project area SF	Cost per Square Foot	Probable cost range	Notes
3.2	**TOPOGRAPHIC SURVEY & GPR SURVEY - VARIOUS AREAS**	$ 40,000	n/a	n/a	*$36,000-$48,000*	Topo surveying Includes Greenwood, Winchester, Casey Ave; Dell Path area, Entrance Area; and Greenough Boulevard Connector areas. GPR includes the wide aisles off of Meadow Ave, Dell Path area, and Casey Ave.
3.2	**LAUREL AVE CLOSURE - ADD TREES**	$ 12,000	n/a	n/a	*allowance*	Cost is for new trees only, (as Laurel Ave is already converted and prepared for burials).
3.3	**MAIN AVE. NARROWING**	$ 130,000	16,000.00	$8.13	*$8-$12*	Includes partial road demolition, road resurfacing, new pull-over areas, and planting lawn. Excludes preliminary surveying fees
3.3	**GREENWOOD AVE. NARROWING**	$ 210,000	10,000.00	$21.00	*$20 - $25 / SF*	Includes partial road demolition, road resurfacing, new pull-over areas, removal of poor-condition trees, planting new trees, lawn, and ground covers. Excludes design and surveying fees
3.3	**WINCHESTER AVE. NARROWING**	$ 346,500	16,500.00	$21.00	*$20 - $25 / SF*	Includes partial road demolition, road resurfacing, new pull-over areas, removal of poor-condition trees, planting new trees, lawn, and ground covers. Excludes design and surveying fees
3.3	**CASEY AVE. NARROWING**	$ 420,000	20,000.00	$21.00	*$20 - $25 / SF*	Includes partial road demolition, road resurfacing, new pull-over areas, removal of poor-condition trees, planting new trees, lawn, and ground covers. Excludes preliminary surveying fees
3.4	**GREENWOOD TRIANGLE CREMATION GARDEN**	$ 165,000	3,800.00	$43.42	*$40 - $50*	Includes partial road demolition, road resurfacing, new curbing, removal of poor-condition trees, imported soils, planting new trees, shrubs, ground covers, and irrigation. Includes a granite "obelisk" communal monument.
3.4	**DELL CREMATION GARDEN**	$ 975,000	15,000.00	$65.00	*$60 - $75*	Includes protection of monuments and trees, tree pruning and root zone decompaction, soil amendments, erosion control, planting new trees, lawn, ground covers, and irrigation. Includes (6) granite communal monuments and (2) benches. Assumes limited preservation scope: resetting lot markers and leaning headstones.
3.4 & 3.5	**WINCHESTER TRIANGLE CREMATION GARDEN**	$ 111,800	2,600.00	$43.00	*$42 - $50*	Includes partial road demolition, road resurfacing, new curbing, removal of poor-condition trees, imported soils, planting new trees, shrubs, and ground covers. Includes communal ledger stones.
3.5	**COLUMBARIUM AT WINCHESTER TRIANGLE**	$ 60,000	n/a	n/a	$53,000 - $63,000	Includes a pre-assembled round granite pavilion with (72) niches, interior ossuary and cupola, delivered and installed. Concrete footing is included; engineering fees are excluded.
3.5	**EXTERNAL COLUMBARIUM AT CHAPEL**	$ 216,000	n/a	$1350 per niche	$1200 - $1500 per niche	Includes custom columbarium with (160) niches, granite face plates, and granite ashlar surround. Includes a paved area with a bench and ornamental planting.
3.6	**ENTRANCE ENHANCEMENTS**	$ 400,000 - $1,000,000	n/a	n/a	allowance	Main entry reconfiguration, North Entry beautification, and Garage Yard screening
4.1	**TREE INVENTORY & ASSESSMENT**	$ 20,000	n/a	n/a	allowance	Inventory of all cemetery's trees, assessment and maintenance recommendations report
4.1	**ARBORETUM ACCREDITATION**	$ 6,000	n/a	n/a	allowance	Consultant support in arboretum establishment and accreditation application
4.2	**CEMETERY INFORMATION MGMT SYSTEM**	$ 100,000 - $ 200,000	n/a	n/a	allowance	Digitizing existing records, database maintenance, grave finder app option

Figure 101. Opinion of Probable Construction Cost for select project (in 2024 dollars).
* For non-construction projects the included cost is a vendor or consultant fee estimate.

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Electronic Map Viewers

Cambridge City Viewer Online Portal: https://www.cambridgema.gov/GIS/interactivemaps/Cambridgecityviewer.

Boston Planning & Development Mapjunction Viewer: https://www.bostonplans.org/3d-data-maps/historical-maps/the-boston-atlas/aerial-photos.com.

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CAMBRIDGE CEMETERY MASTER PLAN

MAY 31, 2024

CAMBRIDGE, MA