

Basic Cemetery Preservation

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*The goal of monument conservation is
to preserve our shared cultural heritage
for future generations.*

Presentation Overview

- Cemetery Monuments: Types and Materials
- What Deteriorates and Why?
- Preservation Guidelines
- Basic (Preventative) Maintenance
- Common Issues
- Levels of Repair
- Basic Cleaning
- Preservation with Limited Resources
- Resources
- Questions



Cemetery Monuments: Types and Materials

Identifying the monument type and material is the first step in successful preservation.

- Who made it?
- What is it?
- What's wrong?

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Prefabricated

Who Makes Monuments?

- Local Carver
- Prefabricated
- Government-Issued
- Vernacular



Government-Issued



Vernacular



Die in Socket



Die on Base

Monument Construction: Mortar

Typical Form

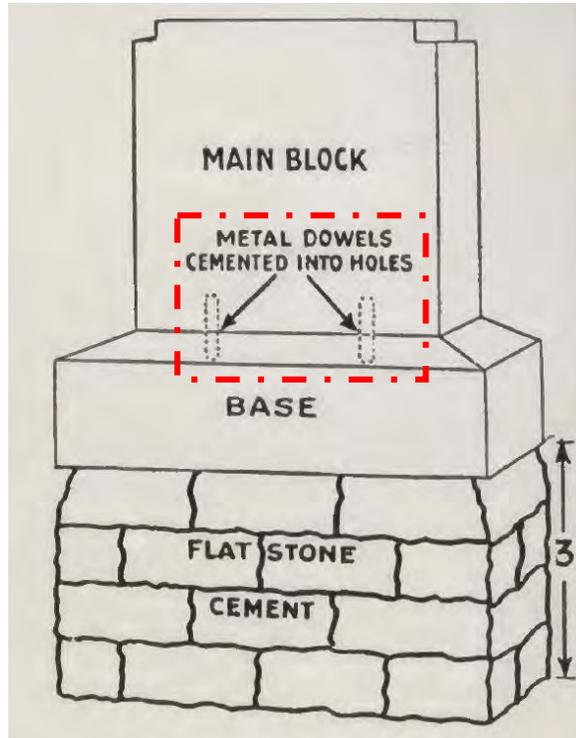
- Die set *in a socket* with a bed of mortar
- Die set *on a base* with a bed of mortar

Types of Mortar

- Lime-based mortars
- Lime (derived from limestone), sand, and water
- Softer than Portland Cement

Monument Construction

Pins (with or without mortar)



Monument Construction

Stacked (with mortar but no pins)



Monument Construction

Armature or Rebar Structure



Monument Construction

Other Methods

- Setting compound
- Cast (zinc)
- Brick/Masonry
- Table Tomb (pins)





Limestone



Marble



Granite



Metal

Typical Monument Materials

- Limestone
- Marble
- Granite
- Metal (often bronze or cast iron)



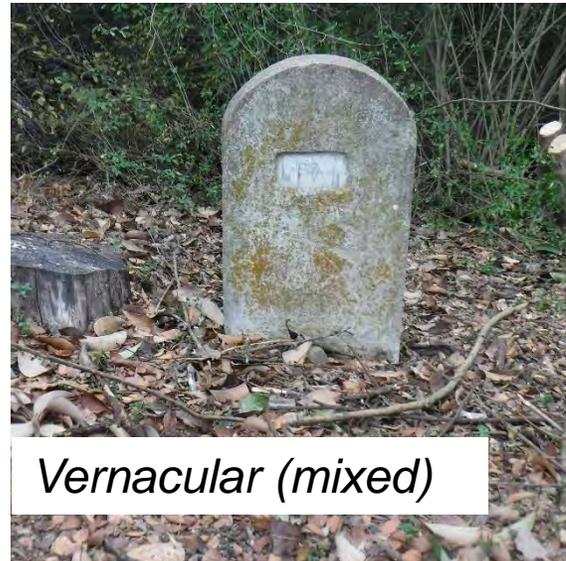
Concrete



Wood



Brick



Vernacular (mixed)

Typical Monument Materials

- Concrete
- Wood
- Brick
- Vernacular (mixed materials)

Limestone

- Sedimentary rock (usually organic)
- Primarily composed of calcium carbonate in the form of calcite
- Light in color
- Granular texture
- Soft stone



Marble

- Metamorphic rock (forms from recrystallized limestone or dolomite)
- Calcium Carbonate
- Granular
- Light in color
 - Bright white has the highest purity
 - Color or veins are mineral inclusions or impurities
- Can be polished
- Reacts with acid



Granite

- Igneous rock
- White, pink, grey (among other colors)
- 20% to 60% quartz
- Hard
- Able to be polished



Concrete

- Composed of an aggregate (such as sand, gravel, crushed stone) bound together with a cementitious materials (such as lime or cement)
- Different mixtures may have different types of deterioration
- Hard
- Limited expansion and contraction



Bronze

- Alloy of copper, tin, and other metals
- Golden brown
- Outer layer oxidizes when exposed to air
 - Creates a patina of copper oxide which becomes copper carbonate and protects the metal
- Used since ancient times



What Deteriorates and Why?

Understanding *types of deterioration* and *sources of deterioration* helps to understand how to treat the monument.



What is Deterioration?

“Broadly, the action or process of growing worse or becoming impaired in quality, state, or condition.”

- Getty Art & Architecture Thesaurus





Why do Monuments Deteriorate?

Natural Factors

- Weathering
- Ground movement (drought/thaw)
- Vegetation (root systems, adjacent vegetation)

Human Factors

- Interaction (touching, scratching)
- Inappropriate interventions
- Vehicular interactions
- Grounds maintenance

Why do Monuments Deteriorate?

Chemical Factors

- Pollution (air and rain)
- Pesticides/fertilizers
- Reaction with H₂O (metals)

Inherent Properties

- Differential expansion/contraction
- Material composition





Do All Materials Deteriorate?

Surface Deterioration

- Biological growth
- Soiling
- Surface staining



Subsurface Deterioration

- Sub florescence
- Pin expansion
- Vegetation growth



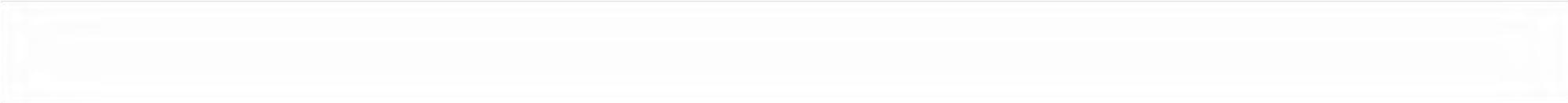


Substantial Deterioration

- Structural
- Internal
- Old repairs
- Erosion
- Substantial loss
- Missing elements

Preservation Guidelines

- Where do our preservation and restoration guidelines come from?
- Which groups and agencies lead research in new conservation methods?



Conservation Standards & Guidelines

- The National Park Service develops national standards and guidelines to care for historic resources.
- Our national standards include four treatment approaches:
 - Preservation
 - Rehabilitation
 - Restoration
 - Reconstruction
- These standards are administered at the state level by the Texas Historical Commission, our State Historic Preservation Office (SHPO).



Conservation Standards & Guidelines

- Museums, universities and research institutions (such as the Getty Conservation Institute and the Museum Conservation Institute of the Smithsonian Institution) support advancements in conservation research.
- The National Park Service also has a National Center for Training and Technology (NCPTT) in Natchitoches, Louisiana.



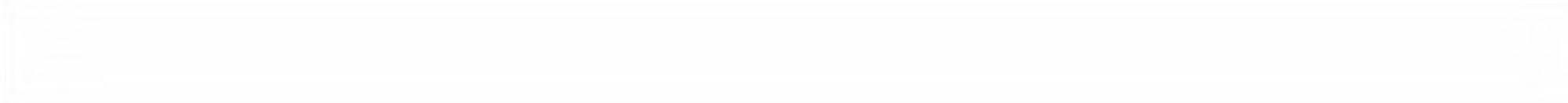
Conservation Standards & Guidelines

- Professional organizations and associations guide technologies, best practices, and professional ethical standards. These include:
 - American Institute for the Conservation of Historic and Artistic Works (AIC)
 - Association for Preservation Technology (APT)
 - Association for Gravestone Studies (AGS)
 - International Centre for the Study of Preservation and Restoration of Cultural Property (ICCROM)
 - International Council on Monuments and Sites (ICOMOS)



Basic (Preventative) Maintenance

- What steps can be taken to prevent deterioration?
- What *sources of deterioration* can we mitigate?





Documentation is the first step in preservation.

Basic Preventative Maintenance

- Restore graves following interments
- Advise Grounds Maintenance on proper equipment use
- Direct human interaction (with wayfinding signage and fencing)
- Monitor inappropriate repairs or cleaning



Water

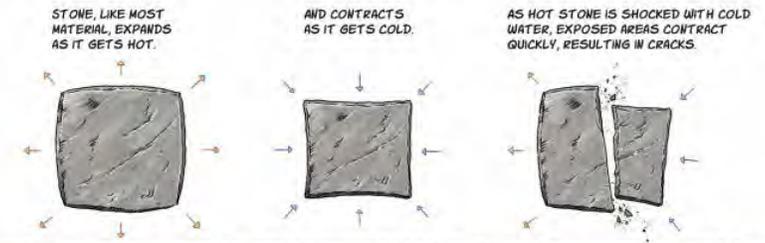
- Monitor ponding water
 - Can you identify the source?
- Avoid “watering” monuments with sprinkler systems during the heat of the day

Image Source: <https://www.baltimoresun.com/maryland/baltimore-city/bs-md-ci-loudon-park-cemetery-20180607-story.html>



GRAVESTONES BITE THE DUST

BY JOHNNA RIZZO AND MATTHEW TWOMBLY



SOURCE: NATIONAL CENTER FOR PRESERVATION TECHNOLOGY AND TRAINING, NATIONAL PARK SERVICE



Vegetation

- Monitor vegetation that may grow into the cracks of monuments
- Monitor potential fallen branches or dead/dying trees
- Watch for trees that are shifting or engulfing monuments as they grow



Common Issues

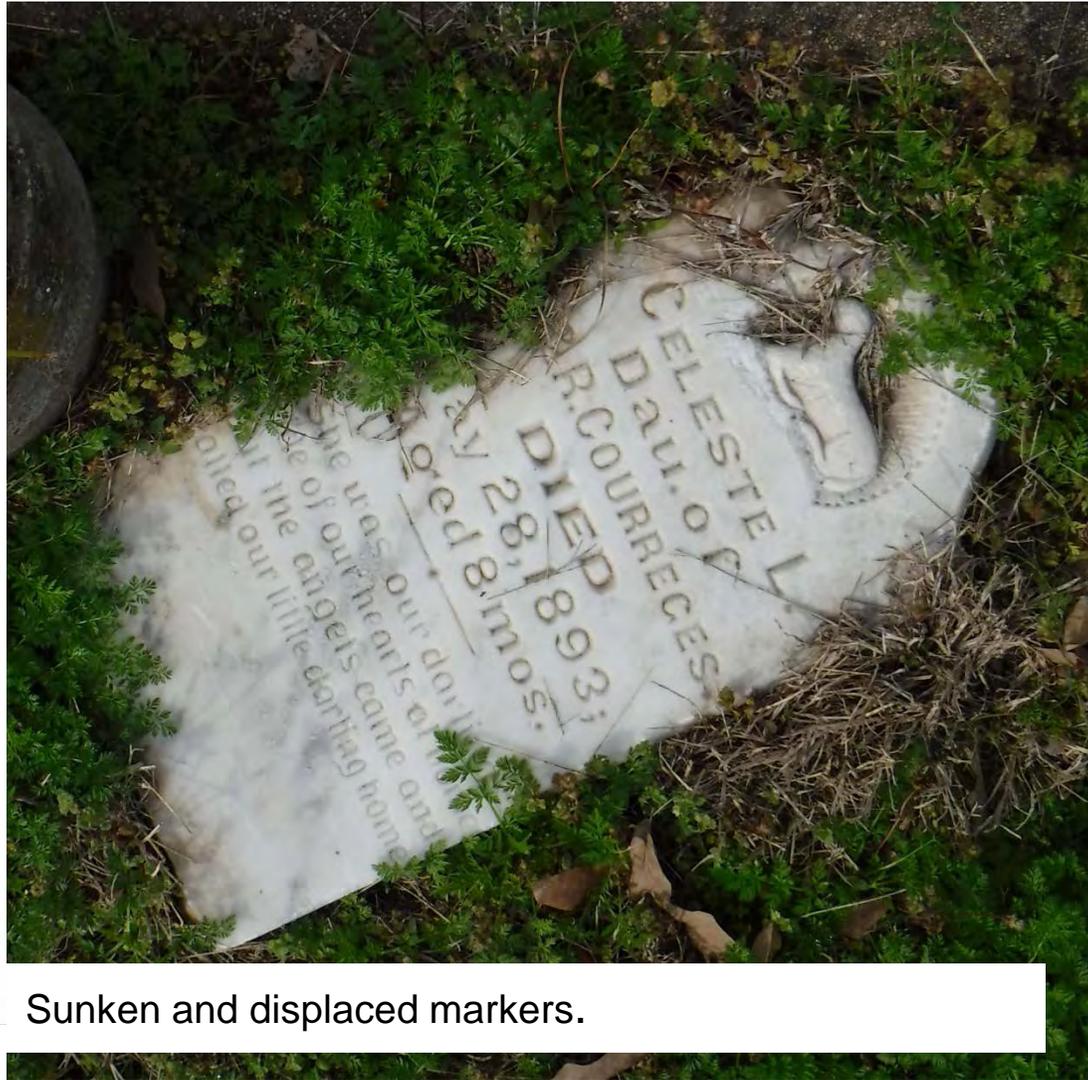
All cemetery markers can deteriorate when exposed to outdoor elements and urban conditions. Common conservation issues found in historic cemeteries include:

- Movement of markers due to soil conditions and tree roots
- Fallen, sunken and partially buried markers or fragments
- Natural deterioration from weathering processes
- Biological growth and soiling
- Migration and/or leaching of salts and minerals
- Old or improper repairs or treatments
- Mechanical damage from maintenance
- Intentional and unintentional damage from vandalism and/or human interaction





Tilted markers due to expansion and contraction of soil.



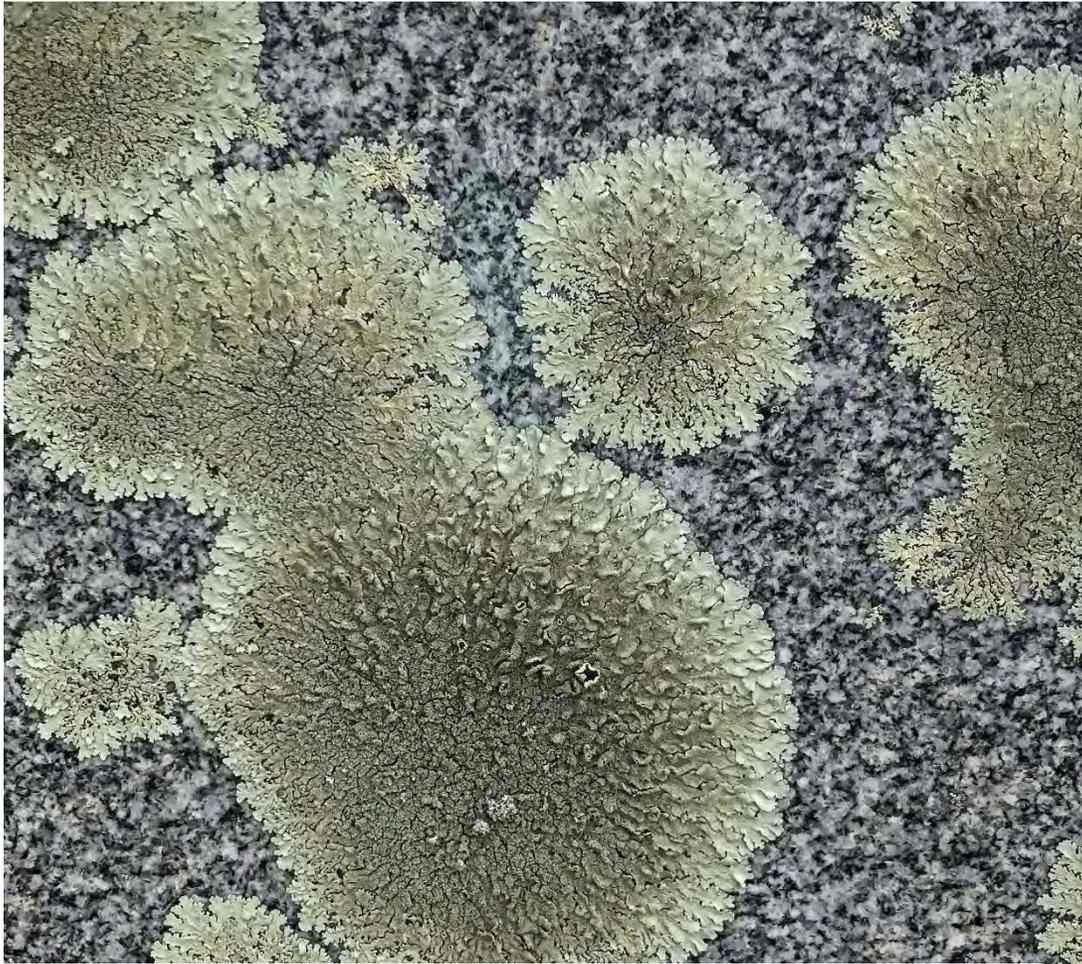
Sunken and displaced markers.



This limestone marker is deteriorating significantly near the ground due to the inherent properties of the material.



Delaminating limestone marker.



Lichen on a granite monument.



Biological growth comes in many shapes, sizes, and colors.



Vegetation causing the coating to flake off.



Vegetation growing in a socket.



Salts migrating to the surface (efflorescence).



Minerals leaching out of the concrete.



Deteriorating marble surface.



Adhesives may fail over time and can require maintenance and reapplication.

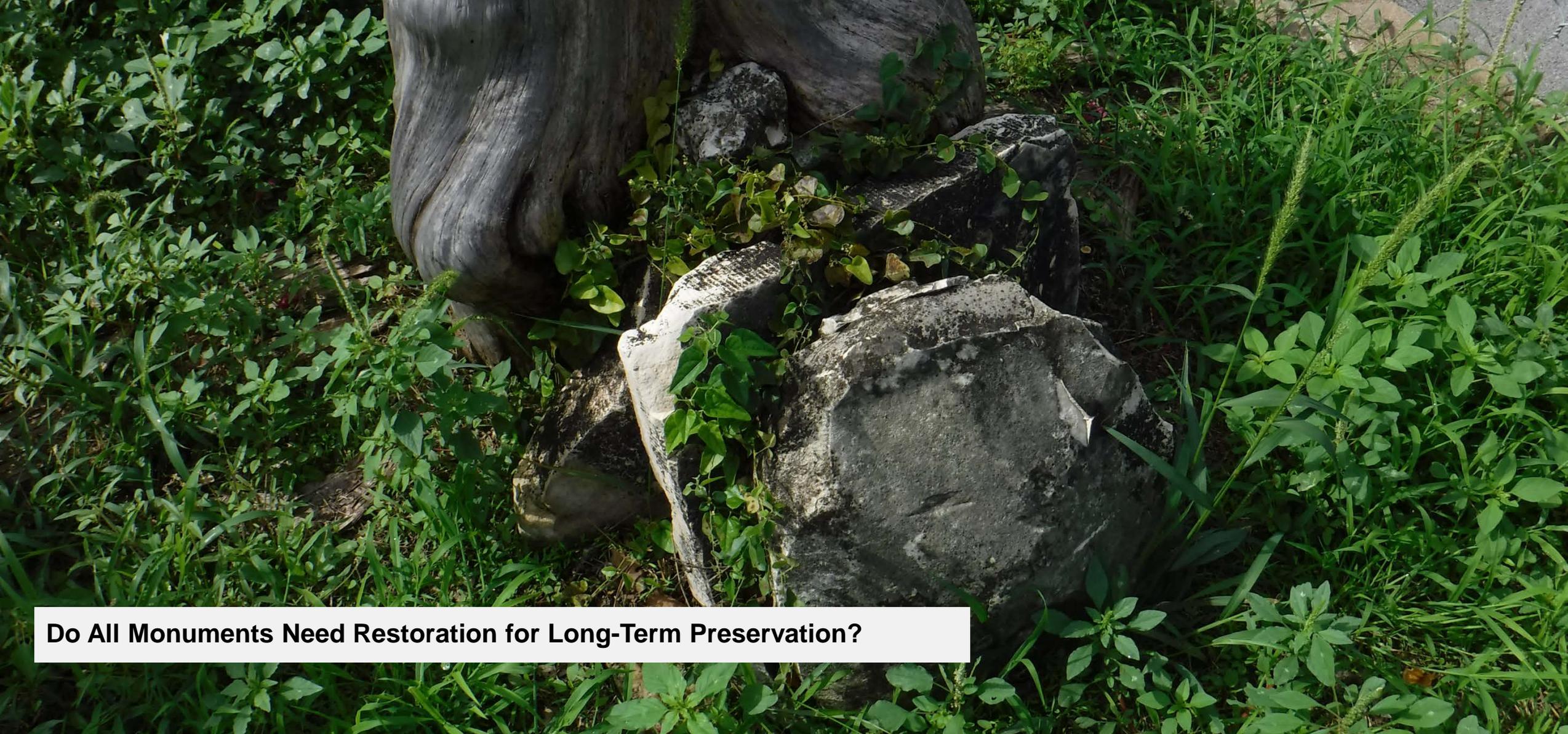


Regular condition assessments can help identify repairs that need to be reassessed.

Levels of Repair

- Do all monuments need restoration or repair?
- Understanding the level of work needed
- Understanding when an experienced professional is needed





Do All Monuments Need Restoration for Long-Term Preservation?

*The goal of monument conservation is
to preserve our shared cultural heritage
for future generations.*



Why Are Levels of Repair Important?

Minimal/Surface

A monument requiring a minimal level of repair may involve:

- Out of level monuments
- Loose footstones
- Minor biological growth
- Soiling

This project may be able to be completed by trained cemetery staff.



Moderate

A monument requiring a moderate level of repair may involve:

- Multi-step project
- Adhesive repairs or pinning
- Specialty restoration materials (such as cleaners, epoxies, and mortar)

An experienced cemetery conservator is recommended.



Substantial

A monument requiring a substantial level of repair may involve:

- Structural issues
- Required archeological monitoring
- Significant loss
- Incomplete context
- Specialized treatment needed (such as surface consolidation)
- Inadequate historic structure (such as with homemade or vernacular monuments)

An experienced cemetery conservator and/or archeologist is required.



Basic Monument Cleaning

- Determine your reason for cleaning
- Document the type of monument, material, and condition
- Check that the area is safe
- Check the weather
- Prepare appropriate materials
- Make a plan for water
- Always test your cleaning method first
- Start with the gentlest treatment possible



First, identify the reason for cleaning. Cleaning will not always make a monument look “like new”

Prepare the Area

- Document the monument or structure and surrounding area
- Check that the area is safe to work in
 - Unstable ground or monuments
 - Falling limbs
- Check the overall condition of the monument
 - Are there any conditions that you cannot identify?
 - If so, do not proceed.
- Check the weather
 - ***It is best to clean masonry in cool, cloudy weather.***



Prepare Materials

- Prepare appropriate tools
 - Soft bristled brushes
 - Avoid painted handles
- Make a plan for clean water
 - Low pressure hose
 - Handheld spray with extra water
 - Do **NOT** use a pressure washer



Remove Vegetation

- Remove any large vegetation with garden clippers
 - Make sure metal clippers do not come in contact with any monuments
- Removing large biological growth (such as moss)
 - ***Wet the monument first***
 - Use a wooden popsicle stick or scraper to gently remove the growth
- Vegetation growing into monument cracks
 - ***Take care:*** this may require dismantling the monument



Clean the Monument

- Thoroughly wet the stone
- Using a soft-bristled brush, gently agitate water on the monument in a circular motion
- Work from bottom to top
- Frequently rinse with clean water



Using a Cleaner

- Always start with the gentlest cleaning method possible (usually water)
- Test any cleaner in a discreet area before proceeding
- Non-ionic detergents (such as Orvus or Photoflo) are effective in removing soiling and biological growth
- Biocidal cleaners such as D/2 Biological Solution and Enviro Klean© BioWash© are recommended by NPS for cleaning biological growth from veteran's monuments



Cleaning may remove a layer of historic material. It is recommended to clean no more than once every 5 years.



How do you find the latest recommended products and treatments?

- Check with the Texas Historical Commission
- Contact the Texas Chapter of the Association for Gravestone Studies
- Attend a workshop organized by THC, NCPTT, AGS, AIC, APT
- Check with NCPTT (<https://www.ncptt.nps.gov/>)



Preservation Best Practices

- Always document and assess monuments prior to conducting or commissioning any work
- Use qualified professionals when necessary
- Always begin with the gentlest and least invasive treatment possible
- Strive for reversible treatments
- Use only historic material restoration-appropriate materials
- Avoid Portland Cement
- Avoid abrasive and mechanical tools such as power washing, wire brushes, or wire wheels
- Plan for continued maintenance of all monuments over time



Preservation with Limited Resources

- Creative solutions and partnerships for preservation with limited resources
- Consider how to activate the cemeteries and engage community to sustain long-term preservation efforts





Preservation with Limited Resources

- **Workshop venue** (THC, AGS, APT, NPI, NCPTT, PT, local historical societies)
- **Partner** with an educational institution (documentation, archeological studies, restoration, planning, historic research, landscape preservation, and much more)
- **Collaborate and exchange** knowledge with a nearby City or County cemetery staff
- **Facilitate** a workshop for a local nonprofit or friend's group
- Hire a **consultant** to provide specific recommendations for maintenance best practices and stabilization *at your site given your available resources*

Questions?

