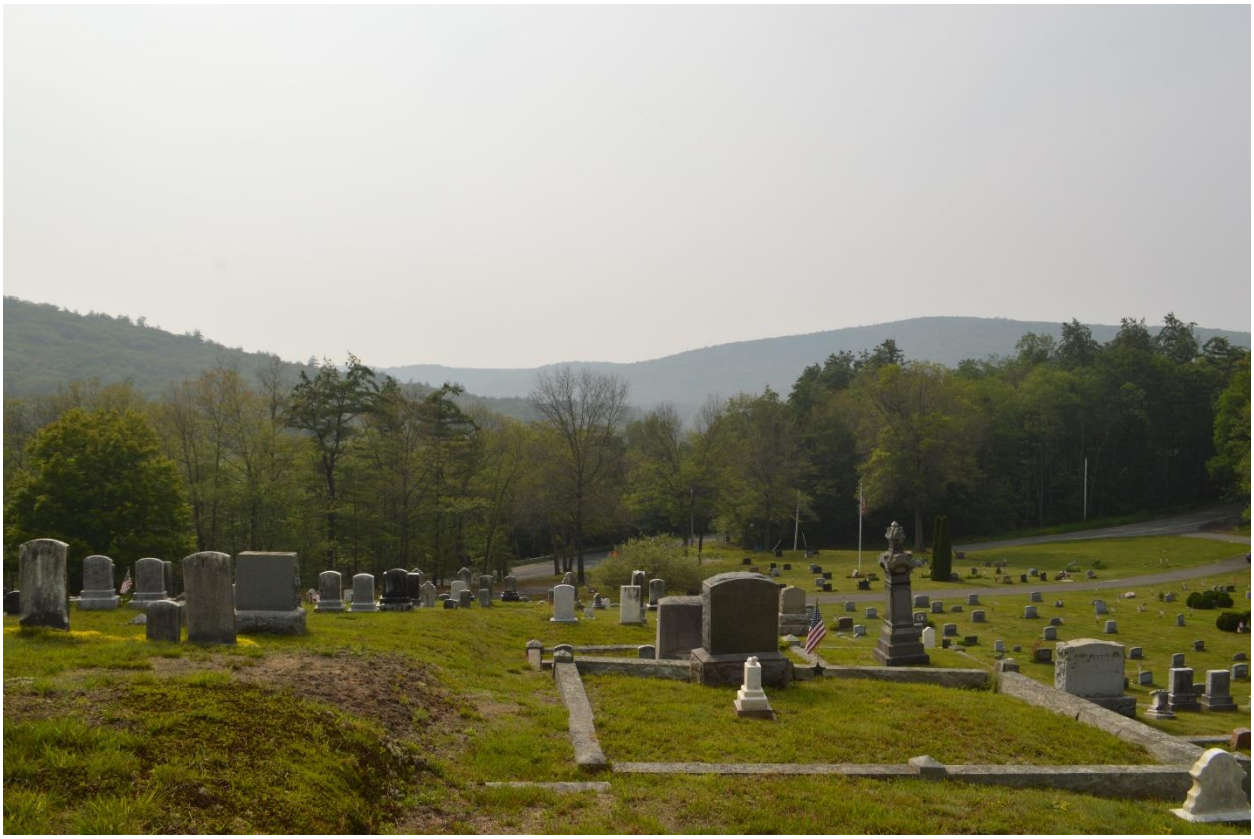
2023

Gravestone Preservation Project



Center Cemetery

Erving, Massachusetts

Glenn McCrory
Project Manager
Erving, MA

Report prepared by
Ta Mara Conde
Historic Gravestone Services
New Salem, MA

Conservation report for Center Cemetery 2023

HGS visited Center Cemetery located in Erving, MA in April 2023 to assess the condition of the cemetery. Working with Glenn McCrory, Highway Superintendent, twenty-one (21) gravestones were selected for preservation treatment; one (1) veteran tablet stone, three (3) tablets with bases, two (2) pedestal monuments, and fifteen (15) die with bases. The project began on May 26th and was completed on June 19, 2023. All work was done in accordance with the Secretary of the Interior's Standards and the American Institute of Conservators code of ethics. The following report, prepared by Historic Gravestone Services, describes all treatments performed and materials used on each gravestone.

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Clark, Abbie
Date of Death	1930
Material	Marble
Style	Die with base

Inscription

ABBIE

.

Stone Condition	Ambient dirt and biological growth Sunken base Leaning Pins
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Remove pins Reset die with lime mortar

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Clark, Edward
Date of Death	1913
Material	Marble
Style	Die with base

Inscription

EDWARD

.

Stone Condition	Ambient dirt and biological growth Sunken base Fallen, off base Pins
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Remove pins Reset die with lime mortar

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Clark, Mother
Date of Death	
Material	Marble
Style	Die with base

Inscription

MOTHER

.

Stone Condition	Ambient dirt and biological growth Sunken base Loose on base Pins
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Remove pins Reset die with lime mortar

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Eaton, Elias
Date of Death	April 17, 1850
Material	Marble
Style	Tablet with base

Inscription

ELIAS F.,

SON OF

JAMES &
HARRIET EATON

DIED
APR. 17, 1850.

Æt. 9 yr's 10 mo.

.

Stone Condition	Ambient dirt and biological growth Fallen Broken 3 fragments
Treatments	Cleaned and treated with D2 Create new below grade base Reset fragment in to base with lime mortar Reattach fragments with Jahn M120


HARRIET EATON

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Gary, Bertha & Eddie
Date of Death	
Material	Marble
Style	Die with base

Inscription

OUR CHILDREN

BERTHA
EDDIE

"Of such is the Kingdom of Heaven"

.

Stone Condition	Ambient dirt and biological growth Leaning Sunken base Erosion
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Fill erosion area Reset die with lime mortar


OUR CHILDREN
BERTHA.
EDDIE.


OUR CHILDREN
BERTHA.
EDDIE.

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Gary, Bertha L.
Date of Death	March 2, 1882
Material	Marble
Style	Die with base

Inscription

BERTHA L.

Dau. Of C.H. & N.M.
GARY

BORN
Dec. 11, 1881
DIED
Mar. 2, 1882

.

Stone Condition	Ambient dirt and biological growth Sunken base Fallen, off base and set in corner of lot
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Fill erosion area Reset die with lime mortar

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Gary, Nina L. & Nina M.
Date of Death	1869 1872
Material	Marble
Style	Die with base

Inscription

NINA L.

DIED OCT. 17, 1869
Æ. 2 YRS. 6 MO'S

NINA M.

DIED JULY 15, 1872
Æ. 15 MO'S

CHILDREN OF J.H. & ANNIE M. GARY

Stone Condition	Ambient dirt and biological growth Leaning Sunken base Concrete
Treatments	Cleaned and treated with D2 Remove concrete Reset foundation stone plumb

Reset die with lime mortar

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Hammond, Henry
Date of Death	Dec. 28, 1863
Material	Marble
Style	Tablet with base

Inscription

HENRY H. HAMMOND

DIED

DEC. 28, 1863.

Æt. 31 yrs 8 mo.
& 28 ds.

Go lovely husband to thy rest
Your Savior bid you come
Go join the Heaven
Your mortal duty is done.

Stone Condition	Ambient dirt and biological growth Leaning Broken 2 fragments Concrete
Treatments	Cleaned and treated with D2 Reset base and stone plumb Reattach fragments with Jahn M120


DIED


HENRY H. HAMMOND
DIED
Dec. 28, 1863.
Et. 21 yrs. 8 mos.
& 28 ds.

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Hanson, Lawrence
Date of Death	July 2, 1896
Material	Marble
Style	Die with base

Inscription

LAWRENCE

LAWRENCE E.

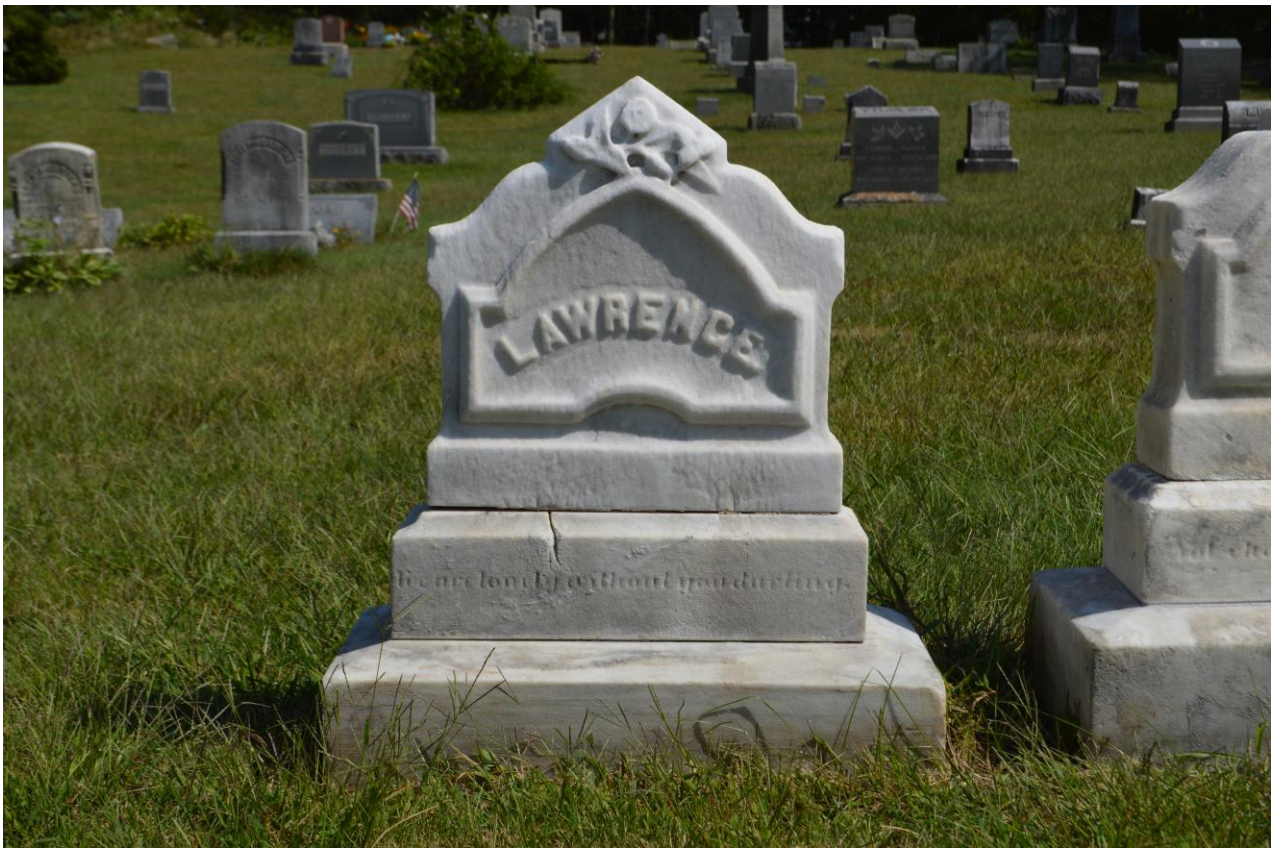
Son of D.V. &
May M. Hanson
DIED
July 2, 1896

Æ. 14 Mos.

.

Stone Condition	Ambient dirt and biological growth Leaning Sunken base Missing mortar
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Reset die with lime mortar


LAWRENCE
DIED


LAWRENCE

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Hanson, Roger
Date of Death	Sept. 12, 1900
Material	Marble
Style	Die with base

Inscription

ROGER

ROGER D.

Son of D.V. &
May M. Hanson
DIED
Sept 12, 1900

Æ. 2 Yrs. 10 Mos.

.

Stone Condition	Ambient dirt and biological growth Fallen Sunken, leaning base Missing mortar
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Reset die with lime mortar


ROGER

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Hanson
Date of Death	
Material	Granite
Style	Die with base

Inscription

HANSON

1860 DANIEL V. HANSON 1929

HIS WIFE

1863 MAY E. HANSON 1929

CHILDREN

1895 LAWRENCE E. 1896
1897 ROGER D. 1900

Stone Condition	Ambient dirt and biological growth Leaning Sunken base
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Reset die with setting compound


HANSON


HANSON

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Leclaire, Ethel J.
Date of Death	1964
Material	Granite
Style	Die with base

Inscription

LECLAIRE

ETHEL J.

1888 – 1964

Stone Condition	Ambient dirt and biological growth Leaning Sunken base
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Reset die with setting compound


JARVIS
BESSIE M.
1863 — 1954


LECLAIRE
ETHEL J.
1888 — 1964

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Litch, Ebenezer, Ann S., Lucy E.
Date of Death	1891 1877 1898
Material	Marble
Style	pedestal

Inscription

DR. EBENEZER
T. LITCH

1834 - 1891

ANN S. HIS WIFE

1833 - 1877

LUCY E. HIS WIFE

1837 - 1898

Stone Condition	Ambient dirt and biological growth Leaning Missing mortar
Treatments	Cleaned and treated with D2 Reset base stone plumb Reassemble with lime mortar


SEYMOUR
LITCH


SEYMOUR
DR. EBENEZER
T. LITCH
834 – 1891
ANN S. HIS WIFE
833 – 1877
LUCY E. HIS WIFE
837 – 1898
LITCH

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Packard, Ansel
Date of Death	July 5, 1889
Material	Marble
Style	Die with base

Inscription

ANSEL PACKARD

DIED

July 5, 1889.

Aged 63YEARS.

Co. A. 31st Reg. Mass Vols.

Stone Condition	Ambient dirt and biological growth Leaning Sunken base Erosion Missing mortar
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Fill erosion area Reset die with lime mortar


ANSEL PACKARD
DIED
JULY 5, 1889.
AGED 63 YEARS


ANSEL PACKARD
DIED
JULY 5, 1889.
AGED 63 YEARS

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Packard, Asa
Date of Death	Dec. 27, 1870
Material	Marble
Style	Die with base

Inscription

ASA S.

SON OF

A.S. & M.W. PACKARD

DIED DEC. 27, 1870.

Æ. 20 YRS.

.

Stone Condition	Ambient dirt and biological growth Leaning Sunken base Erosion Missing mortar
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Fill erosion area

Reset die with lime mortar

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Packard, Francis B.
Date of Death	Sept. 15, 1863
Material	Marble
Style	Die with base

Inscription

FRANCIS B.

SON OF

A.S. & M.W. PACKARD

Co. F. 34th Regt.
MASS. VOLS.

DIED SEPT. 15, 1863.

Æ. 16 YRS.

.

Stone Condition	Ambient dirt and biological growth Leaning Sunken base Erosion Missing mortar
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Fill erosion area Reset die with lime mortar


SON OF
A. S. & M. W. PACKARD
CO. F. 34 REGT.
MASS. VOLS.
DIED SEPT. 15, 1863.
AE. 16 YRS.


FRANCIS B.
SON OF
A. S. & M. W. PACKARD
CO. F. 34 REGT.
MASS. VOLS.
DIED SEPT. 15, 1863.
AE. 16 YRS.

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Packard, Mary E.
Date of Death	May 1, 1909
Material	Marble
Style	Die with base

Inscription

MARY E.

WIFE OF

ANSEL PACKARD

DIED MAY 1, 1909.

Aged 73YEARS.

.

Stone Condition	Ambient dirt and biological growth Leaning Sunken base Erosion Missing mortar
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Fill erosion area Reset die with lime mortar


MARY E.
WIFE OF
ANSEL PACKARD
DIED MAY 1 1909
AGED 78 YEARS


MARY E.
WIFE OF
ANSEL PACKARD
DIED MAY 1 1909
AGED 78 YEARS

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Reynolds, Lyman
Date of Death	April 25, 1861
Material	Marble
Style	Tablet with base

Inscription

LYMAN REYNOLDS

DIED

Apr. 25, 1861.

Æ. 16.

Not dead, but gone before.

Stone Condition	Ambient dirt and biological growth Leaning Concrete
Treatments	Cleaned and treated with D2 Reset base and stone plumb


LYMAN REYNOLDS
DIED
Apr. 25. 1861.
E. 16.


LYMAN REYNOLDS
DIED
Apr. 25. 1861.
E. 16.

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Simonds, Hugh & Nellie
Date of Death	Dec. 7, 1880 June 6, 1881
Material	Marble
Style	pedestal with urn

Inscription

HUGH SIMONDS

DIED

DEC. 7, 1880

Æ. 48 YRS.

NELLIE M. SIMONDS

DIED

JUNE 6, 1881

Æ. 16 YRS.

SIMONDS

Stone Condition	Ambient dirt and biological growth Leaning Missing mortar Urn broken off
Treatments	Cleaned and treated with D2 Reset base stone plumb Reassemble with lime mortar Reattach urn with Jahn M120


HUGH SIMONDS
DIED
DEC. 7. 1880.
Æ. 48 YRS.


RUTH M.
NELLIE M. SIMONDS
DIED
JUNE 6. 1881.
Æ. 16 YRS.
SIMONDS.

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Spauling, Mary
Date of Death	Sept. 19, 1893
Material	Marble
Style	Die with base

Inscription

Mother

MARY W. DEAN

WIFE OF

V.L. SPAULING

BORN JAN. 21, 1827

DIED SEPT. 19, 1893.

.

Stone Condition	Ambient dirt and biological growth Leaning Sunken base Broken corners, pins Missing mortar
Treatments	Cleaned and treated with D2 Reset foundation stone plumb Remove pins Reattach fragments with Jahn M120 Reset die with lime mortar


MARY W. DEAN
WIFE OF
V. L. SPAULDING
BORN JAN 21 1827
DIED SEPT 19 1893


MARY W. DEAN
WIFE OF
V. L. SPAULDING
BORN JAN. 21. 1827.
DIED SEPT. 19. 1893.

Cemetery	Center Cemetery
Location	Erving, MA
Record Date	May 2023
Name	Stevenson, Chas. E.
Date of Death	
Material	Marble
Style	Tablet

Inscription

CHAS. E. STEVENSON

CO. C.

14 N. H. IN.

Stone Condition	Ambient dirt and biological growth Leaning Concrete
Treatments	Cleaned and treated with D2 Reset base and stone plumb


CHA'S. E. STEVE
CO.C
14 N.H.


CHA'S. E. STEVENSON
CO. C.
14 N. H. INF.

CONSERVATION METHODOLOGY

CLEANING

Cleaning gravestones is generally not recommended unless performing repairs. Biological soiling will degrade stone surfaces over a long time. The effects of this degradation needs to be weighed against the degrading effects of cleaning. Depending on the method of cleaning this can be beneficial or detrimental.

If cleaning is necessary the stone surfaces should be rinsed with a generous amount of water and brushed with a natural bristle brush and repeated as necessary. If a stone has biological growth, it should be treated with an anti-biological solution. D2 Biological Solution (Limeworks, Inc.) is the recommended product for this application. D2 is a water soluble, non-toxic, anti-biological solution which does not react with the stone or leave soluble salts.

Removal of failed repairs

Repairs are considered as having failed if they are no longer functional, are unsightly, or are a hazard. Failed adhesives, mortars and pins require careful removal before proceeding with conservation treatment. Some temporary stabilization may be necessary as poorly attached fragments are disassembled.

Removal of degraded structural resins may be particularly difficult and time-consuming. Mechanical removal is generally done with small hand tools. The cutting of pins and fasteners may require power tools. Ferrous metal pins are most often locked in place by corrosion expansion. Their removal is best done by careful drilling with a properly sized coring bit.

RESETTING

Eighteenth and early nineteenth century New England gravestones are typically stone tablets that were set directly in the ground. By the first half of the 19th century many headstones began to use bases. Stones were either mortared into slots or pined to the base. In some cases older tablets were cut and reset with a base.

Larger monuments are often made of several elements and can be both large and heavy. Specialized hoisting equipment is often required. Competent operation and structural engineering considerations are required when performing this work.

Resetting in ground

Tilted stones set directly in the ground can be made plumb by careful excavation of the soil with hand tools, to permit re-setting in the proper position and drainage. When excavating, all large stones should be removed as ice heaves can cause an underground stone to push on the gravestone. A typical tablet will have approximately 1/3 of its length buried in the ground. If there is not an adequate length of below grade material to support the marker a new cast concrete below grade base will be required. Once the stone is carefully placed into the vertical position and at the proper depth, the stone is made plumb and level, and aligned with adjacent markers. Backfill with a

mixture of course sand, loam and pea gravel wetted and compacted. Disturbed areas of the ground are re-graded with topsoil and seeded as required.

Resetting on/in existing base

Unsecured stones in existing bases require re-setting. Generally the base should be reset level and aligned with adjacent stones. Pins should be removed if present. The stone can then be reset level and plumb in the existing slot.

Reset stone on a full bed of modified lime (or hydraulic lime) mortar. Historically ratios of 1 part cement, 4 parts lime and 8 parts fine sand have been used with reasonable results. This mix is generally considered to be a soft mortar. Some conservation recommendations have specified ratios as high as 3 parts cement, 2 parts lime and 8 parts sand. The increased cement and reduced lime content has the effect of increasing the strength and adhesion of the mortar. In theory this would tend to make the mortar last longer than the traditional mix. The negative aspect is that the higher cement ratio produces a harder joint which induces a compression stress on the stone as the stone swells with varying weather conditions.

HGS recommendation is to use 2 parts cement, 4 parts lime and 8 parts fine sand which, increases the strength somewhat while still retaining some of the softer properties to help reduce stress on the stone.

Resetting into new cast concrete base

There are several situations where a new cast base will be required. Usually tablets which are broken near grade level or have been cut years earlier and set into bases that have failed are typical examples of when a new base is needed. Bases can be set above grade or below depending on the stone, aesthetics or other factors. Bases can be cast on site or pre-cast and set in place on a level bed of gravel, loam and sand.

Cast concrete bases are typically made with a slot that is ½” wider and thicker than the stone and is recessed 3”-4”. Depending on the size of the stone the base is usually 8”-12” deep, 8”-12” greater thickness and 6”-8” wider than the stone. This method is fine when resetting stones with a square bottom. If casting with a recessed slot, drainage holes must be provided.

Some conservation specifications recommend squaring the bottom of the stone by cutting the stone with a saw. This is not recommended as the use of power tools on old stones can cause damage to the stone. In addition valuable history including inscriptions may be lost. If the bottom of the stone is not square, a base with the same dimensions as above should be made but the slot should go completely through the base. This allows the excess stone to extend under the base level if needed and provides for better support. This also allows broken fragments, belonging to the stone, to be either attached to or buried beneath the stone.

Restoration mortar repair

Repairs to gravestones, generally involves reassembly of broken pieces and fragments of stone, filling open joints, cracks and delaminating. Depending on the stone and type of break will determine which method of reattachment.

STRUCTURAL REATTACHMENTS

Broken stones to be bonded should be carefully cleaned and dry fitted to insure proper fit. The area around the stone should be probe for any missing pieces which may belong to the stone. Traditional method of two part epoxy (Aboweld 55-22, Abatron) is the common way of bonding stones that require structural integrity. Epoxy is very strong, although it also is moisture insensitive. This has the effect of creating a moisture barrier at the repair joint. There is still a debate on the effects of epoxy on various stones. For marble and slate stones this can cause stone degradation over time due to the inability of the moisture to wick away from the area. Field observations have shown that failures usually occur adjacent to the repair joint which has been attributed to the strength of the epoxy being stronger than the marble. Closer observations have shown that the stone at the new break is usually degraded. Epoxy should be reserved for conditions where high shear forces are acting on the stone. Several factors such as angle of break, thickness of the stone, weight and bonding surface area need to be considered when deciding to use epoxy.

For most bonding applications, a non-polymer, cement-based restoration mortar (Jahn Restoration Mortars, Cathedral Stone) should be used. The specific bonding method should conform to the manufacturer's specifications for the specific stone and should be performed by a certified Jahn Products Technician. Bonding with restoration mortars is preferable since the mortars are permeable to moisture and allow the stones to breath. Over time the stone integrity is maintained and should last longer than the epoxy. Restoration mortars should be tinted to match the stone color and texture after cleaning. Tinting can be achieved through appropriate pigments (alkali stable oxides) which are available through Cathedral Stone or mason supply.

Reinforcement

The routine use of pins has been the traditional way of reinforcing broken stones. This method is in debate and controversial. The use of pins should be avoided except in some very extreme situations where it is unavoidable. Generally, the use of pins is to provide extra support to keep two pieces together. If the stone begins to lean and the adhesion joint fails between the stones, then the pins are carrying the full weight of the stone. The pin extends the moment arm which can cause a large blow out on the face of the stone next to the pin.

If pins are required then stainless steel threaded rods ranging from 3/8"-3/4" diameter should be used and should never exceed 1/3 of the thickness of the stone. Stones should be drilled using a wet coring drill and at a slow speed. Pins are then secured using an epoxy structural adhesive.

Repair mortars/ crack fillers

Areas of missing stone can be filled using commercially available restoration mortars (Jahn Restoration Mortars, Cathedral Stone) tinted to match the stone. Tinting can be accomplished in the same way as described above in bonding mortars. Large cracks can also be filled using the same mortars. Mortar repairs should not be performed if there is a risk of freezing temperatures within two weeks after performing work.

Filling of delaminating stones

De-lamination occurs in many stones typically slate and sandstone. Repair of delaminated stones is designed to adhere the separated layers and prevent water penetration. The first step is to thoroughly clean the interior surfaces of the crack to remove debris. Depending on the nature of the crack, hand tools and compressed are can be used to clean out the area. Interior surfaces should then be wetted with water or a solution of water and isopropanol. For cracks larger than a 1/8" commercially available M40 flowable grout (Cathedral Stone) can be used. For smaller cracks M32 can also be used. Grouts should be tinted to match the stone after cleaning. Flowable grouts should be applied using manufacturers recommendations.

Reattachment of small fragments

Small stone fragments or friable areas are typically reattached with a solution of Acryloid B-72 in solution of acetone. This method is mainly for nonstructural applications where a zero-thickness bonding joint is desired. Care should be taken as the B-72 forms moisture impermeable layers at the joint similar to epoxy. Depending on the geometry of the break it is possible to create a moisture trap which can cause deterioration over time.

Consolidation of friable stone

Stones showing signs of sugaring or de-lamination should be consolidated to maintain the granular integrity of the stone. Consolidation should be performed before further treatment is done. Consolidation should be performed using Conservaire OH100 (Prosoco) following manufacturers specifications for proper application. OH100 should be applied a minimum of 6 applications to promote deep penetration. Failure to perform this task can cause a hard skin to form and cause the layer to de-laminate. OH100 binds the grains of the stone without filling the voids between the grains. This allows the stone to continue to breath and expel water from the interior of the stone.