The Shutesbury Cemetery Commission is seeking bids for the repair / restoration of 18 grave stones/markers located in the West Cemetery, 158 Leverett Road, Shutesbury, MA 01072. The Commission is seeking the services of a person or persons specially trained and skilled in the art of restoration of historically important gravestones. Someone that knows and has access to all of the special techniques, processes, chemicals and adhesives used for this type of project and appropriate for each type of stone.

Bids must be provided in a sealed envelope and marked “West Cemetery Grave Stone Repair Project Bid”. Bids must be received at the Shutesbury, MA Town Administrator’s Office, Shutesbury Town Hall, 1 Cooleyville Rd., Shutesbury, MA 01072 on or before April 14, 2020 at 4:00 PM, at which time they will be opened and read aloud. A 5% Bid Bond must accompany the bid submittal. All bids are subject to prevailing wage and the weekly payroll reporting. No responsibility shall be attached to any person for the premature opening of bids not properly marked. No bid will be accepted at any other location or after time and date specified. Specifications and bid forms may be obtained at the Shutesbury Selectmen’s Office during regular business hours, Monday through Friday, 8:30 AM until 4:30 PM. Specifications may be requested by mail or phone 413-259-1214.

The successful bidder must furnish a 50% payment bond and a certificate of insurance as detailed in the Article X of the Town’s Standard Contract (attached). No bidder may withdraw his bid for a period of sixty days, excluding Saturdays, Sundays and Holidays, after the actual date of the bid opening.

The Town of Shutesbury Cemetery Commission reserves the right to accept any bid; reject any or all bids deemed not to be in the Town’s best interest; reserves the right to waive or permit correction of minor informalities; and to conduct discussions with all qualified offers in any manner necessary to serve the best interests of the Town of Shutesbury and the bidders.
Project Description:

In an effort to look at short term and longer-term restoration and preventative measures the Commissioners are looking at a multi-faceted project. In addition to repairs to the 18 grave stones identified in this request, the person/entity awarded the contract must be able to hold a class/training for up to fifteen (15) people to train them how and when to properly clean different types of stones without doing further damage. Also included would be how to perform minor repairs such as properly resetting smaller leaning stones. Priority will be given to Cemetery Grounds Keepers and Cemetery Commission members with the balance comprised of interested volunteers. The Shutesbury Cemetery Commission will provide the necessary facilities for this training.

It is understood that there are many more gravestones needing repair than there is budgeted funds. The eighteen (18) grave markers selected for this round of repairs were prioritized due to size, complexity and safety. A list of the selected stones is attached along with a general statement of their condition and treatment recommendations (see Appendix A). Also attached are photographs of each stone to be used for identification purposes only (Appendix B).

Descriptions of conditions as well as recommended treatments included with the list are for the purpose of identifying the markers that will be treated and for giving a general description of the conditions and recommended treatments. The short description is not intended to define all of the treatments or treatment steps that may be required. It is the responsibility of the conservator to carefully examine the condition of each stone identified and formulate their own assessment and determine its proper treatment.

All repairs shall begin with documentation of the monument with a “before” photograph and a completed assessment form. The area will be prepared for resetting the stone plumb in the original location and be reseeded with grass seed after completed preservation. Each stone shall (where needed) be cleaned and treated for biological growth in accordance with proper conservation techniques and using approved materials appropriate for that stone. Upon completion, an “after” photograph will be taken and a report prepared with all treatments and photographs for Town/Cemetery records. All work shall be performed in accordance with American Institute for Conservation’s Code of Ethics and the Secretary of the Interior’s Standards.

Documentation

Document the condition of each grave marker or footstone scheduled to receive conservation treatments with a survey sheet and digital photographs prior to proceeding with any work. Document the locations of all treatments to stone on survey sheets. Photograph the stone during and after treatment with digital photos. Upon completion of the project, provide the Shutesbury Cemetery Commission with three (3) copies of the following: copies of all survey sheets with proposed treatments, copies of final treatment reports plus any field reports, and project correspondences. Include material safety data sheets and manufacturer’s cut sheets for all products. In addition, provide the Commission with electronic copies of all forms, reports and photographs of grave markers; before, during and after treatment.
I. Purchase Description

No charges will be allowed for federal, state or municipal sales and excise taxes, for which the Town of Shutesbury is exempt. The prices bid shall be net and shall not include the amount of any such tax.

1. Completion Date: All work shall be completed by October 31, 2020.

2. Site Meeting: Any contractor wishing to visit the site West Cemetery, 158 Leverett Road, may do so on their own at any time. Any contractor that would like assistance in identifying the selected stones prior to the bid date, please contact Walter Tibbetts at 413-687-4158 or Janice Stone at 413-259-1557.

3. Addenda / Questions: All questions must be submitted by phone, fax or email by April 4, 2012 so that the Town, if necessary, can issue an addendum by April 5, 2012. Contact: Becky Torres
   Town Administrator
   Office 413-259-1214
   Fax 413-259-1107
   Email: townadmin@shutesbury.org

II. Evaluation Criteria

Eligible bids will first be examined for their responsiveness to what is requested in this Invitation for Bids. Responsibility of the bidder will then be ascertained. It is the intention of the Town to award the contract to the lowest responsive and responsible bidder.

1. Responsiveness

   Bidders must completely fill out and submit the bid form and all other required forms. All supplies and services that are the subject of the bid must meet the minimum standards and specifications set forth in the purchase description including standards by which the procurement officer will determine acceptability as to quality, workmanship, results of inspections and tests, and suitability for a particular purpose.

2. Responsibility

   Bidders must demonstrate that they meet the following measures of responsibility:

   (A) Bidder is licensed in the Commonwealth of Massachusetts to do the required work. The Town of Shutesbury will reject any bid from a bidder not appropriately licensed.
(B) Bidder has successfully completed 3 projects of similar size and scope in the last three years. The Town of Shutesbury will reject any bid from a bidder that fails to demonstrate the necessary experience.

III. Bid Submission Requirements

1. All bid packages must be sealed and marked “West Cemetery Grave Stone Repair Project Bid.”
2. All bids must be delivered to the Town Administrator’s Office at Shutesbury Town Hall, 1 Cooleyville Rd., MA 01072, no later than 4:00 PM on Wednesday, April 14, 2020. Facsimile transmissions will not be accepted.
3. The Town shall award a contract according to the evaluation criteria set forth in Section II of the Invitation for Bids within 30 days of the receipt of bids. The time for acceptance may be extended by mutual agreement of the successful bidder and the Town. A contract shall be awarded to the lowest responsive and responsible bidder.
4. A bidder may correct, modify or withdraw a bid by written notice received prior to the time and date set for the bid opening. After bid opening, a bidder may not change the price or any other provision of the bid in a manner prejudicial to the interest of the Town or fair competition. The Town shall waive minor informalities or allow the bidder to correct them.
5. The following forms must be submitted with each bid package, copies of which are provided as attachments to this Invitation for Bids:

   (A) Bid Form
   (B) Attachment A
      (1.) Certificate As To Corporate Bidder
      (2.) Certificate As To Payment of State Taxes
      (3.) Certificate of Non-Collusion
      (4.) Certificate of Fair Labor Practices

6. Other Required Bid Submittals – Documentation that the bidder has the necessary previous experience. Include a list of three projects completed in the past three years of similar size and scope. Include contact names and phone numbers for each project.

7. Award Contingency
   The award of this project is contingent on meeting the requirements of the specification set forth in this document:
Project Schedule

March 21, 2020 – Solicitation Released
March 21, 2020 – Bid Document Available
April 14, 2020 – Bids Due
April 14, 2020 – Notice of Award to the Lowest Responsive & Responsible Bidder
May 1, 2020 – Execute Contract and weather permitting
Commence Work

8. Communication – All communication with regard to this solicitation must be made to the Shutesbury Town Administrator. Verbal communication is not binding and shall not alter a specification, term or condition of this solicitation.

9. Site Visit – While not mandatory, each bidder is encouraged to visit the site. Arrangements can be made by contacting members of the Cemetery Commission, Walter Tibbetts 413-687-4158 or Janice Stone 413-259-1557.

Subcontractors – If a bidder intends to use a subcontractor to conduct any of the work in this project, the bidder must identify the subcontractor; provide a summary of each subcontractor’s qualifications, experience and duties to be performed.
Attachment A—(1) Certificate As to Corporate Bidder; (2) Certificate as to Payment of State Taxes; (3) Certificate of Non-collusion; and (4) Certificate of Fair labor practices

(1) CERTIFICATE AS TO CORPORATE BIDDER

I, _______________________________ certify that I am the _____________________ of the corporation named as Bidder in the Bid included herein, that _________________, who signed said Bid on behalf of the Bidder was then ________________________ of said corporation, that I know his signature, that his signature thereon is genuine and that said Bid was duly signed, sealed and executed for and in behalf of said corporation by authority of its governing body.

_______________________
(Secretary-Clerk)

Dated: _______________________

(2) CERTIFICATE AS TO PAYMENT OF STATE TAXES

Pursuant to M.G.L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

_____________________________
Social Security Number or
Federal Identification Number

_____________________________
Signature of Individual or Corporate
Name

By: ___________________________
Corporate Officer (if applicable)
(3) CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

_________________________________
(Name of person signing bid or proposal)

_________________________________
(Name of Business)

(4) CERTIFICATE OF FAIR LABOR PRACTICES

The undersigned certifies under penalties of perjury that in accordance with Section 504 of the (Federal) Rehabilitation Act of 1973 and 31 Code of Federal Regulations, Part 51, his/her company does not discriminate on its employment, procurement and marketing activities on the basis of race, creed, color national origin, sex, handicap or age.

_________________________________
(Name of person signing bid or proposal)

_________________________________
(Name of Business)
BID FORM
Town of Shutesbury
Solar Photovoltaic System

The undersign proposes to provide the work described in the Bid Documents relating to the grave stone repair/restoration project at the West Cemetery, 158 Leverett Road, Shutesbury, MA 01072 for the total delivered price of:

BASE BID PRICE for – **18 grave stone repairs plus class for volunteers:**

$__________________
Base Bid Price in words

BY:

______________________________
Signature

______________________________
Date

______________________________
Type or Print Name

______________________________
Title

______________________________
Business Name

______________________________
Business Address

______________________________
City

______________________________
St.

______________________________
Zip

______________________________
Business Phone

______________________________
Business Email

Please answer the following question. Is this bid based on supplying photovoltaic panels manufactured in the Commonwealth of Massachusetts?

_____ **Yes**, our bid is based on panels manufactured in MA. We understand that if the panels we provide are not manufactured in MA that $0.15 per watt or $300 will be deducted from the final contract price.
No, our bid is not based on supplying photovoltaic panels manufactured in MA. We understand the project will not be eligible for up to $300 in additional incentives from the MTC. We understand that $300 will be added to our base price for purposes of determining the lowest bidder.
STANDARD CONTRACT
TOWN OF SHUTESBURY
1 Cooleyville Road, Shutesbury, MA  01072

CONTRACT FOR:  Grave stone repairs at West Cemetery
This Contract is made this ______day of ______, 2020, by and between the Town of
Shutesbury, a municipal corporation located within the Commonwealth of Massachusetts,
acting through its Chief Procurement Officer (hereinafter, the "Town"), and ____________, a
company with a business address at ______________________.

ARTICLE I
SCOPE OF SERVICES

The Contractor shall furnish Repairs and restoration of 18 grave stone markers at the
West cemetery, 158 Leverett Road, Shutesbury, MA 01072 and a class on cleaning
and minor repair of grave stones for up to 15 volunteers as requested in a (bid dated;
telephone quote; etc.) requested by the Town on April 11, 2020. Contract documents shall
include this Contract; the Town’s Request for Bid; insurance certificates; Specifications and
any addenda and Payment Bonds; and all of which are incorporated herein by reference.

ARTICLE II
TERM OF CONTRACT

This Contract shall be effective as of the date first written above and shall terminate

ARTICLE III
COMPENSATION

1.  **Contract Sum**: The Town shall pay the Contractor in current funds for the
    performance of the work described in the Scope of Services at the price quoted, for a
    Contract Sum not to exceed the prices quoted on, April 14, 2020, for the amount of
    $__________.

2.  **Payment Schedule**: Compensation for the services pursuant to this Contract shall
    be paid on proper acceptance by the Town of the services provided pursuant to the
    Specifications.

ARTICLE IV
AFFIRMATIVE ACTION

The parties hereto agree that it shall be a material breach of this Contract for the Contractor
to engage in any practice which shall violate any provision of Massachusetts General Laws,
Chapter 151B, relative to discrimination or privileges of employment on basis of race, color,
religion, sex, national origin, ancestry, age, sexual orientation or disability.
ARTICLE V
COMPLIANCE WITH LAWS

The Contractor shall comply with all Federal, State and local laws, rules, regulations and orders applicable to the services provided pursuant to this Contract, and shall be responsible for obtaining all necessary licenses, permits, and approvals.

To the extent that the Contractor is responsible for wages, benefits, overtime wages or other labor related costs, expenses or penalties as a result of applicable laws, the Contractor shall be and is solely responsible for such wages, other labor related costs, expenses and/or penalties and the Town shall not have any responsibility to make any such payment, and further the Contractor shall indemnify and hold the Town harmless for all such wages, labor costs, expenses and/or penalties, including, but not limited to, any determination or judgment related thereto and any attorney’s fees incurred by the Town in relation thereto or the defense thereof.

ARTICLE VI
INCORPORATION OF G. L.

This Contract shall be considered to include all terms required to be included by the General Laws of the Commonwealth of Massachusetts, as amended, and any other laws as though such terms were set forth in full herein, to the extent that the same are applicable to this Contract and the Contractor.

ARTICLE VII
INDEPENDENT CONTRACTOR

The Contractor acknowledges and agrees that it is acting as an independent Contractor for all work and services rendered pursuant to this Contract, and shall not be considered an employee or agent of the Town for any purpose.

ARTICLE VIII
TOWN'S LIABILITY

The Town's liability under this Contract shall be to make all payments when they shall become due, and the Town shall be under no further obligation or other liability. Nothing in this Contract shall be construed to render the Members of the Board of Selectmen, the Board of Health, or any other officer of the Town, or their successors in office, personally liable or any obligation under this Contract.
ARTICLE IX
INDEMNIFICATION

The Contractor shall indemnify and hold harmless the Town, its officers, boards, agents and employees from any loss, damage, cost, charge, expense or claim for injury to person or property, which may be made as a result of any act, omission or default on the part of the Contractor, or any of its agents or employees, and will pay promptly on demand all costs and expenses of the investigation thereof, including attorney's fees and expenses. If any such claim is made, the Town may retain out of any payments, then or thereafter due to the Contractor, a sufficient amount to protect the Town against such claims, costs and expenses.

ARTICLE X
INSURANCE

The Contractor shall be responsible to the Town or any third party for any property damage or bodily injury caused by it, any of its subcontractors, employees or agents in the performance of, or as a result of, the work under this Agreement. The Contractor, on behalf of itself and any subcontractors used, hereby certifies that the Contractor and such subcontractors are insured for workers’ compensation, and claims on account of property damage, bodily injury, personal and product liability. The Contractor and all subcontractors it uses shall purchase, and maintain in full force and effect insurance policies in the amounts here indicated.

General Liability
Bodily Injury Liability: $1,000,000 per occurrence
Property Damage Liability $1,000,000 per occurrence
(or combined single limit) $1,000,000 per occurrence

Automobile Liability
Bodily Injury Liability: $1,000,000 per occurrence
Property Damage Liability $1,000,000 per occurrence
(or combined single limit) $1,000,000 per occurrence

Workers’ Compensation Insurance
Coverage for all employees in accordance with Massachusetts General Laws

Professional Liability Insurance
Minimum Coverage $1,000,000 per claim.

Prior to commencement of any work under this Agreement, the Contractor shall provide the Town with Certificates of Insurance which include the Town as an additional named insured for the General Liability and Automobile Liability policies and which include a thirty day notice of cancellation to the Town.
ARTICLE XI

ASSIGNMENT

The Contractor shall not assign, sublet or otherwise transfer the work required under this Contract, in whole or in part, without the prior written consent of the Town, and shall not, either legally or equitably assign any or the moneys payable under this Contract, except by and with the written consent of the Town.

ARTICLE XII

INSPECTION AND REPORTS

The Town shall have the right at any time to inspect the equipment and premises of the Contractor, including the right to enter upon any property owned or occupied by the Contractor, whether situated within or beyond the limits of the Town. Whenever requested, the Contractor shall immediately furnish to the Town full and complete written reports of his operation under this Contract in such detail and with such information as the Town may request.

ARTICLE XIII

TERMINATION FOR CAUSE

If at any time during the term of this Contract the Town determines that the Contractor has breached the terms of this Contract by negligently or incompetently performing the work, or any part thereof, or by failing to perform the same, to the satisfaction of the Town, or by not complying with the direction of the Town or its agents, or by otherwise failing to perform this Contract in accordance with all of its terms and provisions, the Town shall notify the Contractor in writing stating therein the nature of the alleged breach and directing the Contractor to cure such service breach within ten (10) days. The Contractor specifically agrees that it shall indemnify and hold harmless the Town as provided in Article IX from any loss, damage, costs, charge, expense or claim arising out of or resulting from such breach regardless of its knowledge or authorization of the actions resulting in the breach. If the Contractor fails to cure said breach within ten (10) days, the Town may, at its election at any time after the expiration of said ten (10) days, terminate this Contract by giving written notice thereof to the Contractor specifying the effective date of the termination. Such termination shall not prejudice or waive any rights or action which the Town may have against the Contractor because of any default or failure in performance of this Contract up to the date of such termination, and the Contractor shall be liable to the Town for any amount which it may be required to pay in excess of the Contract Sum provided herein in order to complete the work specified herein in a timely manner.

ARTICLE XIV

NOTICE

Any and all notices, or other communications required or permitted under this Contract, shall be in writing and delivered by hand or mailed postage prepaid, return receipt requested, by registered or certified mail or by other reputable delivery service, to the parties at the
addresses set forth on Page 1 or furnished from time to time in writing hereafter by one party to the other party.

Any such notice or correspondence shall be deemed given when so delivered by hand, if so mailed, when deposited with the U.S. Postal Service or, if sent by private overnight or other delivery service, when deposited with such delivery service.

ARTICLE XV
SEVERABILITY

If any term or condition of this Contract or any application thereof shall to any extent be held invalid, illegal or unenforceable by the court of competent jurisdiction, the validity, legality, and enforceability of the remaining terms and conditions of this Contract shall not be deemed affected thereby unless one or both parties would be substantially or materially prejudiced.

ARTICLE XVI
GOVERNING LAW

This Contract shall be governed by, construed and enforced in accordance with the laws of the Commonwealth of Massachusetts and the Contractor submits to the jurisdiction of any of its appropriate courts for the adjudication of disputes arising out of this Contract.

ARTICLE XVII
ENTIRE AGREEMENT

This Contract, including all documents incorporated herein by reference, constitutes the entire integrated agreement between the parties with respect to the matters described. This agreement supersedes all prior agreements, negotiations and representations, either written or oral, and it shall not be modified or amended except by a written document executed by the parties hereto.

ARTICLE XVIII
REAP STATEMENT

The Contractor shall sign the following statement: Pursuant to Massachusetts General Laws, Chapter 626, Section 49A, I certify under penalties of perjury that I have filed all State Tax Returns and paid all State Taxes required under the Law.

_______________________________
(signature of individual or Corporate name - Corporate Officer)

Social Security # or FIN #
APPENDIX “C”

CONSERVATION METHODOLOGY

Cleaning

Clean stones to remove biological growths, general soiling and dirt as required to complete the specified repairs to the stones. If the stone can be successfully treated without cleaning then cleaning is not required.

If cleaning is necessary the stone surfaces should be rinsed with a generous amount of water and brushed with a natural bristle brush. Repeat as necessary. If a stone has biological growth, it can be treated with an anti-biological solution. D2 Biological Solution (LimeWorks Products) 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 markers from the ground

Carefully dig on both sides of the marker without damaging or scraping the marker. If lifting equipment is required to lift the marker out of the hole, carefully place straps around marker so that the straps will not abrade or scratch the stone. For soft or friable stones such as deteriorated marble, stone should be consolidated before lifting straps are used. Store markers or component pieces of markers in a safe location. Cover markers when necessary to prevent damage or soiling.

Removal of failed repairs

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. Stabilize all loose fragments of stone and friable areas of stone with tissue paper or cloth and Paraloid B-72 acrylate bitumen stone adhesive/stabilizer or water soluble adhesives or other means at the discretion of the conservator, prior to proceeding with any other treatments including removal and resetting of stones.

Removal of degraded structural resins may be particularly difficult and time-consuming. Mechanical removal should be done with small hand tools, however, 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 at low speeds and with water. Do not replace pins and fill voids with proper mortar fill material.
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 be set in bases. Stones were either mortared into slots or pinned 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 with good 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, pea gravel, and loam, wetted and compacted. Disturbed areas of the ground are re-graded with topsoil and seeded as required.

Some grave markers may be identified as fragments, or grave markers removed from the ground may turn out to be fragments of whole stones. The conservator should search for possible mates for all fragments that are discovered lying on the ground or below grade. It is their responsibility to make every attempt to rejoin separated fragments.

Resetting on/in existing base

Unsecured stones in existing bases require re-setting. First, the base should be reset level and aligned with adjacent stones. Pins should be removed if present, then the stone can be re-set level and plumb in the existing slot. Re-set the stone in the slot with 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.
**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 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. Drainage holes in the cast base are required in order to remove moisture from the mortar pocket. This method is fine when resetting stones with a square bottom.

Some conservation specifications recommend squaring the bottom of the stone by cutting the stone with a saw. This should never be done as the use of power tools on old stones can cause damage to the stone. In addition valuable history including inscriptions and initial stone integrity will 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. The stone would then be mortared into the base with a high lime mortar as described above.

**Resetting of two and three part markers**

Re-level lowest unit of multi-part markers using gravel and/or shim stones prior to setting additional units on top. Depending on the existing conditions, provide six inches of gravel beneath the lowest unit if the existing is sitting on soil. Set units of two and three piece markers and monuments on full mortar beds. Use wood wedges placed in the joints to control thickness of setting beds. Do not use shims that will remain as part of the setting bed. Maintain existing joint thicknesses. Do not set historic markers in joint compound.

Compress setting mortar to a depth 2.5 times the joint height in order to prepare for the final pointing. Point joints using specified mortars. Use white mortar for white marble and tinted mortars for colored stones such as granite or sandstone. Tint the mortar to match the base color of the stone.

**Extensions to slab markers that are too short to be reset**

Stone extensions: Markers that are too short to be reset in the ground without covering the existing lettering and carvings can be extended with natural stone in the same manner that fragments of broken markers are reattached.

The new piece of stone must be of the same width and thickness as the original and from the same geological class of stone. i.e. marble with marble and slate with slate. The new piece of stone must be coped out to mate with existing piece of stone without removing any of the historic material that contains carving or lettering.
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 probed 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. For marble and slate stones this can cause a small amount of 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. Do not replace pins.

REPAIR MORTARS/ CRACK FILLERS

Pre consolidation/stabilization prior to treatments

The goal of pre-consolidation shall be to secure all loose, semi-detached or friable areas against loss during other conservation treatments including pointing and cleaning. Contractor will be held responsible for losses on the stone that take place during conservation treatments therefore the extent of pre-consolidation shall be that which is in the contractor's judgment sufficient to secure against losses. Submittal shall be for materials and methodology not extent of pre-consolidation.
Acrylic Resin B-72 dissolved in a solvent such as acetone approximately 5% solids shall be applied with a brush to areas requiring pre-consolidation. Japanese tissue paper shall be applied to wetted areas. Additional solution of B-72 may be applied over tissue paper. Where conditions permit, water soluble adhesives may be substituted for B-72. Removal of prior mortar fills and composite mortar repairs Pre-consolidation as described above shall precede all raking out of joints, removal of mortar caps and prior composite mortar or adhesive repairs. It is the conservator’s responsibility to pre-consolidate all loose and friable areas of stone prior to starting other treatments.

Surface tension and bond of prior repairs may be broken using power tools such as small diamond cutting wheels, Dremmel Tools and small pneumatic chisels. All other removal is to be performed by skilled craftsmen using hand tools. Use of hand held grinders or other power tools shall be only after demonstrated proficiency by each craftsman/conservation technician on selected control areas. Cutting wheel shall not be brought in proximity with stone surface or edges. Cutting wheels shall be used only to break the bonds to create entry points for hand tools. Every precaution shall be taken not to damage, nick, scar or abrade the stone.

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 reattach 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 air 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 also be used. For smaller cracks M32 is better suited due to smaller grain size. Grouts should be tinted to match the stone after cleaning. Flowable grouts should be applied using manufacturers recommendations.

**Mortar fills and mortar caps –General**

The goal of mortar fills and caps is to create the maximum water shedding fill, joint or seam for each particular configuration of stone. Surface of fill shall be tooled and slicked to conform to the contours of the edge of the stone in order to achieve maximum water shedding.
Mix mortar to specified proportions and in conformance with the color and texture of approved samples. Apply mortar to stone that has been properly prepared and is free of dirt, soiling and any loose or friable material or surface accretions that may have a detrimental effect on the bond. Wet stone must avoid excess absorption of moisture from mortar.

Apply mortar in consecutive lifts where required to avoid excessive shrinkage. Cure moist mortar for a minimum of seven days or until mortar is properly cured. When mortar has cured, tint the surface of the mortar with approved product.

**Mortar application for fills and mortar caps**

First layer must create a uniform depth for later applications and be thoroughly compacted into cavities. Apply mortar to a maximum thickness of 3/8”. After voids have been filled to a uniform depth, apply remaining mortar in successive thick layers. Fully compact each layer and allow it to dry to thumbprint hardness before applying next layer. When the final layer is thumbprint hard, tool to match the approved sample. Avoid feather-edging of mortar joint.

If existing stonework has rounded edges from wear, recess slightly the mortar from face of stone surface. Immediately after completion, remove excess mortar by light brushing with a natural bristle brush. Do not leave encrusted matter.

Keep mortar damp for 48 hours after pointing to permit proper hardening of mortar. Cover masonry temporarily with burlap, which must be moistened periodically. Temporarily cover wall with plastic sheets to prevent evaporation. Continue to moisten for up to seven (7) days, if required due to high temperatures or high winds. Protect mortar from overnight rain. For proprietary mortars; follow manufacturer's directions for applying and curing mortars.

**Cleaning after mortar rills or patching or grouting**

The face of all stonework shall be thoroughly cleaned after completion of the pointing and other work liable to soil the stone. The stonework shall be gone over and any mortar splashes or smears shall be carefully removed from the surface with scrapers. The cleaning shall be done with clean water applied vigorously with natural bristle brushes. After cleaning with brushes the stone shall be thoroughly rinsed with clear water. Proprietary cleaning compounds containing caustic agents, intended for removing mortar smears shall not be used. The goal is to remove all smears before they set so that caustic agents are not required.

**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 non structural 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. Clean all excess B-72 from the stone surface with acetone.

**Consolidation of friable stone**

Consolidation should be performed before any other treatments are 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 a layer of stone to delaminate. 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. Any stone that is consolidated should not have further conservation work for 30 days to allow all the solvent to evaporate. Structural bonding applications will be degraded if there is solvent still present at the adhesive joint.

**MATERIALS**

Comply with referenced standards and other requirements indicated applicable to each type of material required. Reference in the specifications to materials by trade name is to establish a standard of quality. It is not intended to exclude other manufacturers whose materials are, in the judgment of the project manager with the conservator and based on sample panels, equivalent to those named.

**Materials for cleaning and removing soiling prior to repairs**

Water, all water should be clean portable water.

Detergents or soap, should be Vulpex soap from Talas, 568 Broadway, New York, NY 10012 (212)219-0770 or Orvus WA Paste also available from Talas.

Biological growths should be treated with D-2 available from LimeWorks.us (215)536-6706 or Revive from Prosoco.com or approved equal.

Materials for flushing cracks and fissures prior to adhesive or infill
Clean water or solvents such as Acetone or Ethanol D6 Anhydrous.

Materials for stabilization of loose fragments prior to removal or other treatments
Paraloid acrylic resin B-72 and Japanese tissue paper or fine cloth such as silk Crepeline applied to the surface of the friable or loose stone. B-72 should be dissolved in solvent such as acetone.
and the percentage of solids to solvent to be field tested. B-72 is available from Talas, 330 Morgan Ave, Brooklyn, NY 11211 (212) 219-0770 www.talasonline.com or other conservation supply companies.

Material for non-structural repairs and laying down stone flakes
Paraloid acrylic resin B-72 (100%) dissolved in solvent such as acetone and the percentage of solids to solvent to be field tested. Tubes of 10% paraloid B-72 in acetone can be obtained from Talas, 330 Morgan Ave, Brooklyn, NY 11211 (212) 219-0770 www.talasonline.com or other conservation supply companies.

Material for adhesive structural repairs
Exterior grade flowable and paste epoxies that are moisture tolerant and specifically manufactured for the structural repair of stone and masonry. Akemi Akepox 2000, 2010, 2030, 5000, and 5010 available from Akemi North America, Stone Boss Industries, 26-04 Borough Place, Woodside, NY 11377 (718)278-2677 or approved equal.

Material for mortar fills, rebuilding areas of loss and caps
Composite repair mortars should be non-polymer modified composite repair mortar specifically for slate, sandstone or marble and should be used for fills, rebuilding areas of loss and capping delaminating stones. These can be obtained from Cathederal Stone Products, 8332 Bristol Court, #107, Jessup, Maryland 20794 (800)6840901 and www.limeworks.us (215)536-6706. For smaller voids use Acryloid B-72 dissolved in solvent. Concentrations will vary depending on the depth and width of the crack or void to be filled. Large voids to be filled with B-72 bulked with an inert material such as fine grain stone material. Exact proportions to be determined by the conservator in the field based on the size of the area to be filled and other requirements such as ability of the mix to flow evenly through the area.

Replacement stone (for extending broken stones)
1. Marble: Vermont Marble available from Vermont Quarries, 88 Church Street, Rutland, Vermont 05701, (802) 775-1065 or approved equal.
2. Slate: New or Salvaged slate to match color and texture of historic material. Portland Munson Slate available from Sheldon Slate Products, 38 Farm Quarry Road, Monson, ME 04464, (207)-997-3615, or approved equal.

Soil materials
1. Structural Fill: Provide gravel, sandy gravel, or gravelly sand free from organic material; foam, trash, snow, ice, frozen soil and other objectionable materials and well graded within the following limits:

<table>
<thead>
<tr>
<th>Sieve Size Passing Through</th>
<th>6 inches</th>
<th>No.4</th>
<th>No. 40</th>
<th>No. 200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Finer by Weight</td>
<td>100</td>
<td>30-90</td>
<td>10-50</td>
<td>0-8</td>
</tr>
</tbody>
</table>

2. Crushed Stone: Provide clean, washed crushed stone free of fine materials and graded within the following limits:

<table>
<thead>
<tr>
<th>Sieve Size Passing Through</th>
<th>6 inches</th>
<th>%inch</th>
<th>12 inch</th>
<th>No.4</th>
<th>No. 40</th>
<th>No. 200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Finer by Weight</td>
<td>100</td>
<td>90-100</td>
<td>20-30</td>
<td>0-5</td>
<td>0-5</td>
<td>0-5</td>
</tr>
</tbody>
</table>