



Documentation of Restorations to West Hanover Cemetery

MONUMENT CONSERVATION COLLABORATIVE LLC, NORFOLK, CT

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Standards of Practice

The goal of the cemetery conservator is to preserve both the substance and significance of funerary monuments. Because of the physical proximity of the visitor to the artifacts, cemetery conservation procedures demand closer tolerances of color and texture than are generally enforced in the related field of architectural historic preservation. They require the collaboration of the conservator and the historian/curator on ethical, technical and aesthetic considerations, especially with regard to issues of the restoration of inscriptions and decoration.

In general, cemetery conservators have in the recent years, been moving toward a “conserve as found” approach, emphasizing the preservation of monuments via materials and methods that are dedicated to retarding environmental processes of decay.

Documentation

Prior to starting any work, all gravestones, tombs and other monuments to be restored were digitally recorded. A condition assessment form was prepared for each monument, describing existing conditions and recommended treatments.

Documentation was made of all conservation treatments performed, and a completed set of these documents is enclosed. All digital images are recorded on the enclosed DVD and are identified with the markers ID number.

Restoration work was also digitally documented with the ID number followed by a decimal number.

Cleaning

The goal of cleaning is not to return the monument to a "like new" appearance, but to remove particulate soiling, staining and biological growth that may interfere with successful restoration. In most situations, cleaning was done prior to other treatments.

Removal of biofilm was with D/2 Biological Solution. It is an aqueous antibacterial solution that also aids in the removal of algae, fungi and other organisms. After application and scrubbing with soft brushes, surfaces are fully rinsed with water. Stubborn, well-attached growths will slowly release their grip in a short amount of time and the stone will appear cleaner.

Cleaning of marble markers was limited to those requiring structural adhesions. General cleaning of marbles would make the markers appear very white and not historically accurate.

Failed adhesives, mortars and pins were carefully removed before proceeding with new conservation treatment. Mechanical removal was done with hand tools and smaller power tools.



#6, Charles Studley before and after cleaning

Resetting Tilted or Fallen

Earlier gravestones are typically long panels of stone that were set directly into the ground. After determination of the correct location and orientation of the stone, soil was removed to an appropriate depth. Gravel (or broken stone) was introduced to establish a stable base. The stone was made plumb and level, and set in plane with the adjacent markers. Backfilling was done with sand and gravel, wetted and compacted.

Every effort was to replace disturbed areas with existing topsoil and turf, however additional topsoil was required at a number of sites.



Before and after— Reset into the ground #7 Henry Studley

Resetting into New Bases

A new below-grade base was fabricated when an original base could not be located, or the existing base was damaged beyond repair. Fabrication of a base was also necessary to re-erect the upper fragment(s) of earlier gravestones that did not have adequate length for conventional re-setting. These stones were usually fractured at or near the ground level and their lower elements are missing.

Bases were made on site by casting in place with concrete. The casting is generally 9 to 12 inches deep, and 6 inches greater in both thickness and width than the stone itself. The finished top surface of the base should be entirely below grade. A form for a 2 inch deep setting slot, $\frac{1}{2}$ inch wider and $\frac{1}{2}$ thicker than the stone, was positioned in the concrete. After the base cured, the gravestone was reset into the slot with a cement/lime-based grout. The top of the new base was covered with topsoil.



Form for new below grade concrete base



Concrete poured, with form for setting slot in place



Form removed, ready for resetting marker

Resetting into existing bases cont'd

Gravestones that required insertion into existing or new bases were set with a relatively weak cement/lime-based grout (3:2:9:1) with fine aggregates (000), made fluid with a high-range water reducer which ensures a complete fill. This was poured or injected into the base slot. Stones were braced for a minimum of three days to limit movement during curing of the grout.



Example of marker reset into slot in new below grade concrete base. Braced for minimum 3 days.

Structural Adhesion

All fragments were carefully cleaned and dry fitted. A thixotropic, thermosetting structural resin (A-5522, by Abatron, Kenosha, WI or equivalent) was thinly and evenly applied along the bond line only. The fragments were aligned, joined with clamps, and adequately braced during curing, which was typically a period of several days.

Several factors, including weathering, can result in a loss of stone surface, which results in a poor 'fit' at the fracture. In this instance, a structural fill (mix of structural resin and fine aggregates) was required in addition to the structural adhesive. The fill was tucked into any voids of the fracture, but was kept well back from the surface of the stone. After curing, the structural fill was concealed by installation of an appropriately colored cement/lime-based crack filler or restoration mortar.

Work in this section was not performed when the temperature of the air or of the stone surface was below 50 degrees Fahrenheit.



Example of fragmented marker



Clamping and bracing in a vertical position allows gravity to help position fragments. Often marble becomes "bowed" or curved with time.

PRODUCTS/SUPPLIERS

D/2 Biological Solution

Granite City Tool
11 Blackwell Street Barre, VT 05641
802) 476-3137

RepliCal™

Jahn™ Restoration Mortars

Cathedral Stone Products Inc.
7266 Park Circle Drive
Hanover, MD 21076 USA
800 684 0901 fax 800 684 0904

Adhesives

Aboweld 55-22

Abatron Inc
5501 95th Avenue
Kenosha, WI 53144
414 653 2000 fax 414 653 2019

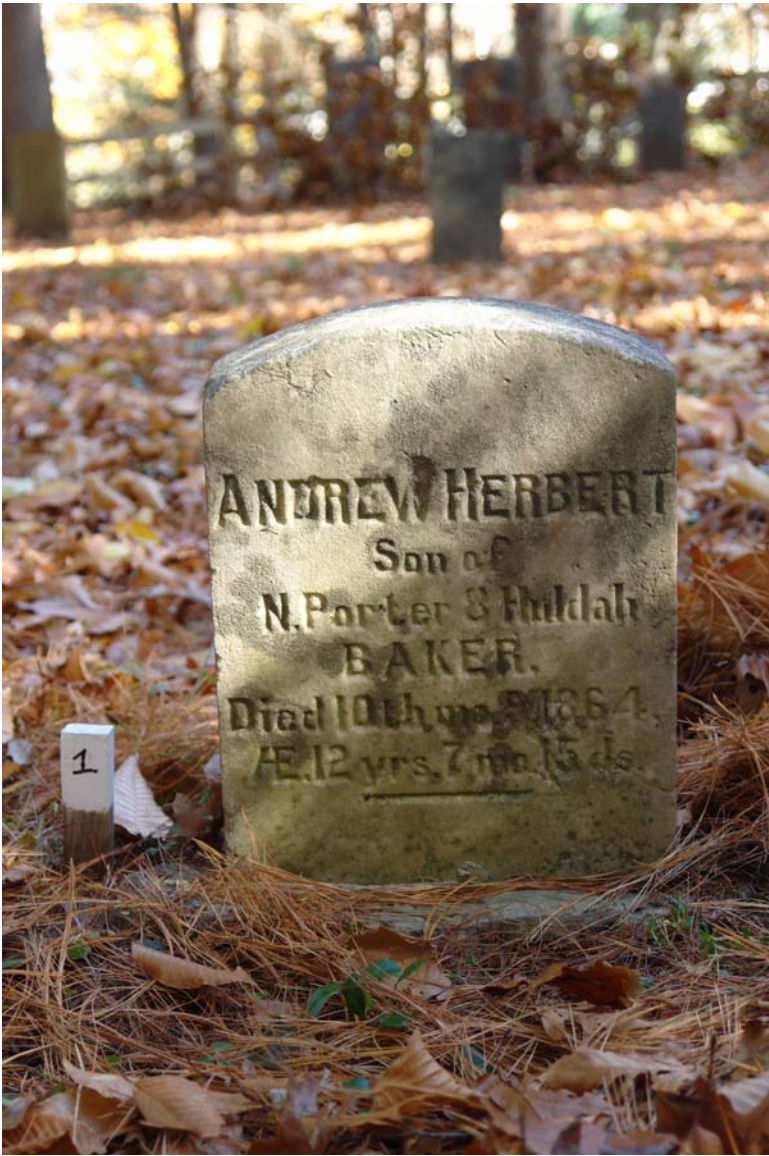
West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **Andrew Baker**
Death Date: 10/9/1864 Marker Type: Headstone
Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Tilted	Reset base plumb

TREATMENT	Treatment Dates 5/11/2015
Marker appears to be firmly set into base.	
1. Marker and base carefully excavated. Marker appears to be sound.	
2. Soling removed by light brushing with nylon brushes and water.	
3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers	
4. Area backfilled around marker with tamped sand and gravel	
5. Disturbed areas re-graded with existing topsoil and sod.	

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West Hanover/ Darling Cemetery, Hanover, MA

NAME ON MARKER	Nathan Studley		
Death Date:	1/27/1850	Marker Type:	Headstone
Cond. of Inscription:	Legible	Material:	Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Tilted, unstable	Reset in new below grade base

TREATMENT	Treatment Dates
1. Marker excavated and found to be sound. Light soiling removed by brushing with nylon brushes and water. 2. Setting area excavated for new below grade cast concrete base sized minimum of 12 inches deep, 12 inches greater in thickness and 6 inches wider than the stone. 3. Wooden forms and setting slot form stabilized and aligned with adjacent markers before concrete is poured 4. When required, the lower edge of marker is re-squared with minimal loss using a power grinder 5. Setting forms are removed after partial curing of the concrete and the base backfilled with tamped sand or gravel 6. Marker reset into setting slot with a cement/lime grout (3/2/9) with 000 sand made fluid with a super plasticizer. 7. Marker set plumb and level, and braced for minimum of 5 days. 8. Disturbed areas backfilled with existing topsoil.	5/11-12/2015

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West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **Charles Studley**
Death Date: 11/18/1849 Marker Type: Headstone
Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Un stable	Reset in new below grade base

TREATMENT	Treatment Dates 5/11-12/2015
<div>1. Marker excavated and found to be sound. Light soiling removed by brushing with nylon brushes and water.</div> <div>2. Setting area excavated for new below grade cast concrete base sized minimum of 12 inches deep, 12 inches greater in thickness and 6 inches wider than the stone.</div> <div>3. Wooden forms and setting slot form stabilized and aligned with adjacent markers before concrete is poured</div> <div>4. When required, the lower edge of marker is re-squared with minimal loss using a power grinder</div> <div>5. Setting forms are removed after partial curing of the concrete and the base backfilled with tamped sand or gravel</div> <div>6. Marker reset into setting slot with a cement/lime grout (3/2/9) with 000 sand made fluid with a super plasticizer.</div> <div>7. Marker set plumb and level, and braced for minimum of 5 days.</div> <div>8. Disturbed areas backfilled with existing topsoil.</div>	

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West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **Henry Studley**
Death Date: 9/18/1843 Marker Type: Headstone
Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Fallen	Reset

TREATMENT	Treatment Dates 5/11/2015
<div>1. Marker carefully excavated. Marker appears to be sound.</div> <div>2. Soling removed by light brushing with nylon brushes and water.</div> <div>3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers</div> <div>4. Area backfilled around marker with tamped sand and gravel</div> <div>5. Disturbed areas re-graded with existing topsoil and sod.</div>	

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West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **Ruth Ellis**
Death Date: 9/19/1846 Marker Type: Headstone
Cond. of Inscription: Decipherable Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Fallen	Reset in new below grade base

TREATMENT	Treatment Dates 5/11/2015
<div>1. Marker carefully excavated. Marker appears to be sound. 2. Soling removed by light brushing with nylon brushes and wa- ter. 3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers 4. Area backfilled around marker with tamped sand and gravel 5. Disturbed areas re-graded with existing topsoil and sod.</div>	

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West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **Spooner Ellis**
Death Date: 1868 Marker Type: Headstone
Cond. of Inscription: Missing Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Tilted Fragmented	Probe area for fragments Reset marker

TREATMENT	Treatment Dates 5/11/2015
<p>1. Marker carefully excavated. Area probed and no fragments were found. The soil around tilted markers was removed to an appropriate depth. When required, the marker was removed from the ground. Marker appears to be sound.</p> <p>2. Soling removed by light brushing with nylon brushes and water.</p> <p>3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers</p> <p>4. Area backfilled around marker with tamped sand and gravel</p> <p>5. Disturbed areas re-graded with existing topsoil and sod.</p>	

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Height 25 Width 19.5 Thickness 2 Marker# **10**

CONDITION ASSESSMENT Inspection Date: **11/3/2014** Inspected By: IS & MJ

MONUMENT CONSERVATION COLLABORATIVE LLC
PO Box 541, Norfolk, CT 06058 860 307 6695 MCCLLC@gmail.com

West Hanover/ Darling Cemetery, Hanover, MA

NAME ON MARKER

D.J.D (David Davis)

Death Date: 2/17/1869

Marker Type: Footstone

Cond. of Inscription: Legible

Material: Marble

EXISTING CONDITIONS

CONSERVATION STRATEGY

Tilted

Reset in ground

TREATMENT

Treatment Dates 5/11/2015

1. Marker carefully excavated. The soil around tilted markers was removed to an appropriate depth. When required, the marker was removed from the ground. Marker appears to be sound.
2. Soling removed by light brushing with nylon brushes and water.
3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers
4. Area backfilled around marker with tamped sand and gravel
5. Disturbed areas re-graded with existing topsoil and sod.

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Height 12 Width 6 Thickness 2 Marker# **11FS**

West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **W.S.D. (William S. Davis)**
Death Date: 6/15/1861 Marker Type: Footstone
Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Tilted, sunken Facing wrong way	Reset marker facing East

TREATMENT	Treatment Dates 5/11/2015
1. Marker carefully excavated. The soil around tilted markers was removed to an appropriate depth. When required, the marker was removed from the ground. Marker appears to be sound. 2. Soling removed by light brushing with nylon brushes and water. 3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers 4. Area backfilled around marker with tamped sand and gravel 5. Disturbed areas re-graded with existing topsoil and sod.	

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Height 10 Width 7 Thickness 2 Marker# **12FS**

West Hanover/ Darling Cemetery, Hanover, MA

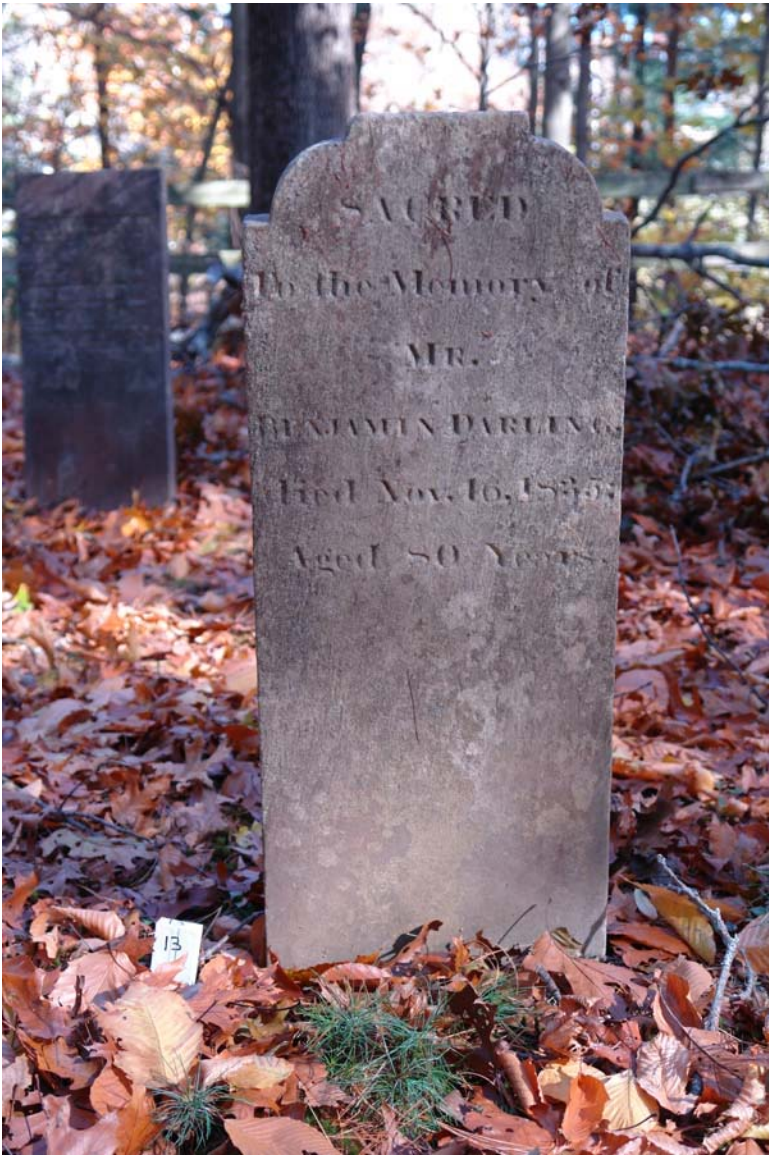
NAME ON MARKER	Benjamin Darling		
Death Date:	11/16/1835	Marker Type:	Headstone
Cond. of Inscription:	Legible	Material:	Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Set too high	Reset lower

TREATMENT	Treatment Dates 5/11/2015
<div>1. Marker carefully excavated. The soil around tilted markers was removed to an appropriate depth. When required, the marker was removed from the ground. Marker appears to be sound.</div> <div>2. Soling removed by light brushing with nylon brushes and water.</div> <div>3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers</div> <div>4. Area backfilled around marker with tamped sand and gravel</div> <div>5. Disturbed areas re-graded with existing topsoil and sod.</div>	

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West Hanover/ Darling Cemetery, Hanover, MA
 NAME ON MARKER Lydia Darling
 Death Date: 7/30/1887 Marker Type: Headstone
 Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Tilted Fractured	Reset to leveled base Attach fragment with structural adhesive

TREATMENT	Treatment Dates 5/11-12/2015
1. Area around lower fragment carefully excavated and inspected for soundness. 2. Area probed and buried or overgrown fragments carefully excavated and inspected for soundness. 3. Lower fragment re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers 4. Area backfilled around marker with tamped sand and gravel 5. All mating edges of fragments cleaned with water and any failed adhesives removed with hand tools 6. Fragments attached with structural adhesive (Abatron 55-22), clamped and braced until cured. Epoxy removed with hand chisels within 24 hours. 7. Cracks and losses filled with RepliCal products, misted with water and covered for 3 days min. 8. Filled surface areas treated with light acid wash rinsed thoroughly with water.	

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West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **Nathaniel Pratt**
Death Date: 4/30/1848 Marker Type: Headstone
Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Fallen	Reset in new below grade base

TREATMENT	Treatment Dates 5/11-12/2015
<div>1. Marker excavated and found to be sound. Light soiling removed by brushing with nylon brushes and water.</div> <div>2. Setting area excavated for new below grade cast concrete base sized minimum of 12 inches deep, 12 inches greater in thickness and 6 inches wider than the stone.</div> <div>3. Wooden forms and setting slot form stabilized and aligned with adjacent markers before concrete is poured</div> <div>4. When required, the lower edge of marker is re-squared with minimal loss using a power grinder</div> <div>5. Setting forms are removed after partial curing of the concrete and the base backfilled with tamped sand or gravel</div> <div>6. Marker reset into setting slot with a cement/lime grout (3/2/9) with 000 sand made fluid with a super plasticizer.</div> <div>7. Marker set plumb and level, and braced for minimum of 5 days.</div> <div>8. Disturbed areas backfilled with existing topsoil.</div>	

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West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **N.O.P (Nathaniel Pratt)**
Death Date: Marker Type: Footstone
Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Tilted, facing wrong way	Reset facing East

TREATMENT	Treatment Dates 5/11/2015
1. Marker carefully excavated. The soil around tilted markers was removed to an appropriate depth. When required, the marker was removed from the ground. Marker appears to be sound. 2. Soling removed by light brushing with nylon brushes and water. 3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers 4. Area backfilled around marker with tamped sand and gravel 5. Disturbed areas re-graded with existing topsoil and sod.	

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West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **H. W. (Harriet Winslow)**
Death Date: 11/29/1836 Marker Type: Footstone
Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Tilted, sunken Facing wrong direction	Reset facing East Possible new base required

TREATMENT	Treatment Dates 5/11/2015
1. Marker carefully excavated. The soil around tilted markers was removed to an appropriate depth. When required, the marker was removed from the ground. Marker appears to be sound. 2. Soling removed by light brushing with nylon brushes and water. 3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers 4. Area backfilled around marker with tamped sand and gravel 5. Disturbed areas re-graded with existing topsoil and sod.	

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West Hanover/ Darling Cemetery, Hanover, MA
NAME ON MARKER **H. W. (Henry Winslow)**
Death Date: 1/29/1858 Marker Type: Footstone
Cond. of Inscription: Legible Material: Marble

EXISTING CONDITIONS	CONSERVATION STRATEGY
Tilted Facing wrong way Marker too high	Reset marker in ground facing East

TREATMENT	Treatment Dates 5/11/2015
1. Marker carefully excavated. The soil around tilted markers was removed to an appropriate depth. When required, the marker was removed from the ground. Marker appears to be sound. 2. Soling removed by light brushing with nylon brushes and water. 3. Setting area excavated to sufficient depth and stone re-set plumb at appropriate height and level onto gravel bed, aligned with adjacent markers 4. Area backfilled around marker with tamped sand and gravel 5. Disturbed areas re-graded with existing topsoil and sod.	

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Height 18 Width 6 Thickness 2 Marker# **18FS**