Carved Stones Adviser Project

Guidance Notes: Decay

Decay Groups and their decay Types:

The following tables are organised by different decay group and describe the decay patterns found in each group. The first two decay groups (granular erosion and planar erosion) show the ways in which material can be lost from a stone. The third table sets out the ways in which material may be deposited upon the surface of the stone. The final grouping is a miscellaneous decay category, an opportunity to describe any signs of decay that have not already been described.

GRANULAR EROSION

- **surface loss**
- **differential weathering**
- **cratering and pitting**

Granular erosion is material loss whereby individual grains become detached from a stone's surface. This type of decay also includes the wearing away of selective parts of a memorial.

PLANAR EROSION

- **delamination**
- **contour scaling**
- **surface blistering**
- **scaling and flaking**

Planar erosion is material loss whereby layers of stone become detached from a stone's surface.

SURFACE DEPOSITS

- **pollution deposit**
- **salts deposit**
- **misc. staining**

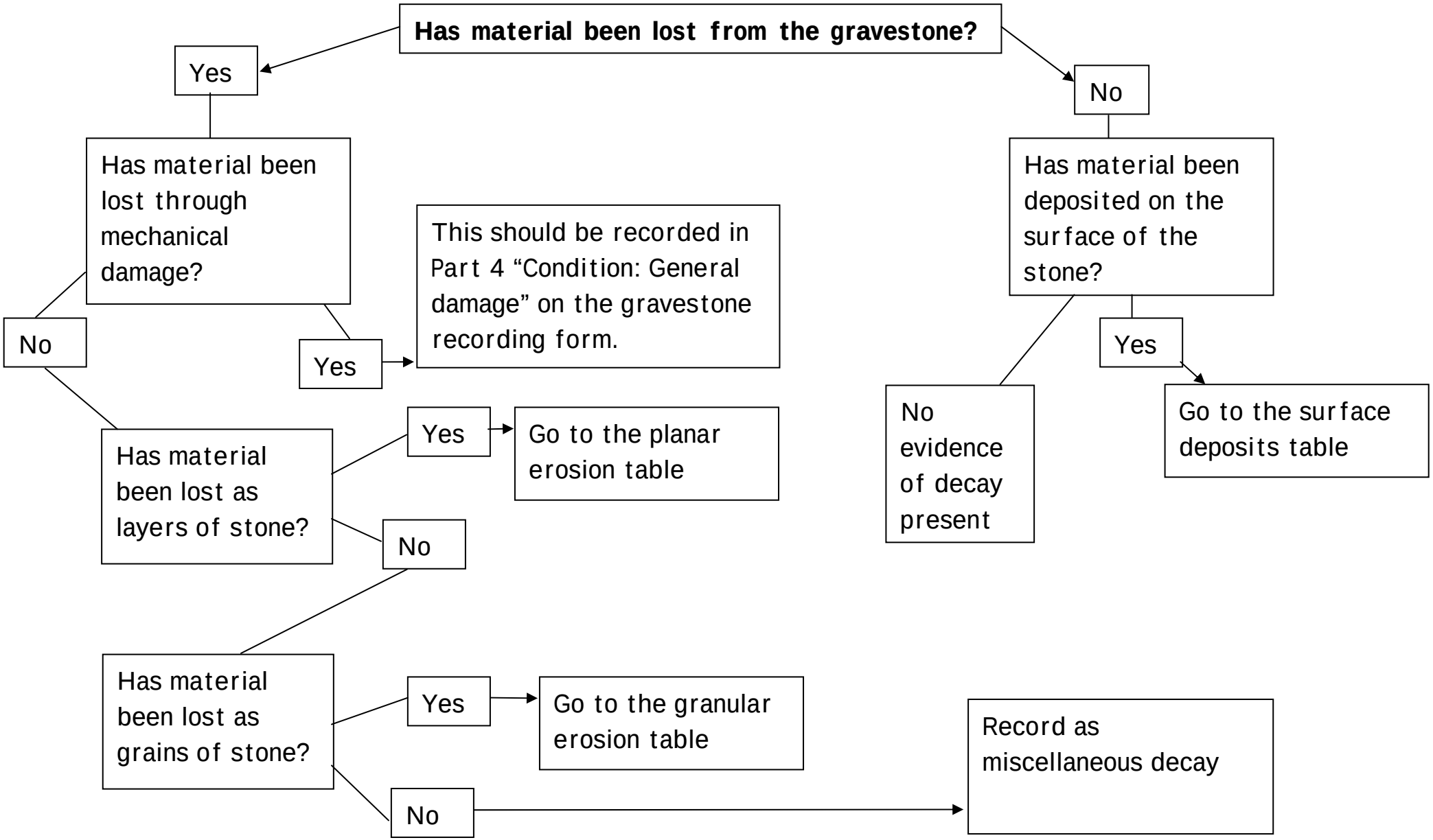
These decay types are characterised by the deposition of new material at the stone surface.

MISCELLANEOUS DECAY

- **cracking and crazing**
- **other decay**

This group includes any examples of decay which do not fall into the above categories.

Key steps to identifying decay



Granular erosion is material loss whereby individual grains become detached from a stone's surface. This type of decay also includes the wearing away of selective parts of a memorial. There are three different types of granular decay:

▪ surface loss ▪ differential weathering ▪ cratering and pitting

Decay types	Description	Criteria to identify the scale of decay	Problem: Level 1 – minimal	Problem: Level 2 - moderate	Problem: Level 3 - major
Surface loss	Individual grains become detached from the surface layers of a memorial. The memorial's face takes on a roughened granular appearance, resulting in a loss of definition to carvings and edges	The key factor determining the severity of surface loss is whether the stone actively disintegrates when an inconspicuous, uncarved area of the stone affected by this decay type is gently touched	The stone's surface has become roughened but when stroked gently with a finger, no individual grains are lost	As level 1, except when gently stroked with a finger, individual grains come away from the surface	As level 2, except, when touched with a finger numerous grains become detached as small crumbs of stone
Differential weathering	Some parts of the stone have weathered deeper than others. This type of decay may be more localised than surface loss and often results in cavities and hollows. In extreme cases, holes through the stone can be the result. One common type of differential weathering is surface run-off patterns that are furrowed areas within the stone face caused by water being channelled along specific parts of the stone face, often as a result of the shape of the memorial. This process may reveal a stone's layers / bedding planes	The criteria used to calculate the scale of differential weathering are the amount of material lost (visible as cavities) and whether the structural stability of the memorial is threatened	There is a loss of material beyond the surface layers resulting in an uneven face but with no depressions visible	There is a loss of material beyond the surface layers resulting in hollow concave areas	There is a loss of material beyond the surface layers resulting in hollow concave areas which threaten the structural stability of the memorial
Cratering and pitting	Visible as small dimples or hollows on a memorial's surface. A number of different factors can cause this type of decay. One cause is the wearing away of naturally-occurring inclusions that are softer than the surrounding stone	The criteria used to assess the scale of pitting are the depth, diameter and number of the pits	Occasional, small shallow pits that are less than $^1/_2$cm in diameter	Frequent shallow pits or occasional large pits which are more than $^1/_2$cm in diameter	Numerous large pits

Examples of surface loss:

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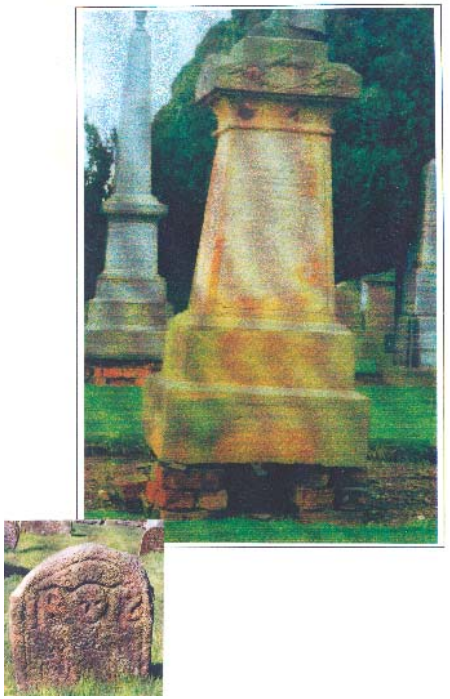

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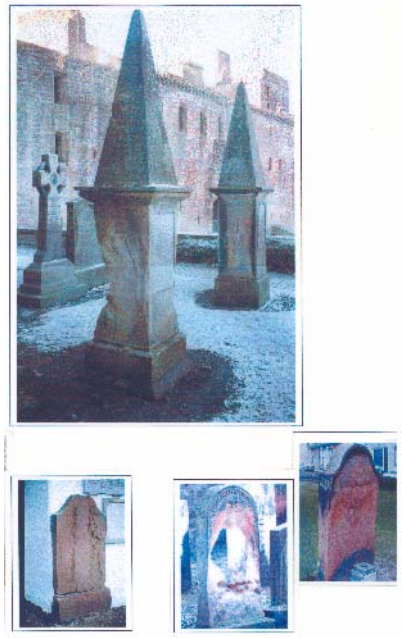
Examples of differential weathering:



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Examples of cratering and pitting

Examples of delamination

Planar erosion is material loss whereby layers of stone become detached from a stone's surface. There are four types of planar decay

- delamination
- contour scaling
- surface blistering
- scaling and flaking

Decay types	Description	Criteria to identify the scale of decay	Problem: Level 1 – minimal	Problem: Level 2 - moderate	Problem: Level 3 - major
Delamination	The detachment or loss of a layer of stone that follows the alignment of bedding planes. [Headstones are normally constructed with the bedding planes parallel to the face of the stone. Tablestones are normally constructed with the bedding planes parallel to the top surface of the table slab.] The cleavage between bedding planes always extends to the edge of the stone (i.e. is visible on the flank of a stone)	The key factors determining the severity of delamination are the number of bedding planes detaching and the extent of material loss	Cleavage visible between bedding planes, minimal or no material loss from face	Cleavage visible between bedding planes, material loss from one bedding plane	Cleavage visible between bedding planes, material loss from more than one bedding plane
Contour scaling	The layer of stone that is detached or lost may or may not follow the alignment of a bedding plane – the key difference to delamination is that the break always occurs parallel to an architectural profile. This may be a carved or a worked face. Detachment or loss may be localised or run along an entire profile. It can occur in relation to more than one profile and on more than one face	The criteria used to calculate the scale of decay are the number of profiles affected and the extent of the overall loss of material	The detachment/ loss of one profile; no or very limited material loss	The loss of one profile; the extent of material loss moderate	The loss of two or more profiles; extent of lost surface major
Surface blistering	A blister forms in the surface layers of the stone, i.e. in the few outer millimetres. Blisters are characterised by a bowing or lifted surface	The criteria used to calculate the scale of blistering are the size of the blisters and whether or not material loss has occurred	Scattered small blisters, but no loss of material	As level 1 except blisters have burst and the surface layers of the stone lost	As level 2 except that the blisters are large
Scaling and flaking	Any other loss of layers of stone not clearly falling into the above three decay types	The criteria used to calculate the scale of scaling is the extent of the stone surface affected	Isolated patches only affected	Less than $^1/_2$ of the memorial's surface affected	More than $^1/_2$ of the memorial's surface affected

Examples of contour scaling:

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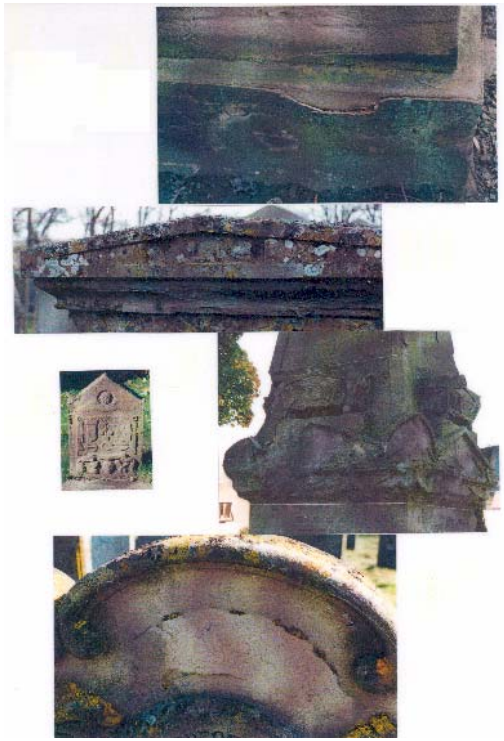

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Example of surface blistering

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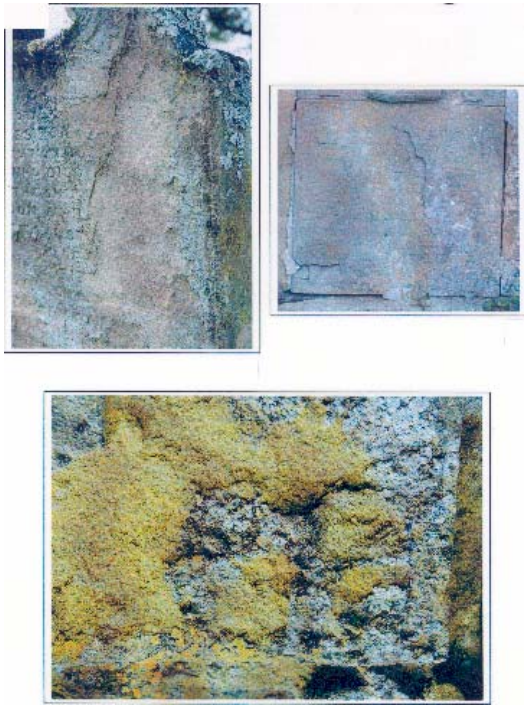
Examples of scaling and flaking



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Surface Deposits. The following decay types are characterised by the deposition of new material at the stone surface. There are three different types

- pollution deposit
- salts deposit
- miscellaneous staining

Decay types	Description	Criteria to identify the scale of decay	Problem: Level 1 – minimal	Problem: Level 2 - moderate	Problem: Level 3 - major
Pollution deposit	Atmospheric pollution products have become attached to the surface of the stone	The key factors determining the severity of pollution deposit are the thickness of the layer deposited and its adherence to the stone when an inconspicuous, uncarved area of the stone affected by this decay type is gently touched	Sooty layer only present i.e. particles of the deposit can be removed when gently touched	A thin hard deposit present i.e. no particles can be removed when the surface of the stone is gently stroked	A discernible crust has formed i.e. a thicker deposit
Salts deposit	Salt crystals are deposited at the surface of the stone. Common salt deposits include a line of salt crystals parallel to the ground in the bottom $^1/_3$ of the stone. This type is caused by the deposition of salts from ground water. Deposits are also common in the top $^1/_3$ of wall monuments where salts derived from the mortar used in the memorial and the surrounding wall are often the source of the salt	The criteria used to calculate the scale of salt deposition are the number of separate deposits and their extent	one salt deposit visible; very limited extent	one salt deposit; moderate extent	two or more discrete salt deposits; major extent
Misc. staining	Any other staining of the stone surface clearly not caused by the above 2 decay types	The criteria used to calculate the scale of staining is the extent of the stone surface affected	Isolated patches only affected	Less than $^1/_2$ of the memorial's surface affected	More than $^1/_2$ of the memorial's surface affected

Miscellaneous Decay is any decay that has not been covered above.

- Crazing and cracking
- other decay (please describe)

Decay types	Description	Problem: Level 1 – minimal	Problem: Level 2 - moderate	Problem: Level 3 - major
Crazing and cracking	Cracking through the thickness of material or crazing through surface layers.	Crazing only visible	Small cracks visible	Large cracks visible