

Roof Survey Report

September 24, 2008



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EXECUTIVE SUMMARY

At the request of XXXXXXXXXXXXXXX, of XXXXXXX University Office of Facilities, The Moriarty Corp. (TMC) conducted an investigation of the roofs of Silliman College, XXXXX University. The inspection included a complete visual survey and defect mapping of the slate and tile roofs of the college, together with the low slope flat-lock lead coated copper (LCC) roofs of the Georgians. The roofs were evaluated to provide a comprehensive profile of their current condition. Visits were made to the buildings during the week of August 18-23, 2008.

Specific buildings surveyed were the Georgians on Grove and Temple Streets; the Master's House and Vanderbilt-Sheffield on Wall Street; the Vanderbilt-Sheffield and the 493 building on College Street; and Byers Hall on the corner of College and Grove Streets. All tile and slate roofs of the complex were surveyed along with all abutting flat-lock LLC roofs. The LCC roofs are topmost low-slope roofs and are not visible from the ground. The survey included all metal flashings, snow retention systems, and the condition of gutter trough systems (for drainage).

The slate shingles and the clay tiles of all roofs surveyed are well installed. The sheet metal valley flashings, sheet metal gutter linings and sheet metal roofing are also well installed and in sound condition. However, there are specific slates and tiles that need replacement or repair. These slates and tiles are cataloged.

10 Slates on Byers Hall, 25 slates on the Georgians, 5 slates on the Master's House, 15 slates on the 493 College Street building, and approximately 14 tiles on each of the Vanderbilt-Sheffields need to be replaced or refastened. Of the tile, 18 are broken valley tiles which may be covered by the tile manufacturer's 75-year warranty.

Sheet metal needs attention in 3-5 locations, a number of gutters need unclogging, debris needs to be removed from the roofs, and failed snow guard systems on the Vanderbilt-Sheffields and the 493 building need to be addressed.

Slate is a stone quarried from the earth. Along with natural beauty comes some potential for hidden defects. Thermal cycling can cause cracks to form and pieces to dislodge. It is also not unusual for a small number of cracked, broken, or slipping slates to appear during the first couple of years after the installation of a slate roof. This is a result of stresses and unseen damage done to the slate during installation.

Snow rails which are used to protect pedestrians from avalanching snow loads can also be used to retain loosened slate. Expanded stainless steel metal backing is attached to the horizontal rails, preventing objects sliding under or through the rails.

Some slate roofs at the college have 3-rail type snow guards in place. We recommend adding metal backing to the existing snow guards and installing similar snow guard systems on the slate and tile roofs where lacking.

INTRODUCTION

Silliman College is a residential college at XXXXX University. Silliman College opened in September 1940 and includes buildings that were constructed as early as 1901. It is XXXXX's largest college in terms of area, consisting of a full city block in New Haven, Connecticut. It is bounded by College, Wall, Grove, and Temple Streets.

The newer, Georgian brick portion of the college which includes the Master's House was completed in 1940 when the college was opened.

The older, Indiana limestone clad part of the college consists of Vanderbilt-Sheffield dormitories and Byers Hall. Vanderbilt-Sheffield was built between 1903 and 1906. Byers Hall was built in 1903. 493 College Street shares a roof with St. Anthony Hall, which was built in 1913.

Between 2004 and 2007 the college was renovated. Renovations included installation of the low slope lead coated copper roofs, replacement of the Georgians slate roofs in the summer of 2004, replacement of the Master's House slate roofs in 2006, replacement of Byers Hall slate roofs in 2007, and replacement of the 493 College Street slate roofs in 2007, except for the south facing roof which still has original slate.

We believe the clay tile roofs on the Vanderbilt-Sheffields were removed and replaced with new clay tile in 1994.

METHODOLOGY

In order to evaluate the condition of the slate roofs at Silliman College we performed the following:

Available documents provided by XXXXX University Office of Facilities and XXXXX Construction as they related to the slate and tile roofs were reviewed.

- a. Silliman College Renovation, XXXXX University Construction Documents of July 29, 2005 (PCO-401), 07320, "Roof Tiles," consisting of 4 pages.
 - b. Silliman College 2004 Renovation Project, XXXXX University, 30 January 2004 "Slate Shingles" Section 07315 consisting of 6 pages.
 - c. 493 College Street Façade and Roofing Restoration, XXXXX University, 21 October 2005 "Slate Shingles" Section 07315 consisting of 10 pages of Text plus one diagram.
 - d. Submittals:
 - Transmittal # 0105 dated February 21, 2006 (Slate Shingles and Roof Tiles)
 - Transmittal # 0206 dated March 16, 2006 (Slate Shingles and Roof Tiles)
 - Transmittal # 0293 dated March 30, 2006 (Slate Shingle Roofing)
 - Transmittal # 0398 dated April 20, 2006 (Slate Shingle Roofing)
 - Transmittal # 0423 dated April 21, 2006 (Slate Shingle Samples)
 - Transmittal # 0517 dated May 11, 2006 (Slate Shingle Samples)
 - e. Roof Plans and Section Drawings:
 - 493 College Street Façade & Roofing Restoration dated 6/11/07; Sheets FR7, FR8, FR9, FR10, FR10A
 - Silliman College Renovations Record Set Drawings dated 18 April 2008; Sheets A2.6a, A2.6b, A2.6c, A6.1.9a, A6.5.1, A6.5.2, A6.5.3, A6.5.4, A6.5.5, A6.5.8, A6.5.9
2. Visual inspections were conducted to determine the condition of the slate roofs, the tile roofs, the LCC roofs and the metal flashings and gutter systems associated with the roofs.

Observations were made by a three-person team. The project team included XXXXX XXXX, Registered Roof Consultant, of TMC and XXXXX XXXX, roofing and waterproofing consultant of TMC. Both individuals each have 30+ years of experience in the roofing industry. TMC personnel were accompanied by XXXXX XXXXX, who is recognized within the roofing industry as an authority on slate roofs and has been involved with the trade since 1968.

Flat roofs above and below the slate and clay tile roofs were accessed through roof hatches and windows; the slate and clay tile roofs were inspected from these flat roofs and from the ground using binoculars. We recorded our observations on roof plans provided to us by the University. We marked the locations of defects on the roof plans. Digital photographs were taken to document findings and photographs were keyed to locations on the roof plans.

3. Slates were removed in several locations to determine attachment, fastener types, and slate thickness.
4. We reviewed the history of Silliman College in the XXXXX on-line archives and reviewed photographic images taken during the 2004 and 2006 Silliman renovations that are posted on *facilities.XXXXX.edu*. We also consulted personnel from XXXXX Construction Company who were involved with the renovations.

ROOF AGE

Byers Hall: 1 year

The Georgians: 4 years

The Master's House: 2 years

The Vanderbilt-Sheffields: 14 years

493 College Street: 2 years except south facing slate roof is the original roof (95 years)

TYPICAL ROOF CONSTRUCTION

The Georgians, The Master's House and Byers Hall

Rough Vermont slate installed in "graduated" slate coursings (a graduated slate roof is a roof in which the slate diminishes in length and/or thickness as it progresses from eave to peak) with longest slates at the eaves, diminishing in length toward the ridge. The slate is a mix of Vermont Unfading Mottled Purple & Green, Vermont Unfading Green, and Vermont Unfading Purple. Thickness varies, bottom to top, from approximately 1-inch to 3/8 inch. The slate is fastened with copper slating nails into a gypsum plank deck. Dormers added during renovations have plywood decks.

The Vanderbilt-Sheffields

One-piece barrel style 13 ¼ -inch long Spanish clay tile manufactured by Ludowici Roof Tile · 4757 Tile Plant Rd. · PO Box 69 · New Lexington, Ohio 43764 · 800.945.8453. Color of tile is Forest Green. Probes were not taken on these roofs. Typically the tiles are nailed to wooden battens attached to the roof deck. The roof deck on Vanderbilt-Sheffield is terra cotta book tile set on a steel framework. The underside of the roof deck exhibits regular rows of toggle bolts indicating wood battens have been fastened to the deck. The substrate should be verified during repairs.

493 College Street

Rough Vermont Slate installed in "graduated" slate coursings with longest slates at the eaves, diminishing in length toward the ridge. A mix of Vermont Unfading Mottled Purple & Green, Vermont Unfading Green, and Vermont Unfading Purple. Thickness varies from approximately 1-inch to 3/8 inch. The slate is fastened with stainless steel fasteners through 30 lb. asphalt saturated organic felt or ice-and-water shield at roof eaves and valleys to 1 ft. x 2 ft. x 3-inch thick terra cotta book tile.

OBSERVATIONS

Byers Hall

Broken or cracked slate: 2
Slipping Slate: 3
Missing Slate: 5

The Georgians

Broken or cracked slate: 4
Exposed hole in slate: 1
Slipping Slate: 7
Missing Slate: 9
Broken, slipping or missing slate: 4
Metal strap repair: 3

The Master's House

Slipping slate: 4
Broken slate: 1

Vanderbilt-Sheffield (Wall Street)

Missing flat-top tile piece: 1
Broken cut and closed valley pieces: Approximately 12; to be verified during repairs
Broken valley tile: 1
Suspected void in chimney flashing: 1 location to be verified during repairs
Suspected improperly lapped step-flashing: 1 location to be verified during repairs
Failed pad-type snow guards: random locations
Bucket filled with water and leaves in roof valley
Debris on cupola ledge
Tree branch on roof

Vanderbilt-Sheffield (College Street)

Missing flat-top tile piece: 1
Loose beveled eave pieces: 3
Dislodged tile: 1
Broken field tile: 3
Loose field tile (installed instead of flat-top tile piece): 1
Missing flat top tile: 2
Broken cut-and-closed valley tile: Approx. 2; verify during repairs
Cracked tile: 2
Failed pad-type snow guards; debris in gutters and drain outlet strainer missing

493 College Street

Broken, missing or cracked slate
 2007 roof: 6 pieces
 South facing original roof: 6-8 pieces; verify quantity during repairs.
Slipping slate: 1
Failed pad-type and failed wire-type snow guards; random locations

DISCUSSION

The Georgians

The slate roof was installed in 2004. The roof deck is a nailable gypsum material. The slates were fastened to the deck using smooth-shank copper roofing nails. The slate style is "graduated," using a mix of Vermont roofing slate types and sizes, ranging from 24" long at the eaves to 12" long at the ridge, installed with a 3" headlap (headlap is the amount of the slate that is lapped by the second course of shingles above. This headlap is what makes a slate roof watertight). The color scheme includes primarily Vermont semi-weathering gray-green, with Vermont semi-weathering gray, Vermont mottled green and purple, and Vermont unfading purple mixed in. All flashings are lead-coated copper.

Valleys are closed, hips and ridges are custom-made lead-coated copper, cleated and soldered, and the built-in gutter system is also made of lead-coated soldered copper. Snow retention systems are primarily Mullane 500 3-pipe brass snow rails.

The flashings (sheet metal used in waterproofing roof valleys or hips, or the angle between a chimney and a roof), LCC low-slope roofs, and slate are generally in good condition. The workmanship appears good. The slates were installed on an appropriate roof deck using the correct nails. The slate itself is high-quality S1 slate with an exceptional longevity, perhaps of a century or more. It appears that the slate roof and the associated flashings were installed by a contractor experienced and proficient in the installation of slate roofing.

However, a number of faulty slates were observed: 25 slates were broken, missing or sliding out of place. Three additional slates had been replaced using metal straps. A correctly repaired slate will not utilize an exposed metal strap, but instead will use a slate hook or the "nail and bib" slate replacement method. Repair of these slate failures should be covered by the contractor's warranty.

The breakage and the attachment failure of the slate can be attributed to natural attrition and damage caused to the individual slates prior to or during installation. (Slaters install scaffolding to move materials and themselves up and down roofs. They progress up-slope with their scaffolding. After reaching the top they work down, repairing any broken or cracked slate as they move down. It is common for the installers to miss some cracks where they may be covered by the slate course above. Wind, building vibration and sliding snow and ice can dislodge these pieces). Other factors may be foot traffic and ladders set up against the roof after it is complete.

We recommend an expanded stainless steel metal backing be attached to the horizontal rails of the existing snow rails. This should prevent objects sliding underneath or through the rails. We also recommend adding snow rails on the roof eaves lacking snow guards. An acceptable snow rail system is the Mullane 500 brass, 3-pipe system, which appears to be the type already in use on many of the eaves at Silliman.

Approximately 6 gutter areas on the Georgians slate roofs were showing clogged gutters with standing water and leaf debris. These gutters should be cleaned out. Debris prevention at the gutter outlets may be advisable, such as the installation of copper strainers in the outlets, if they aren't already in place.

Two solder joint fractures were also observed - one at a chimney corner and one in a low-slope roof area. These solder joints should be re-soldered. Particular attention should be paid to allowances for expansion and contraction in these areas, with additional expansion joints added as needed.

Byers Hall

Byers Hall has a new slate roof, installed in 2007. The slate style is "graduated," using a mix of Vermont roofing slate types and sizes similar to the Georgians. All flashings are lead-coated copper and the gutter system is built-in, also of lead coated copper.

The flashings and slate are in good condition, again showing excellent workmanship. However, 10 faulty slate shingles were observed. All of these slates should be replaced or otherwise properly repaired.

The breakage and failure of the faulty slate can be attributed to natural attrition, damage caused to the individual slates prior to or during installation that went unnoticed during installation and had a delayed response time before the damage revealed itself, or other incidental causes that are not related to any pervasive defect or general failure of the roof system.

The Master's House

The Master's House has a new slate roof, installed in 2006. The slate style is "graduated," using a mix of Vermont roofing slate types and sizes similar to the Georgians. All flashings are lead-coated copper.

The flashings, low-slope roofs and slate are in good condition, showing excellent workmanship. However, 5 faulty slate shingles were observed. All of these slates should be replaced or otherwise properly repaired. The breakage and failure of the slate can be attributed to natural attrition, damage caused to the individual slates prior to or during installation that went unnoticed during installation that had a delayed response time before the damage revealed itself, or other incidental causes not related to any pervasive defect or general failure of the roof system.

Standing water was observed in one area of the gutter where the gutter outlet was blocked with leaf debris . The gutters should be cleaned and outlet unblocked. Some eaves have a snow rail system like the snow rail system at the Georgians. Installation of an appropriately designed snow retention system along eaves with expanded stainless steel metal backing attached to the horizontal rails is recommended at roof eaves lacking snow rails.

493 College Street

493 College Street has a slate roof, a section which was replaced in 2007. A section on the south side appears to be original, probably installed when the building was constructed. The original south facing section is made primarily of Vermont mottled green and purple slate of uniform lengths and random widths, with open copper valleys and copper ridges. This south facing original roof is in need of repair . There are 8-10 slates which need replacement. The mottled green and purple slates on this roof are known to have exceptional longevity. Such roofs are therefore highly restorable.

The new sections of slate roof were installed with random width Vermont mottled green and purple slates. Six of the newly installed slates on this building are in need of repair or replacement. Furthermore, a number of snow guards have become damaged. The damaged snow guards could be replaced, allowed to remain in place, or simply cut off. The College Street side of this building's roof is over a public sidewalk. We recommend a pipe-type snow system with an expanded stainless steel metal backing be installed.

The adjacent slate roof on St. Anthony Hall was outside the scope of our investigation. Slipping and missing slate was observed on that roof.

The Vanderbilt-Sheffields

Vanderbilt-Sheffield on Wall Street and Vanderbilt-Sheffield on College Street have tile roofs installed in 1994. The tile is Grade 1 clay roof tile manufactured by Ludowici Roof Tile, a reputable company with over 100 years of experience in the manufacture of clay roof tile. The tile style is one-piece barrel, 13 ¼-inch long Spanish tile, forest green in color.

The valleys are open type lined with copper. Hips and ridges are custom-made of copper, and the build-in gutter system is also made of copper. Snow retention systems are primarily copper pad-type snow guards.

The tile is generally in good condition, appears to be well fastened and should last for over a century. However, faulty tiles were observed that need repair. Random cut-and-

closed valley tile pieces are broken. (Closed valley tile pieces are used at roof valleys. Tiles are cut at the appropriate angle to match the angle of the copper valley. Flat pieces of tile are attached to the cut surface with a liquid clay or slip to close the end of the tile. This tile is fired to form one piece of tile. This attached piece forms a weak point and the pieces of tile were broken at the slip joint.)

As a result of being broken these tiles are open and snow, water, or other intrusions can enter beneath the tile. Possible reasons for tile breakage are foot traffic or a manufacturing defect. The broken cut-and-closed valley tiles may be covered by the tile manufacturer's 75 year limited warranty. We recommend the manufacturer be contacted regarding the warranty coverage.

Past adhesive repairs to the cut-and-closed valley tiles have been made; however, repairs are failing in several locations. For long term performance, new tile pieces matching the angle of the valley should be installed.

One flat-top tile piece is completely dislodged (this tile was found resting on the tile below it and was removed from the roof for safety). Additionally we observed four loose tiles, four improper or missing termination pieces, and four broken tiles. One of the tiles appears to have broken as a result of a snow guard forced against the tile by snow loads. The other broken tiles may be a result of foot traffic or other causes not related to any pervasive defect or general failure of the roof system.

A stockpile of the tile was found in the attic of the Vanderbilt-Sheffield building on Wall Street. Tile pieces appropriate to conditions may be among the attic stock and could be used to make repairs. If not, the defective tiles, particularly the cut-and-closed valley tile, which is custom-made by the tile manufacturer to fit a specific roof profile, should be sent to the manufacturer for replication.

A number of snow guards are failing because the snow guard pad has broken or unfolded under snow loads. Retro-fit snow guards are available and a warranty for their performance can be obtained. It may be possible to eliminate the pad-type snow guards with the installation of a pipe style snow retention system. We recommend a 3-pipe style snow retention system with expanded stainless steel metal backing attached to the horizontal rails. The mesh can catch falling objects should tile or tile fragments become dislodged from the roof over time.

RECOMMENDATIONS

Byers Hall

1. Replace broken or cracked slate: 2
2. Replace/Refasten Slipping Slate: 2
3. Replace missing Slate: 5

The Georgians

1. Replace broken, slipping and missing slate to match the existing: 25
2. Replace slate installed with exposed metal straps utilizing a slate hook or the "nail and bib" slate replacement method: 3
3. Re-solder cracked solder joints; add additional expansion joints as needed: 2 locations
4. Install a Mullane 500 brass, 3-pipe snow retention system where lacking at eaves. Add an expanded stainless steel metal backing to the horizontal rails of the new snow guards.
5. Add an expanded stainless steel metal backing to the horizontal rails of the existing snow guards.
6. Clean gutters and un-block gutter outlets. Install copper strainers at gutter outlets where missing.

The Masters House

1. Replace or refasten slipping slate: 4
2. Replace broken slate: 1
3. Install a Mullane 500 brass, 3-pipe snow retention system at eaves where lacking eaves. Add an expanded stainless steel metal backing to the horizontal rails of the snow guards.
4. Add an expanded stainless steel metal backing to the horizontal rails of the existing snow guards.
5. Clean gutters and un-block gutter outlets. Install copper strainers at gutter outlets where missing.

493 College Street

1. Examine south facing original roof, replace broken, missing or cracked slate: 8-10
2. Replace broken, missing or cracked slate: 6 pieces 2007 roof
3. Replace/refasten slipping slate: 1
4. Replace failed snow guards
5. Install a Mullane 500 brass, 3-pipe snow retention system at eaves with an expanded stainless steel metal backing to the horizontal rails of the snow guards.

Vanderbilt-Sheffield (Wall Street)

1. Re-install flat-top tile piece: 1
2. Install tile closure at dormer ridge: 1
3. Examine all cut-and-closed valley tile pieces. Replace broken tile with new tile

- matching the existing tile
4. Replace cracked tile: 1
 5. Examine metal flashings at chimney and repair voids or improperly lapped metal step flashing: 2 locations
 6. Remove tree branch from roof: 1
 7. Remove bucket from valley
 8. Remove debris from ledge of cupola
 9. Replace failed pad type snow guards with new stronger snow guards, add additional snow guards to reduce loads on individual snow guards. It may be possible to eliminate the pad-type snow guard system if 3-rail snow retention systems are installed.
 10. Install a Mullane 3-rail snow retention system designed to fit Ludowici tile at the eaves. Install an expanded stainless steel metal mesh backing to the horizontal rails of the snow guards.
 11. Clean gutters

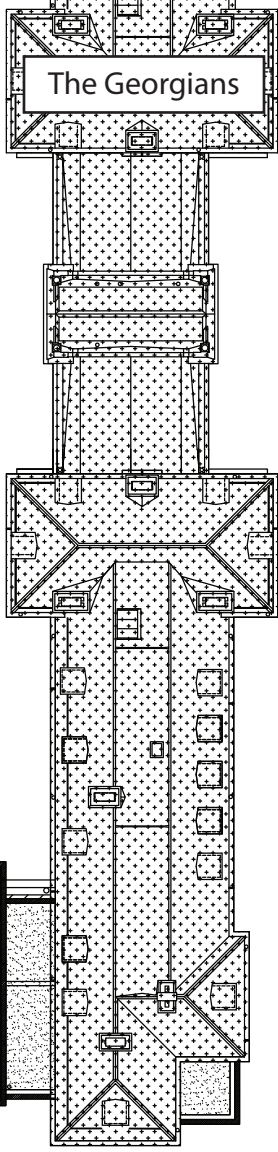
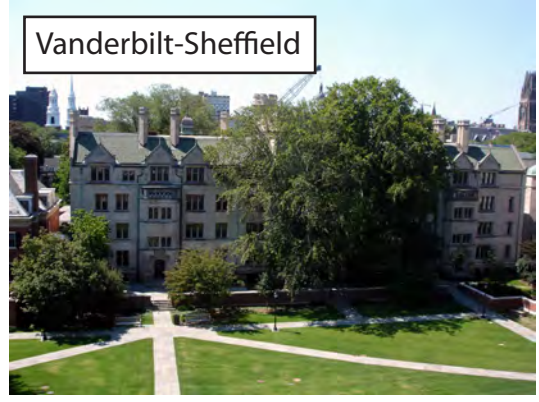
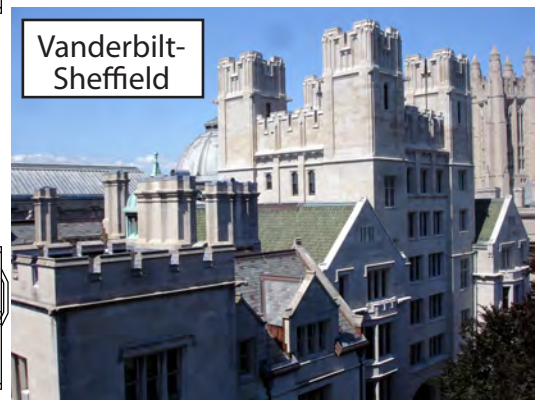
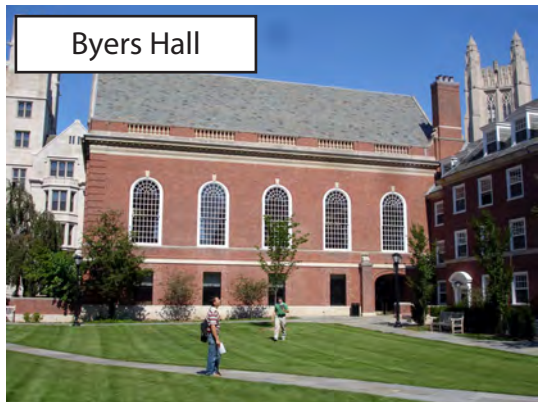
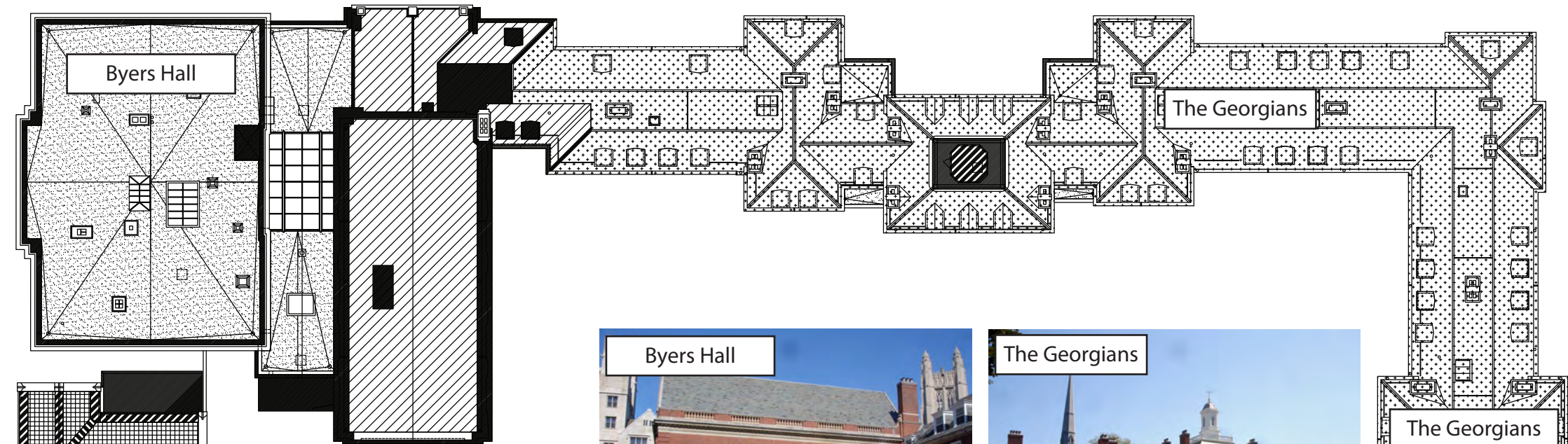
Vanderbilt-Sheffield (College Street)

1. Check all valleys, replace cut and closed valley pieces to match existing
2. Re-attach 3 beveled eave pieces.
3. Replace cracked tile: 2
4. Reset and re-attach 1 dislodged valley tile
5. Install missing flat-top tile: 1
6. Replace field tile with a flat-top piece: 1
7. Replace failed pad-type snow guards with new snow guards, add additional snow guards to reduce loads on individual snow guards. It may be possible to eliminate the pad-type snow guard system if 3-rail snow retention systems are installed.
8. Install a Mullane 3-pipe snow retention system designed to fit Ludowici tile at the eaves. Install an expanded stainless steel metal mesh backing attached to horizontal rails of the snow guards.
9. Clean gutters, install strainers at drain outlets where missing

Report prepared by:

XXXXXX XXXX, Registered Roof Consultant
The Moriarty Corporation

Grove Street



Temple Street

Central Campus

Office of Facilities
2 Whitney Avenue
New Haven, CT 06520

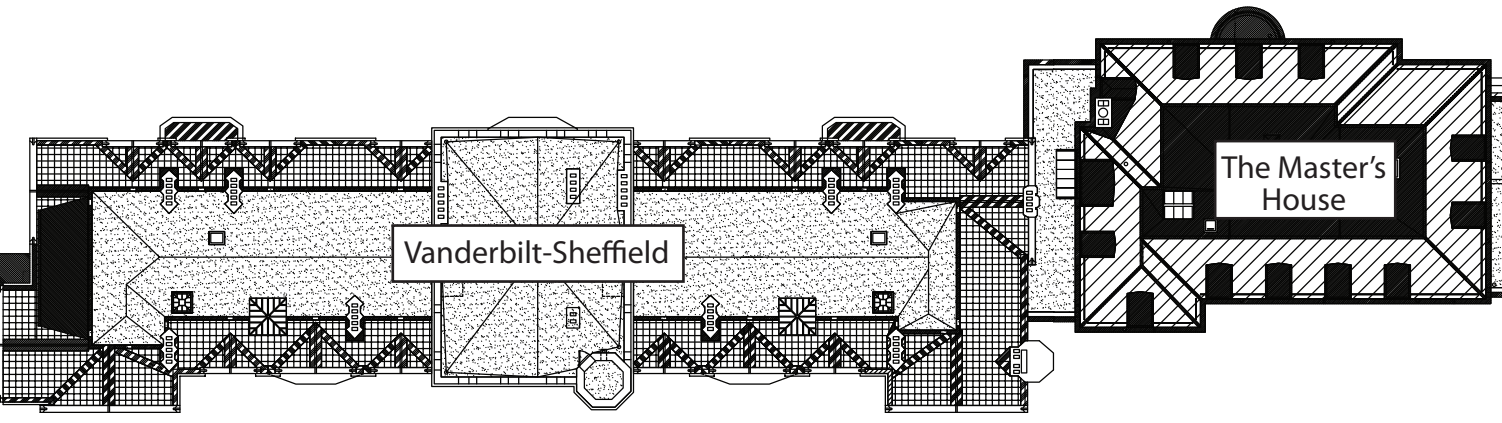
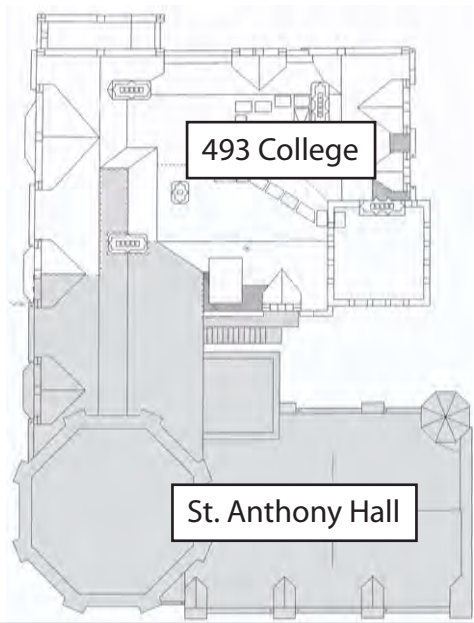
Silliman College
Site Plan

Byers Hall
The Georgians
The Master's House
Vanderbilt-Sheffield
493 College Street



REPORT DATE:
9-24-08

Wall Street



College Street

BYERS HALL

THE GEORGIANS

VANDERBILT-SHEFFIELD









SILLIMAN COURTYARD

Central Campus

Office of Facilities
2 Whitney Avenue
New Haven, CT 06520

Silliman College
Byers Hall
Vanderbilt-Sheffield

LEGEND

-  Slate Roof, 2004
-  Slate Roof, 2006-2007
-  Tile Roof
-  Slate broken, missing or slipping; needs replacement
-  Tile broken, missing or loose; needs repair/replacement
-  Closed valley tile broken
-  Metal strap repair; replace with slate hook
-  Additional observation or comment



REPORT DATE:
9-24-08

3 tiles slipping
(VS1)

1 dislodged tile
(VS1)

random failed snow guards
(VS2)

1 broken tile

1 broken tile

1 broken tile
(VS2)

1 missing flat
top tile
(VS6)

1 loose tile at
top course,
flat top tile
not installed
(VS5)

old shirt in gutter,
could block
drainage

1 broken tile
(VS3)

1 broken tile
(VS3)

tile fragment in gutter
debris in gutter, drain
outlet missing strainer

closed Valley,
tile broken
(VS4)

1 slate slipping 2nd
row from top
(B1)

1 slipping slate 2nd row from top
(B1)

1 missing
slate
(B2)

1 missing
slate
(B3)

1 missing
slate near
ridge
(B4)

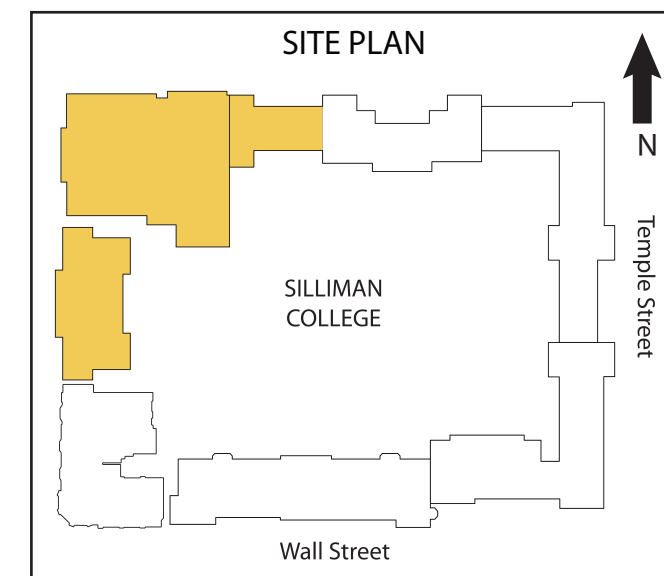
1 broken slate
(B5)

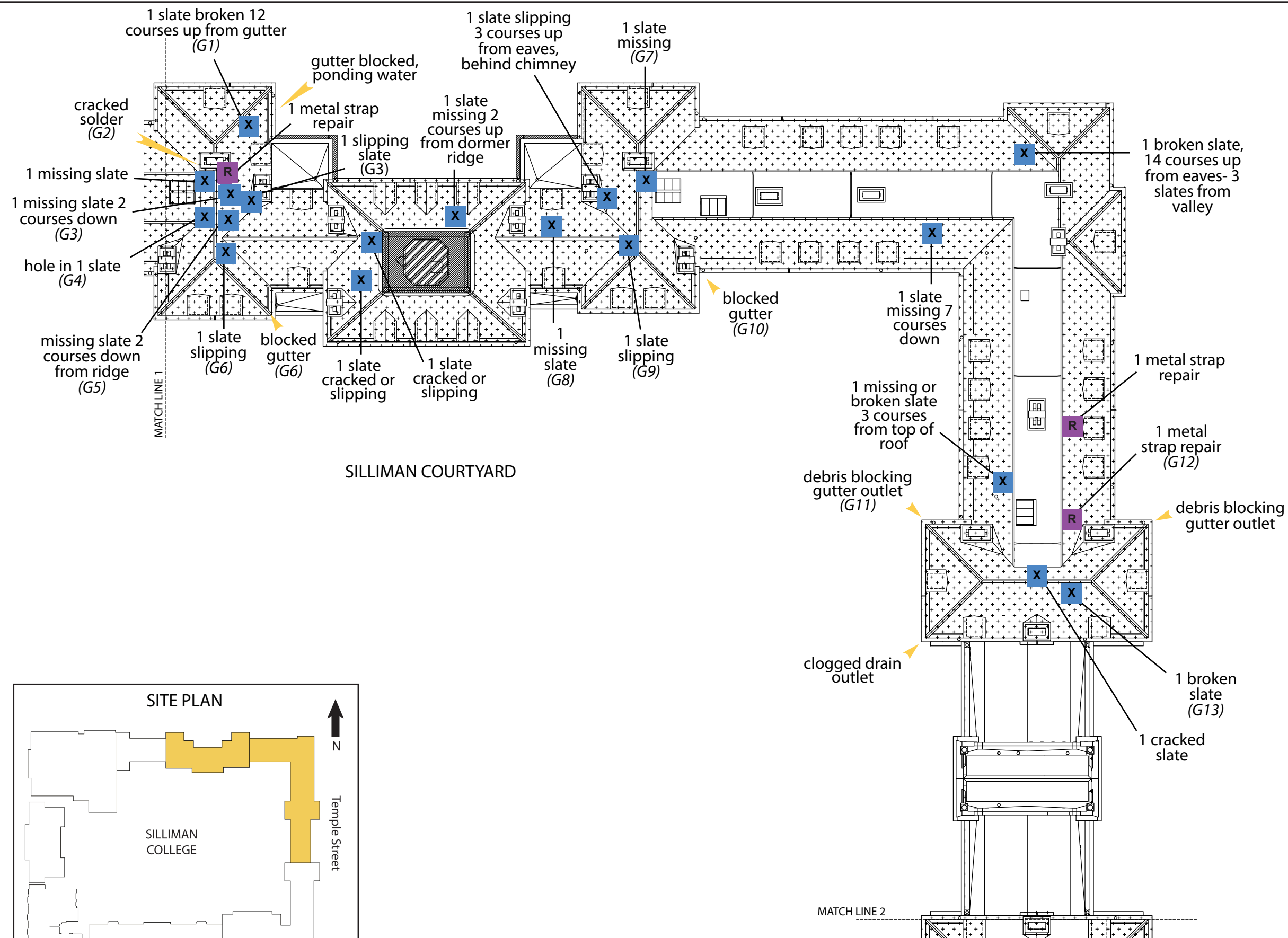
1 slate
missing 9
courses
down
(B6)

1 cracked
slate

1 slate missing,
four courses
down from ridge
(B6)

SITE PLAN





Central Campus

Office of Facilities
2 Whitney Avenue
New Haven, CT 06520

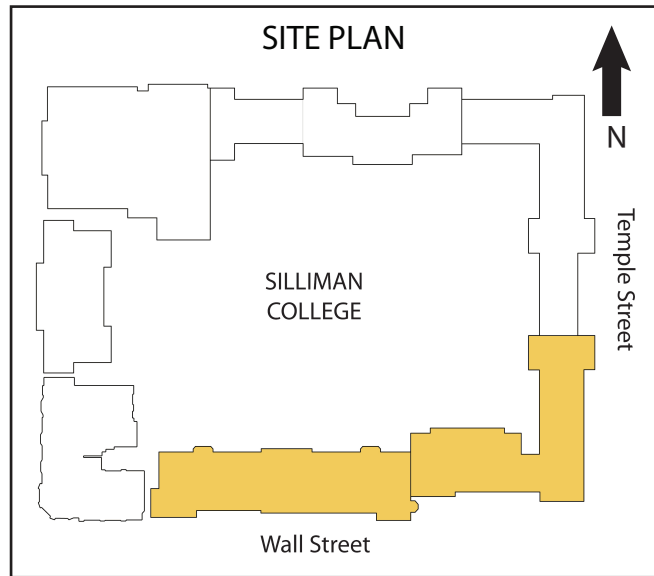
Silliman College
The Georgians

LEGEND

- Slate Roof, 2004
- Slate Roof, 2006-2007
- Tile Roof
- Slate broken, missing or slipping; needs replacement
- Tile broken, missing or loose; needs repair/replacement
- Closed valley tile broken
- Metal strap repair; replace with slate hook
- Additional observation or comment



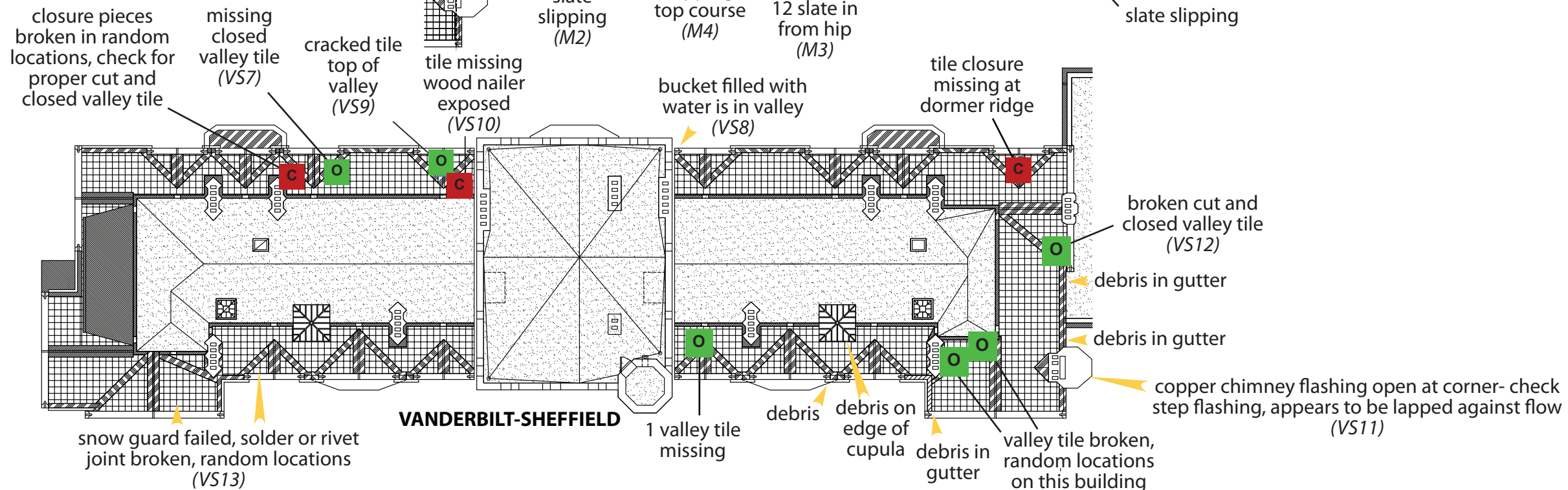
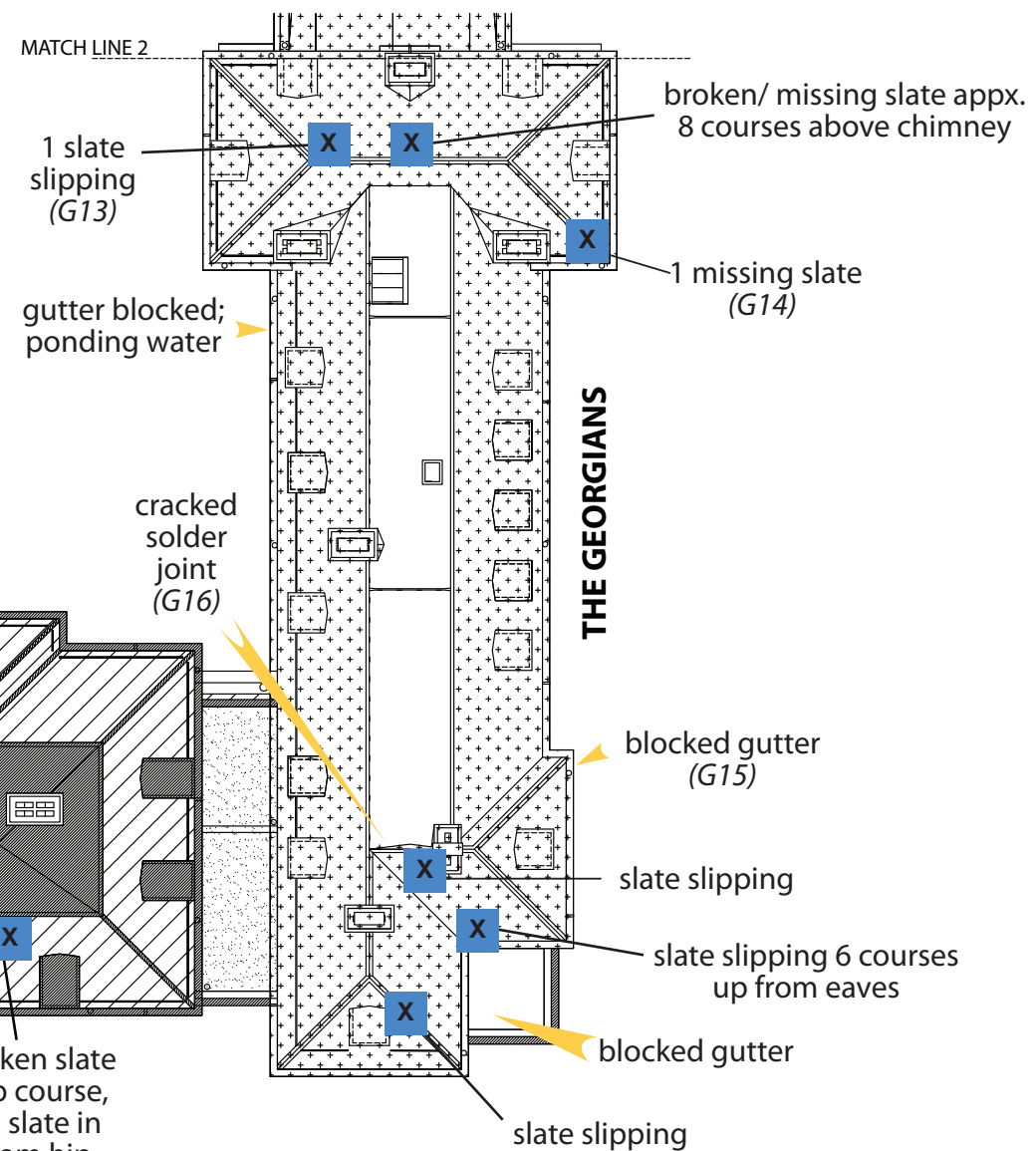
REPORT DATE:
9-24-08



SILLIMAN COURTYARD

THE MASTER'S HOUSE

VANDERBILT-SHEFFIELD



Central Campus

Office of Facilities
2 Whitney Avenue
New Haven, CT 06520

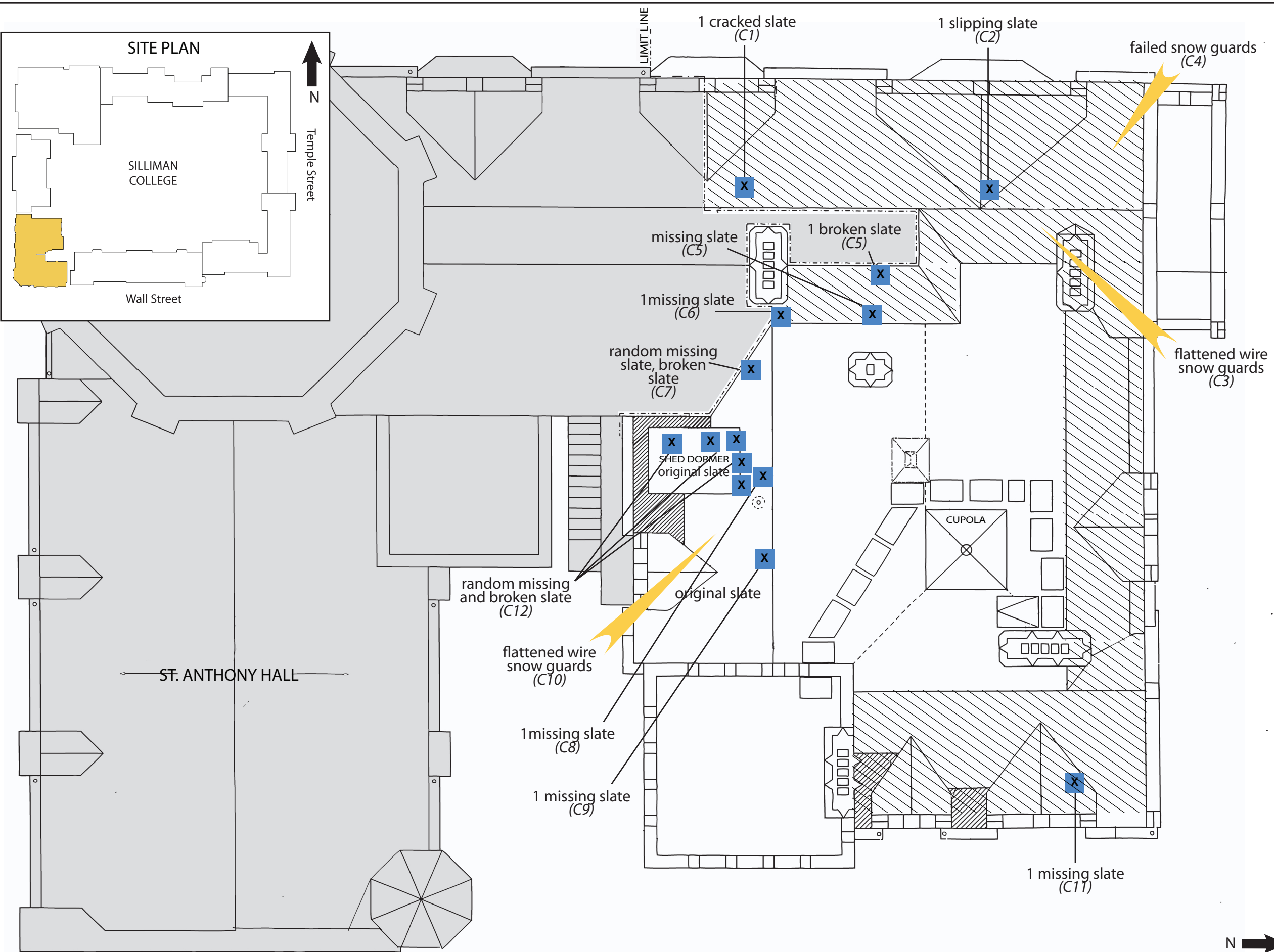
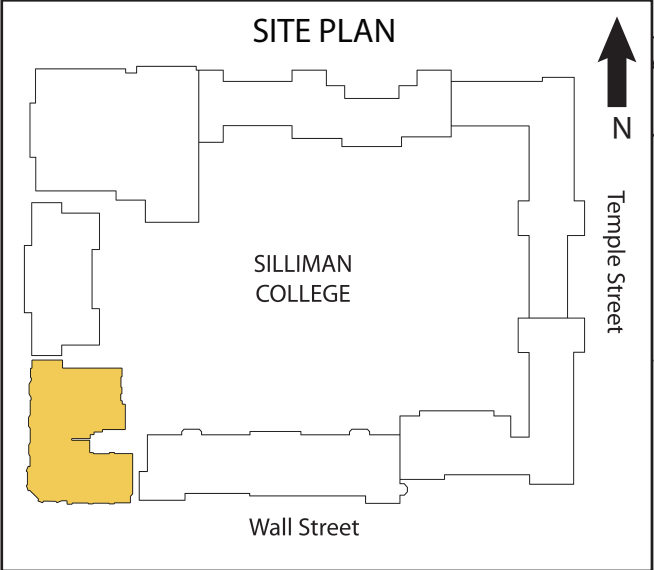
Silliman College
The Master's House,
Vanderbilt-Sheffield,
and The Georgians

LEGEND

- Slate Roof, 2004
- Slate Roof, 2006-2007
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- Slate broken, missing or slipping; needs replacement
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9-24-08



Central Campus

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2 Whitney Avenue
New Haven, CT 06520

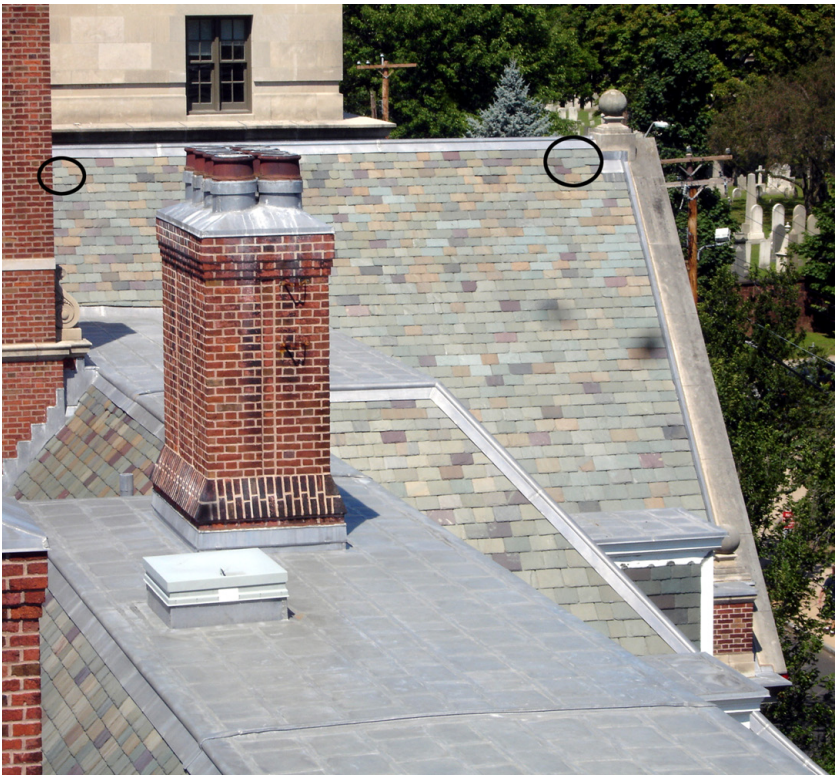
Silliman College
493 College Street

LEGEND

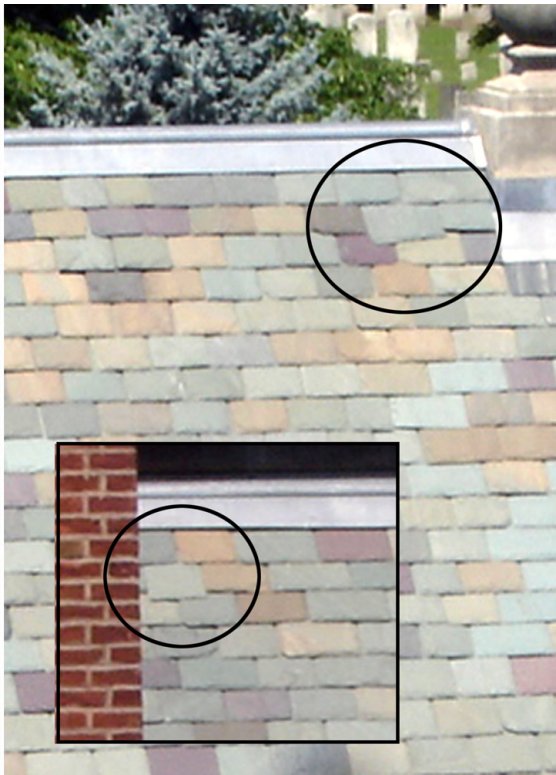
- Slate Roof, 2004
- Slate Roof, 2006-2007
- Tile Roof
- Slate broken, missing or slipping; needs replacement
- Tile broken, missing or loose; needs repair/replacement
- Tile closure missing or dislodged
- Metal strap repair; replace with slate hook
- Additional observation or comment



REPORT DATE:
9-24-08



B1: slipping slate 2nd row from top



B1: close up of slipping slate



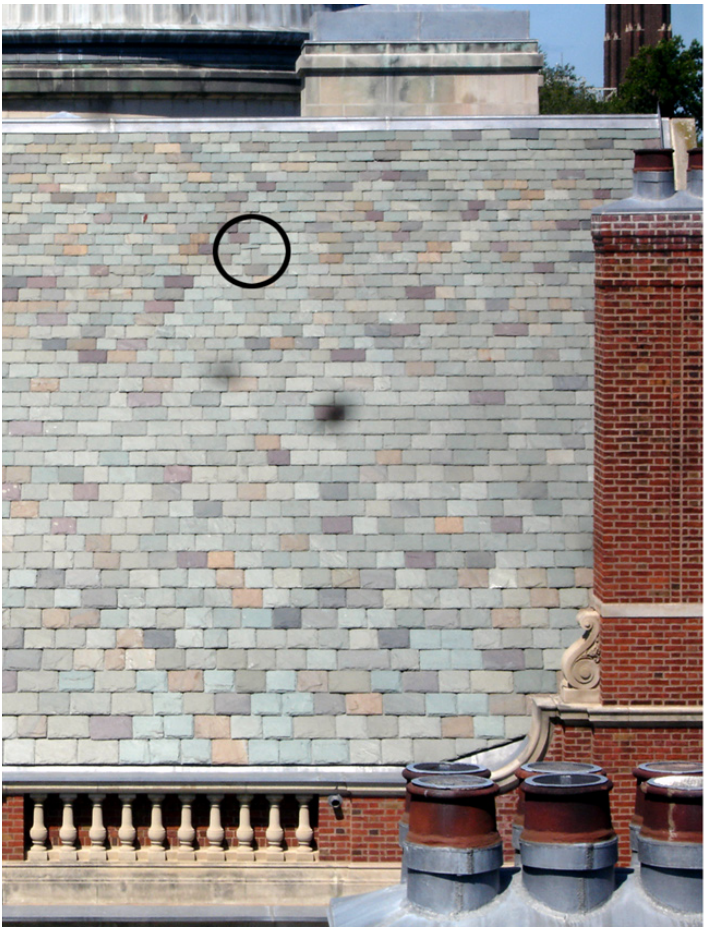
B2: 1 missing slate, slate resting on dormer roof



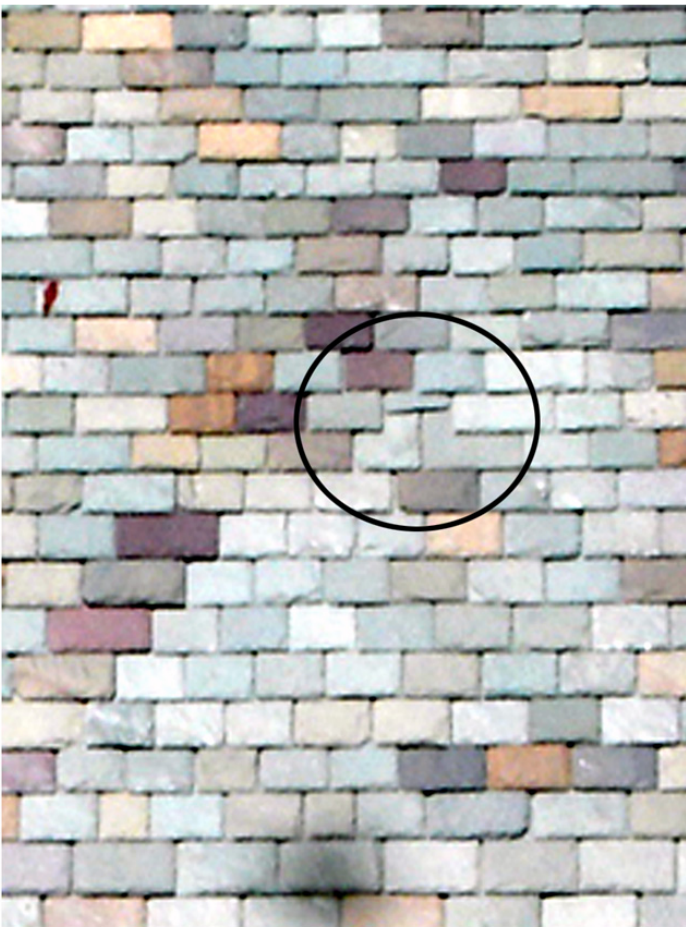
B3: 1 missing slate



B4: 1 missing slate near ridge



B5: broken slate



B5: close up of broken slate



B6: slate missing four courses down from ridge and nine courses down from ridge





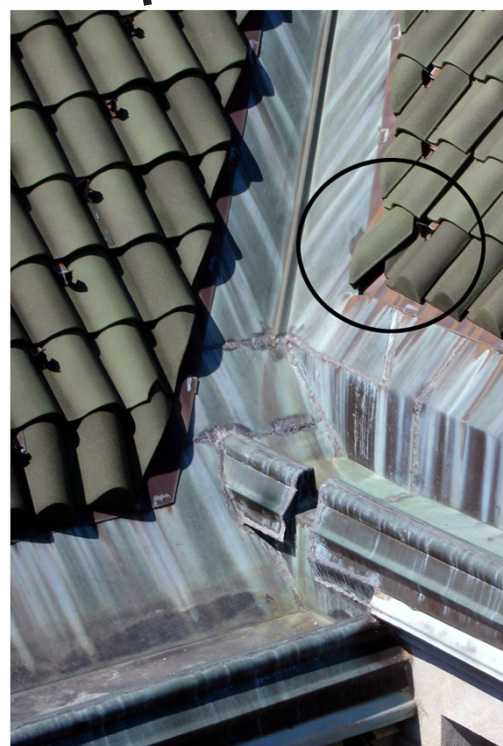
B6: close up



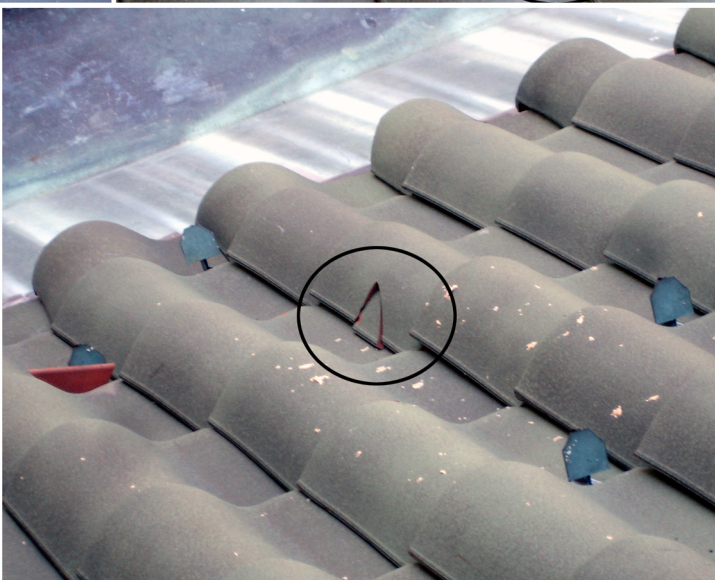
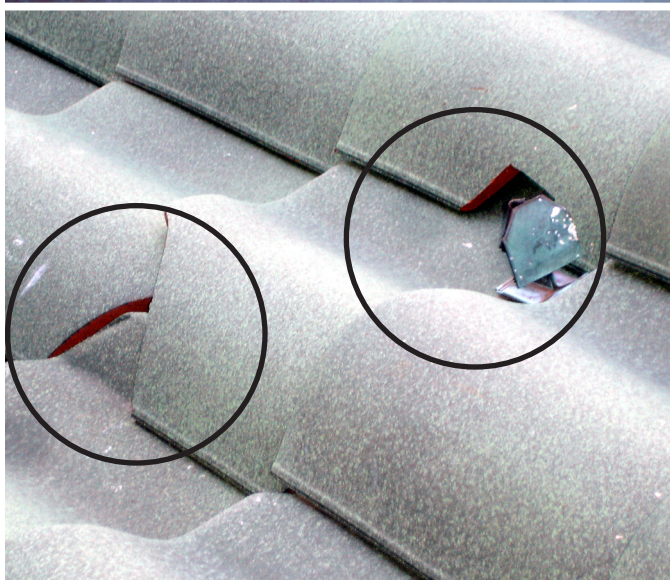
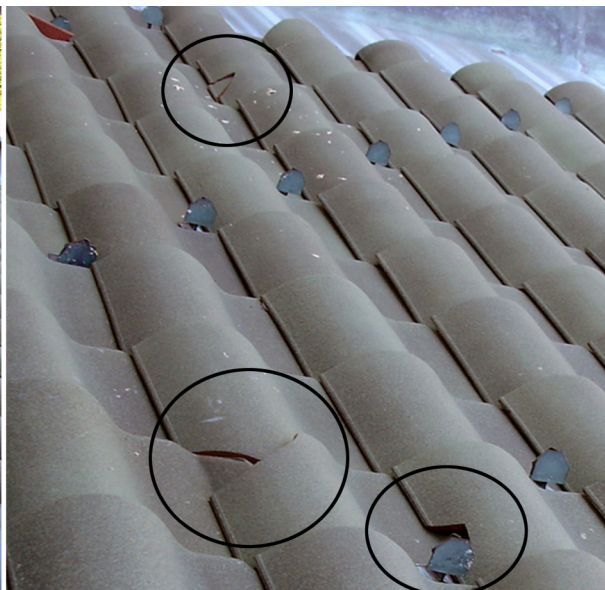
B6: close up, one slate missing four courses down from ridge



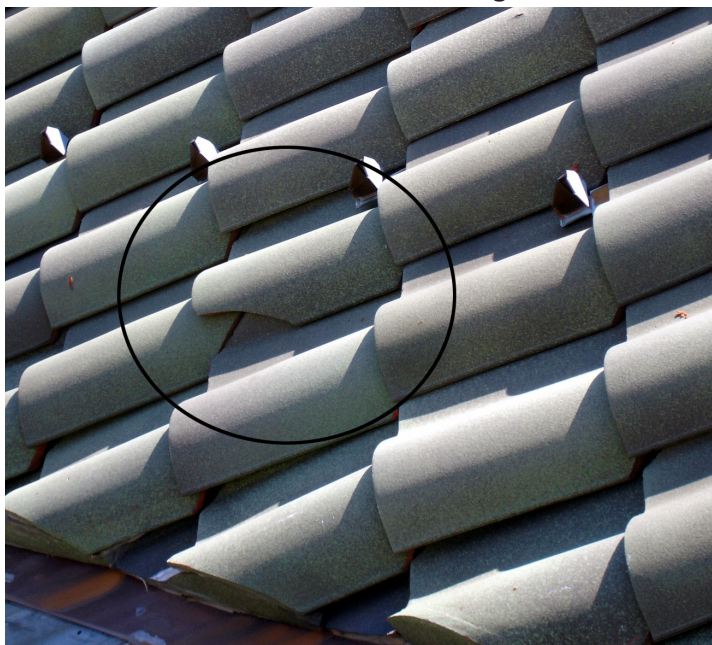
VS1: tiles slipping



VS1: one tile dislodged



VS2: 3 broken tiles and broken snow guard



VS3: broken tile



VS4: closed valley tile broken, past repair failed



VS5: flat top tile not installed, tile loose and open to water



VS6: missing flat top tile piece



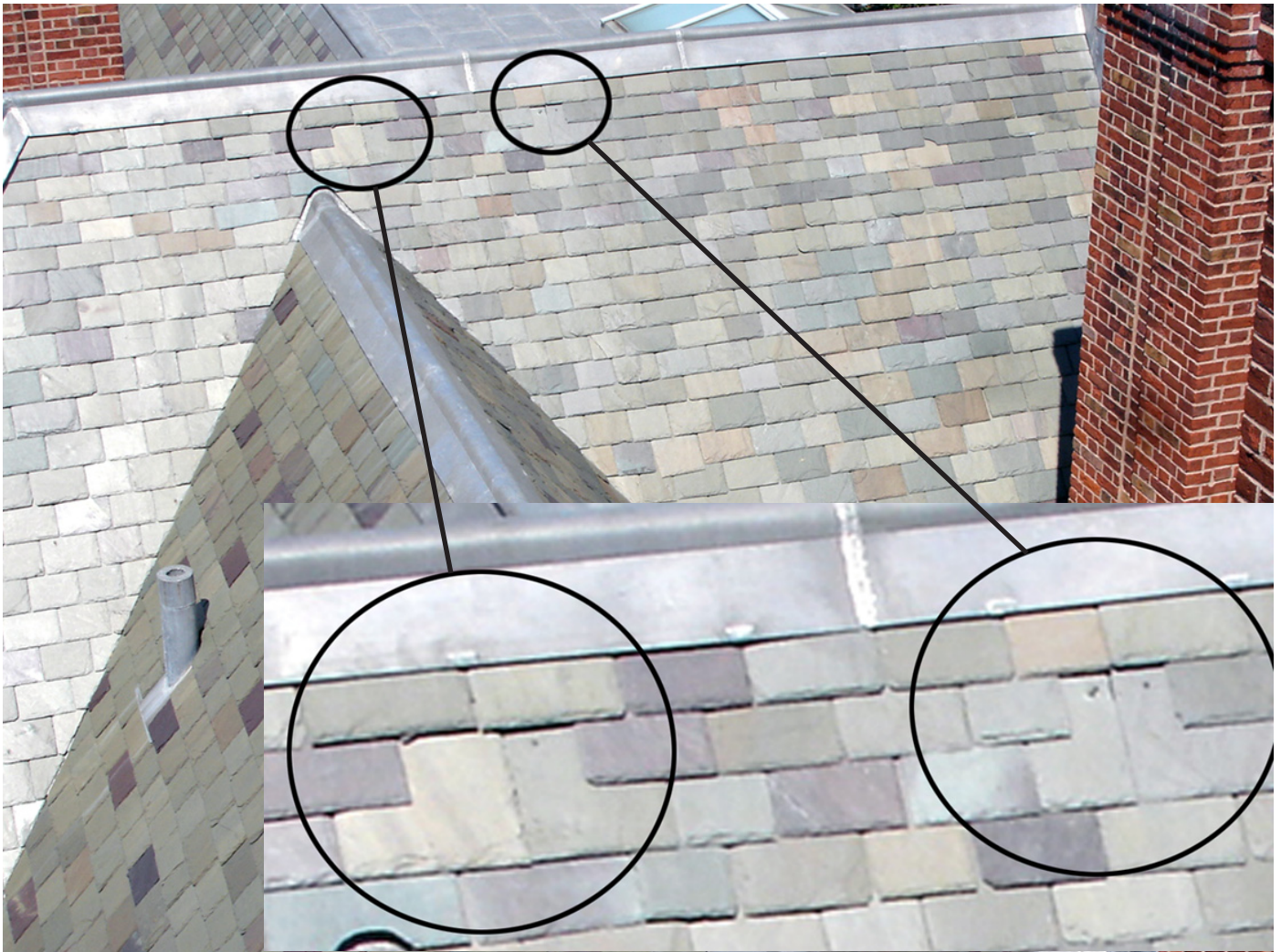
G1: one slate broken twelve courses up from gutter



G2: cracked solder



G2: close up of cracked solder



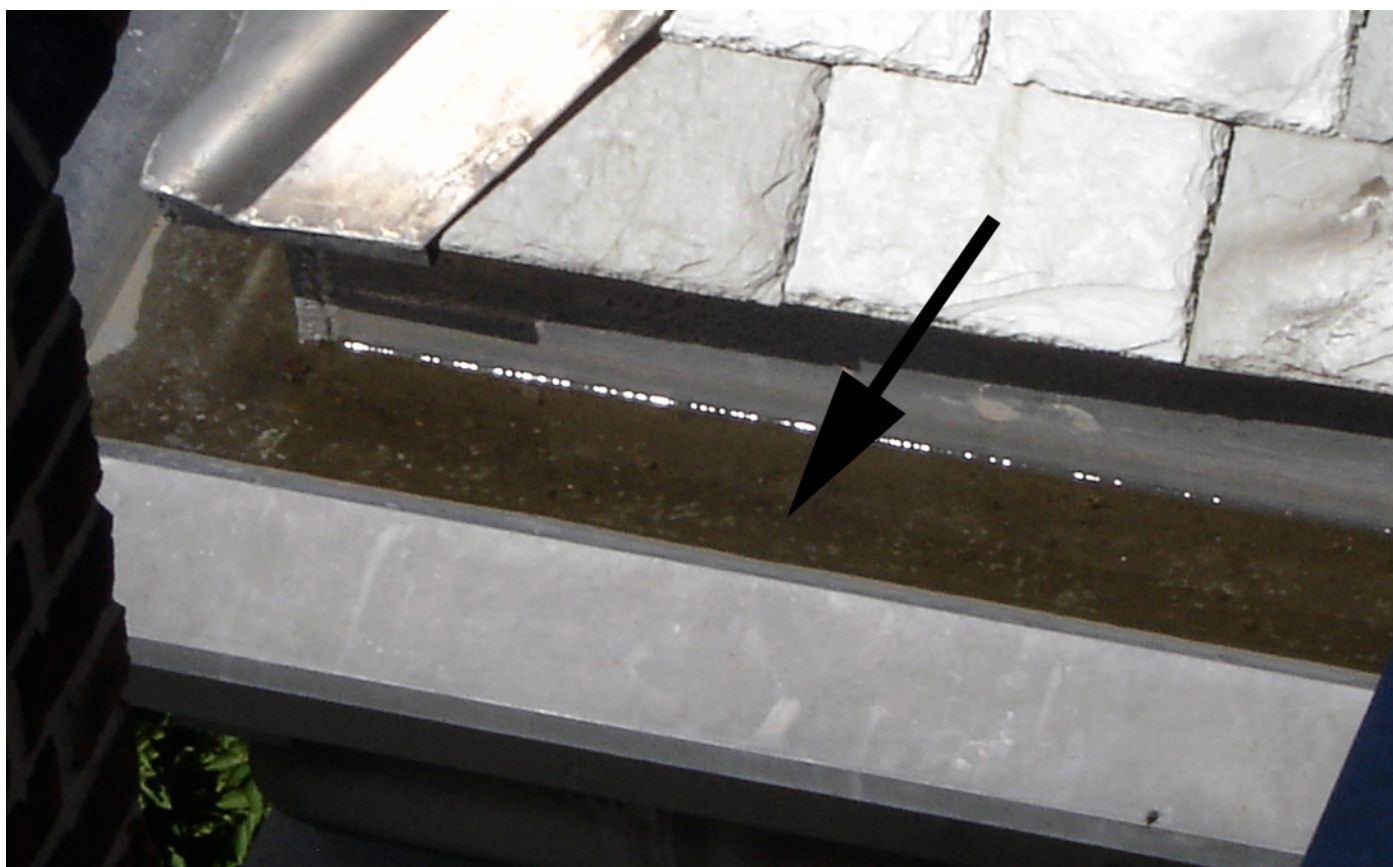
G3: two missing slate two courses down from ridge



G4: exposed hole in one slate



G5: missing slate two courses down from ridge



G6: blocked gutter, ponding water

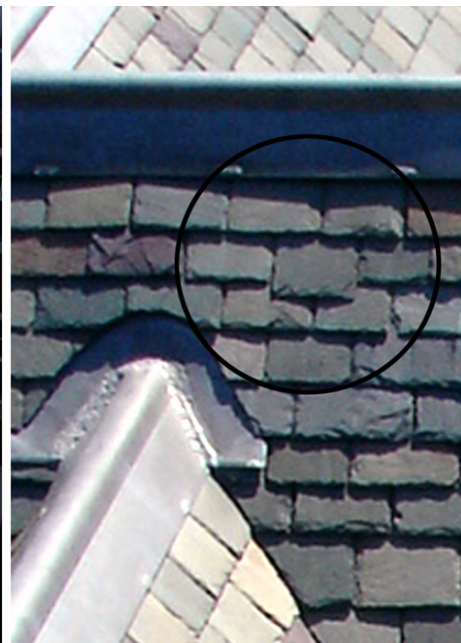


G7: one slate missing



G8: one broken/ missing slate, slate resting on dormer roof

The Georgians



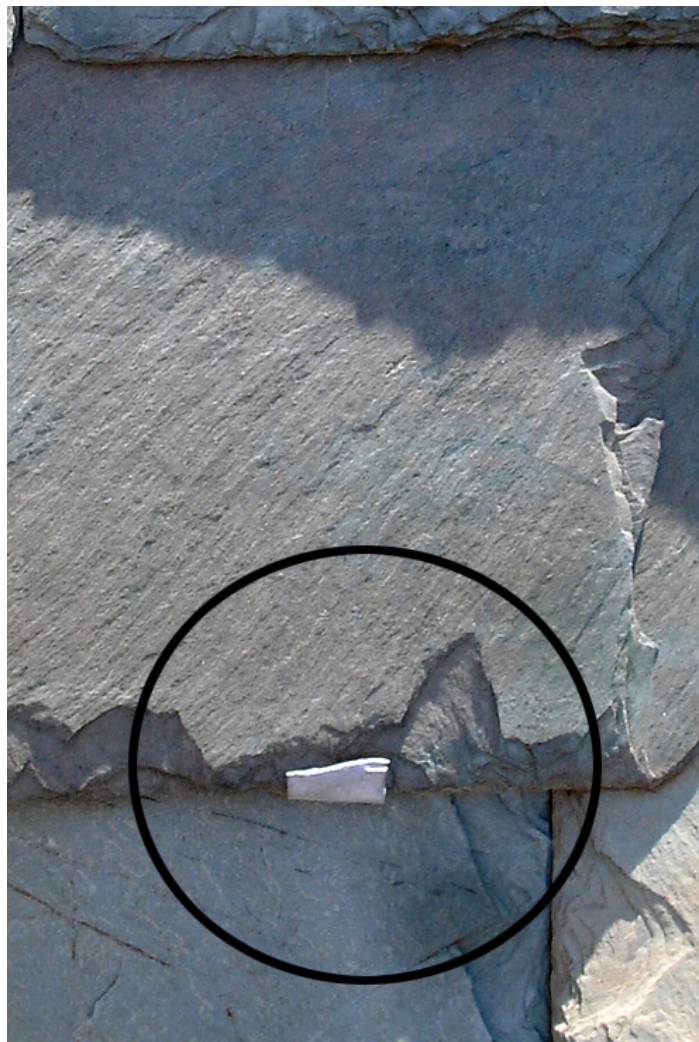
G9: one slate slipping



G10: blocked gutter



G11: debris blocking gutter outlet



G12: metal strap repair, three observed on roof



G13: one broken slate





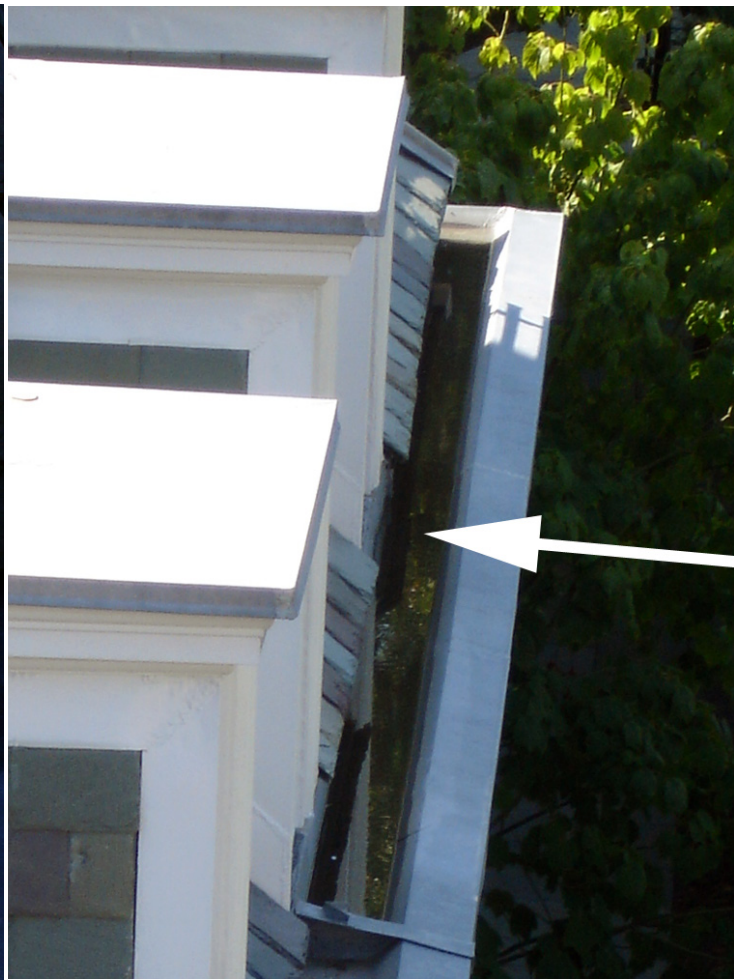
G13: slate slipping



G13: slate has fallen out and is resting on dormer roof



G14: one missing slate



G15: blocked gutter



G16: cracked solder joint



G16: close up of cracked solder joint

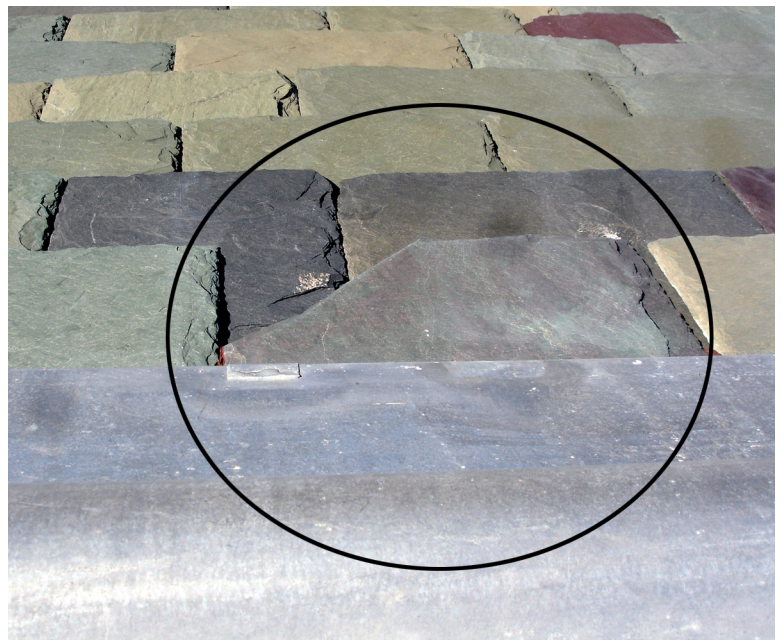
The Master's House



M1: slate slipping two courses above dormer



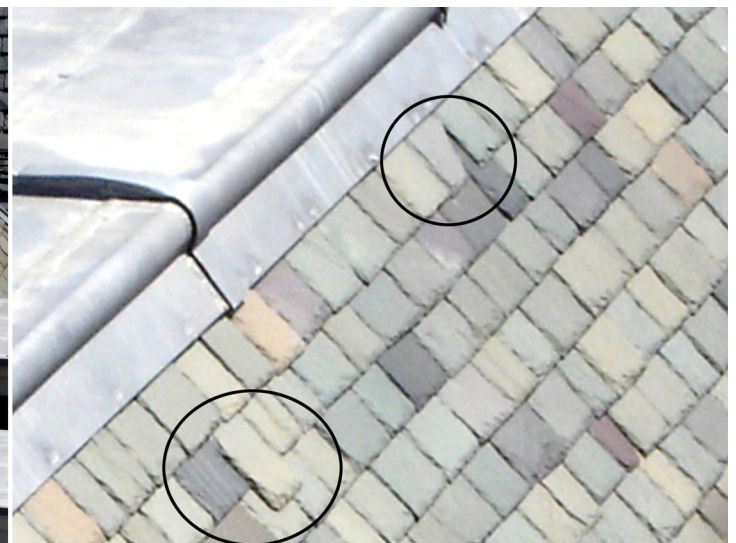
M2: slate missing



M3: broken slate top course, twelve slate in from hip



M4: slate slipping and broken





VS7: missing closed valley tile



VS8: bucket filled with water is in valley



VS9: broken tile



VS10: tile missing, nailer exposed



VS10: close up



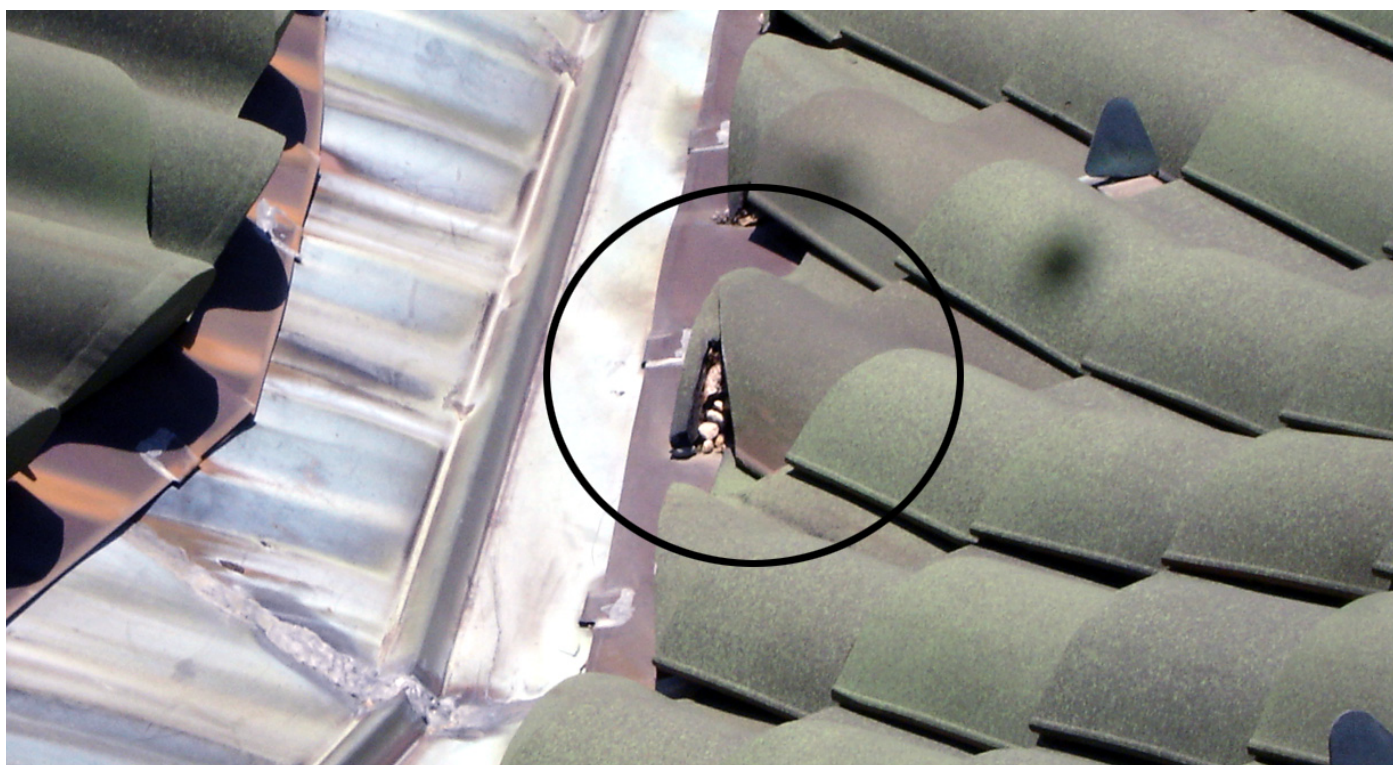
VS11: copper chimney flashing appears open at corner



VS11: close up

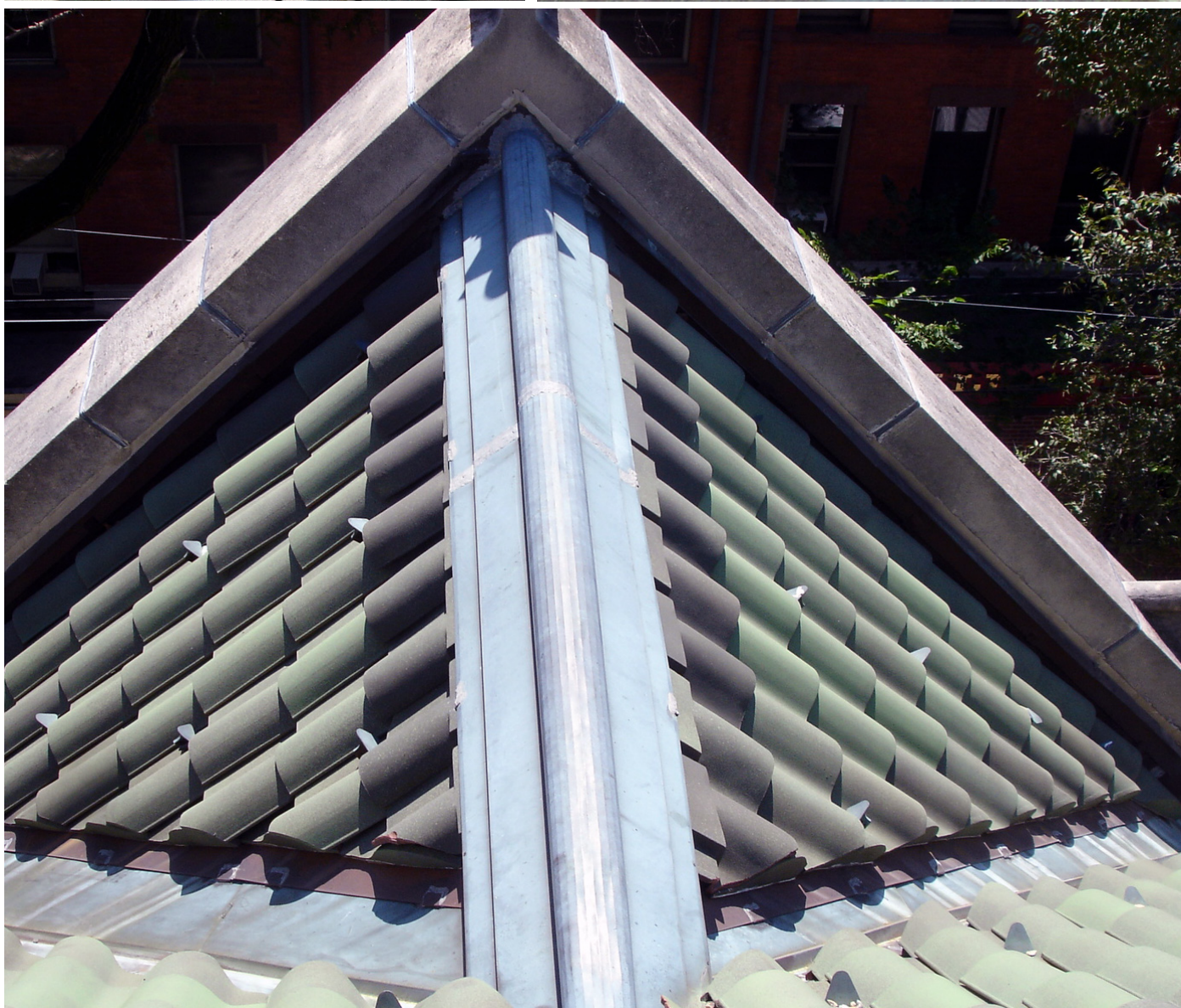
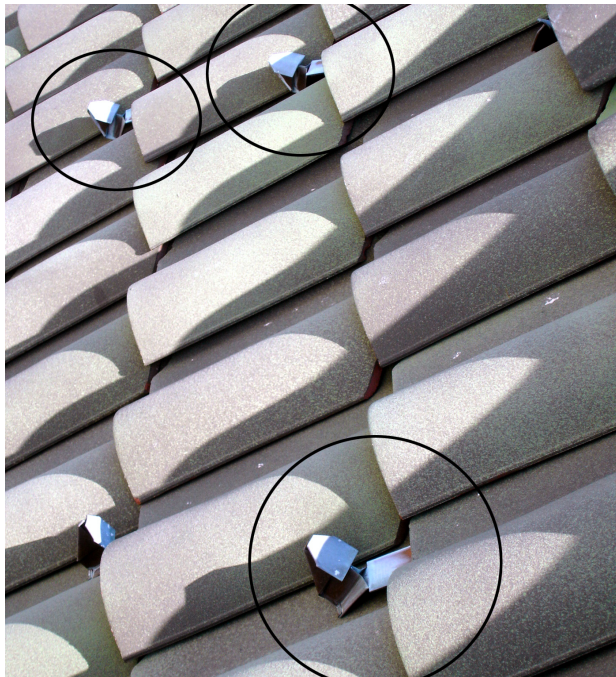


VS11: step flashing appears lapped against flow



VS12: broken cut and closed valley tile

Vanderbilt-Sheffield, Wall Street



VS13: failed snow guards, random locations



C1: cracked slate



C1: close up of cracked slate



C2: slipping slate; smaller circle shows flattened snow guard



C3: flattened wire snow guards

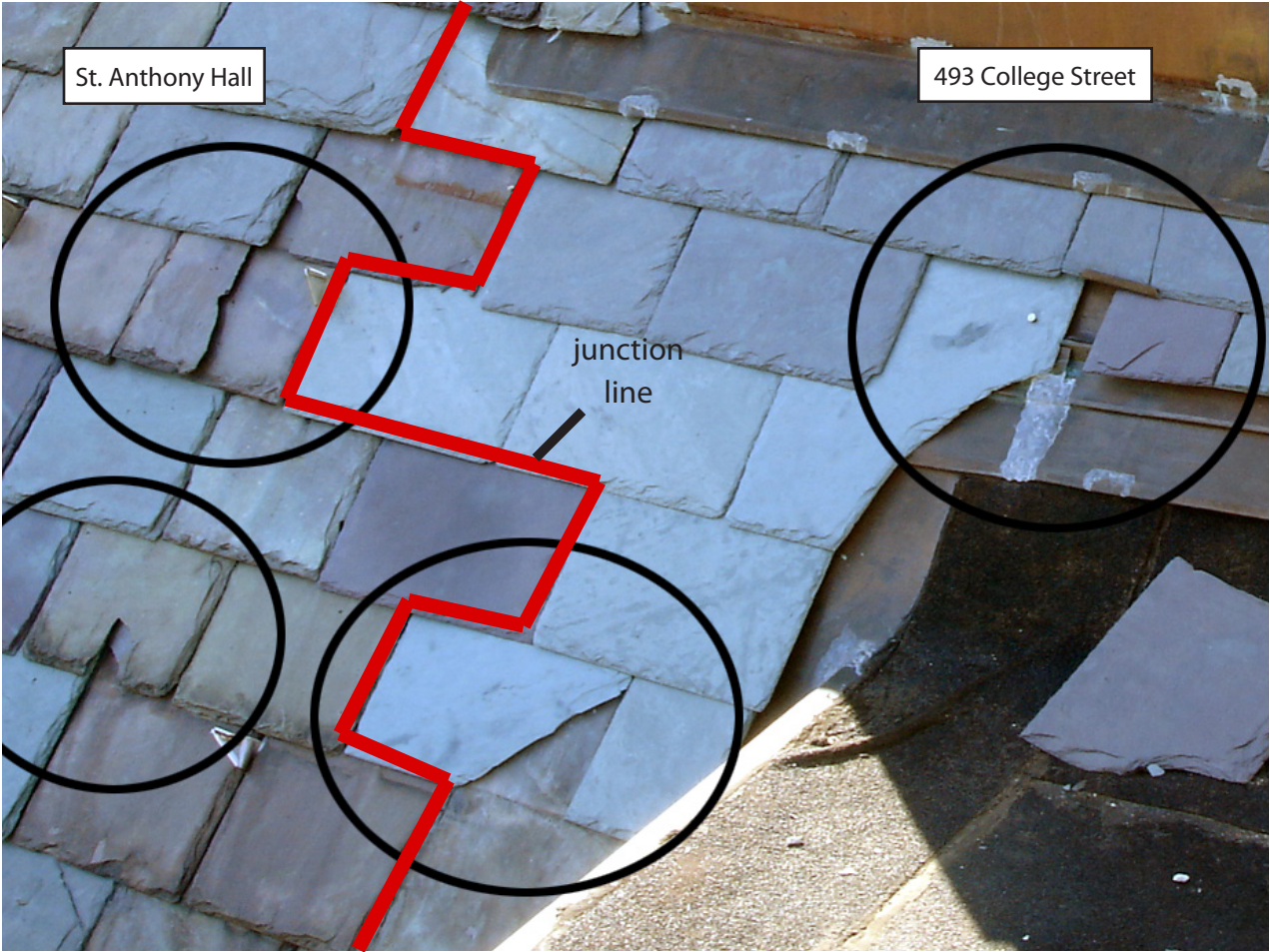


C4: broken snow guards





C5: broken slate, missing slate



C6: missing and broken slate



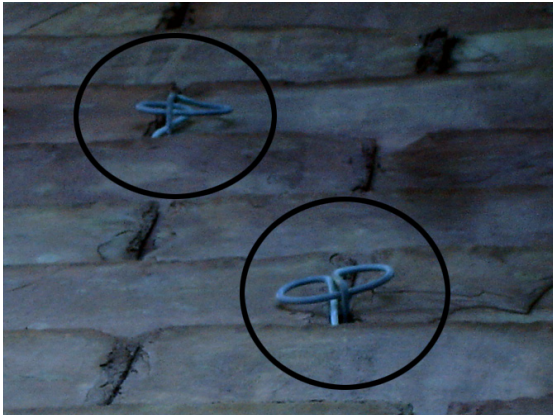
C7: broken and missing slate (portion of original slate roof)



C8: overview of original slate, south side



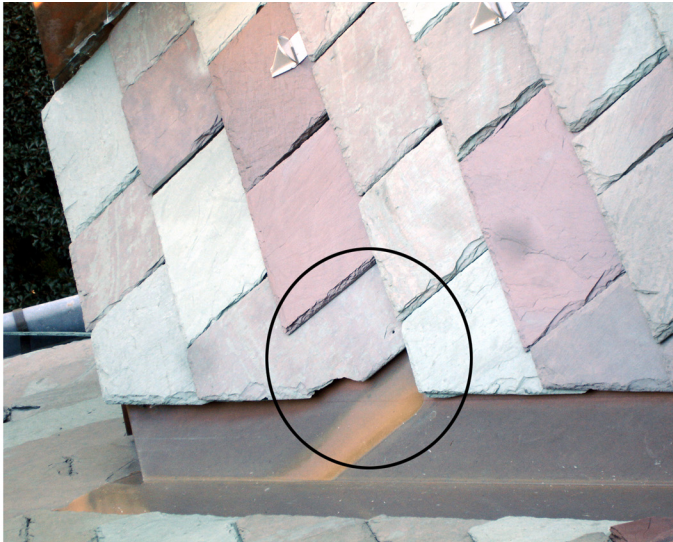
C9: missing slate



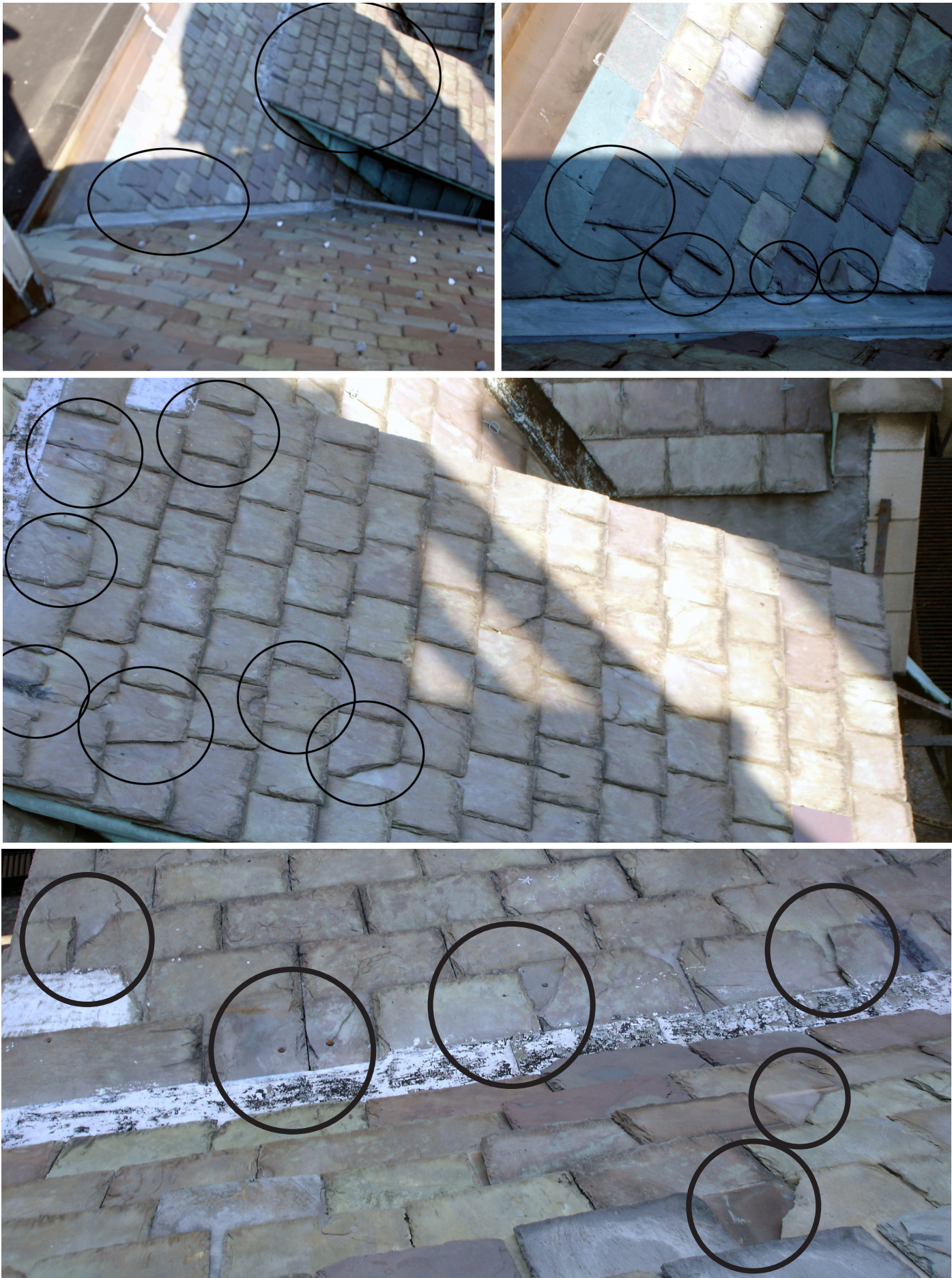
C10: flattened wire snow guards



C11: missing slate



C11: close up of missing slate



C12: missing and broken slate, south side of original roof