Installing Slate Roofs and Avoiding Common Mistakes

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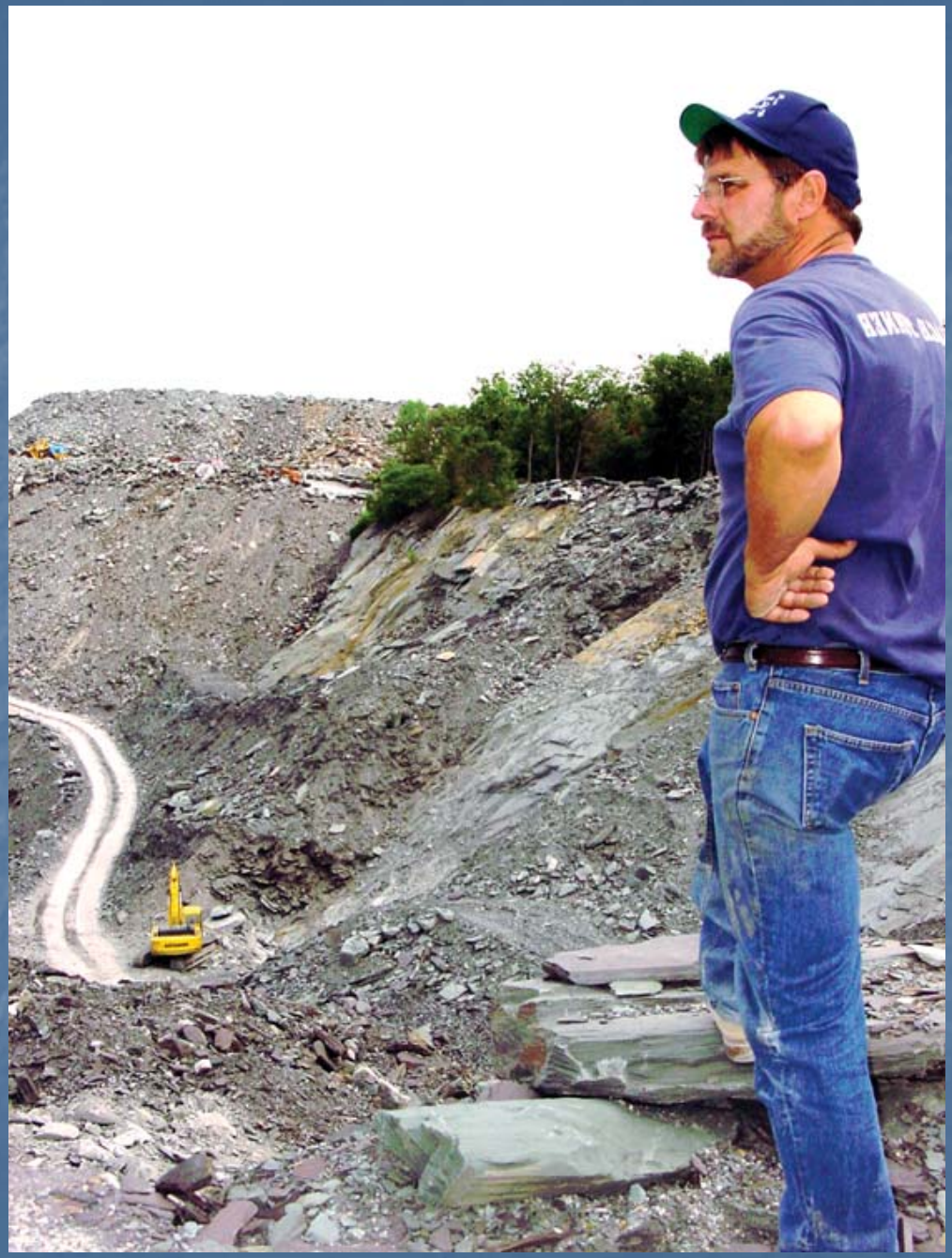
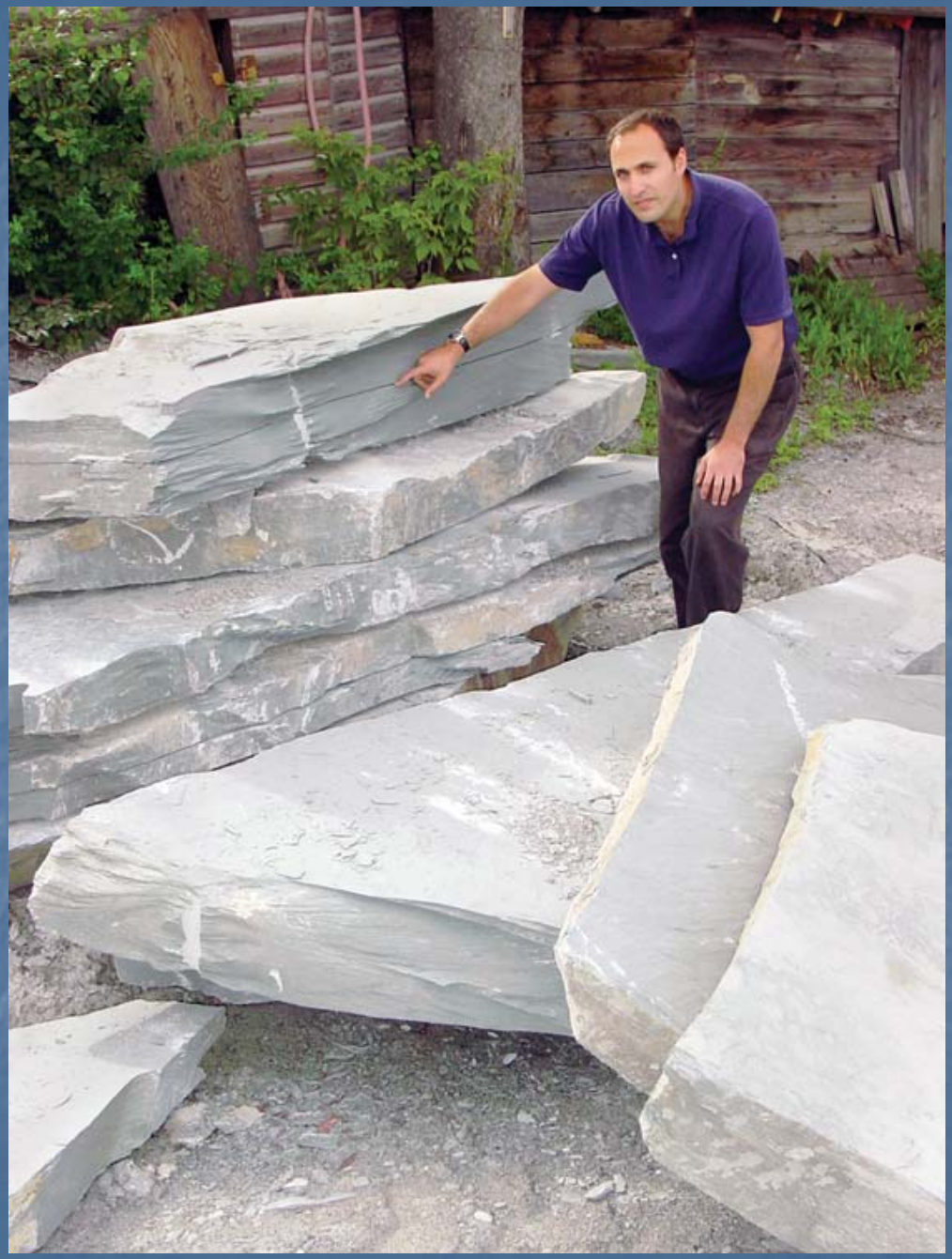
Why install a slate roof?

- Natural material - stone
- Natural Beauty – has no equal
- Fire-proof – will not burn
- Wind-resistant
- Versatile – can be installed in many ways
- Longevity – will last a century or two

Slate is stone and it comes from quarries or mines.



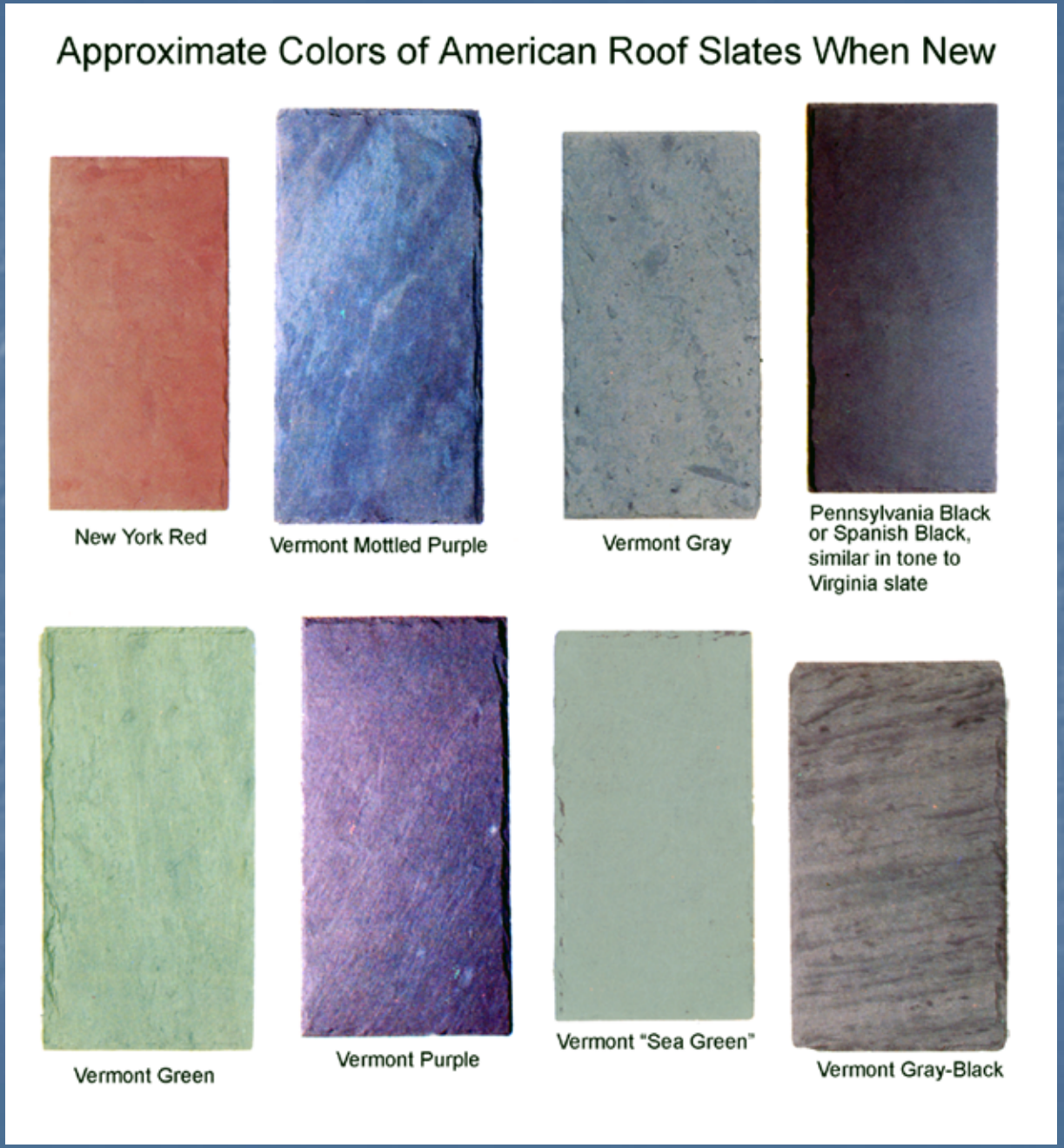
It is a stone that is easily split.



It is worked largely by hand into a roofing material.

The finished slate shingles are available in many sizes and types.

American slate is available in a range of colors.



Roof slate is produced today in the U.S. and around the world.

The beauty of slate roofs is legendary.

Slate can be installed in many ways due to several variables.

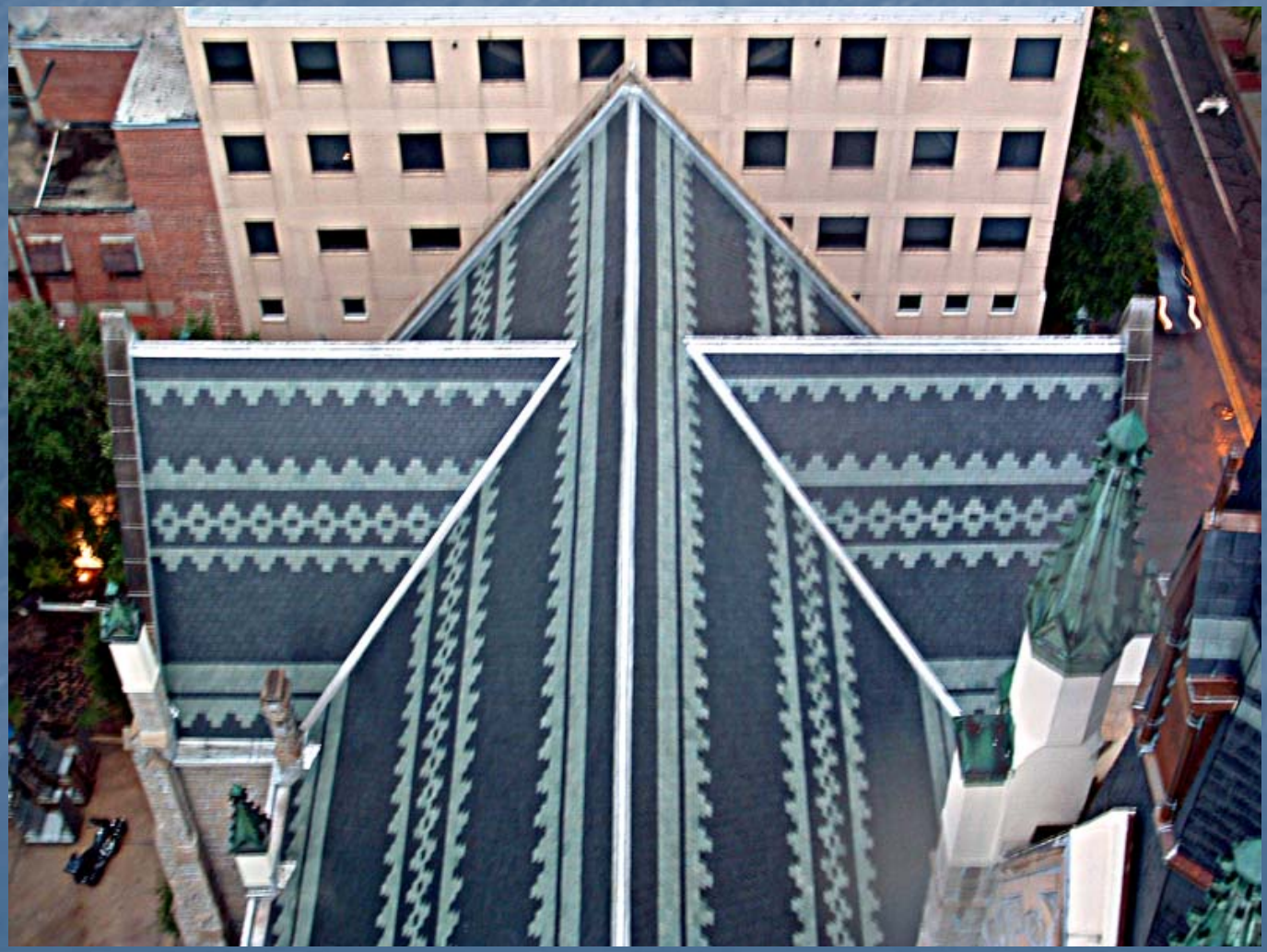
- Widths can be varied.
- Lengths can be varied.
- Thicknesses can be varied.
- Colors or types can be varied.
- Shapes can be varied.
- Recycled (weathered) slates can be used.
- All of the above can be combined on one roof.

This is the common standard pattern – all slates are the same size.

Another standard pattern, but different shapes have been used.

This has been developed into an art form by the Germans.

This is also a standard pattern, but the colors have been varied.



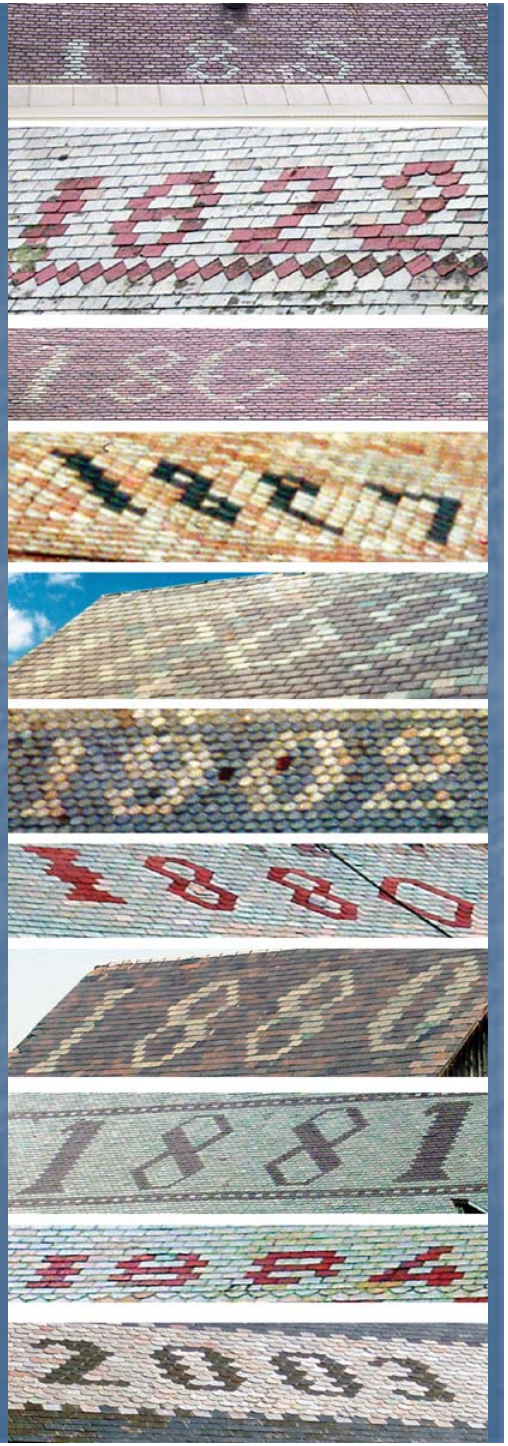
This slate roof blends thicknesses, widths, lengths, colors and shapes. It is a variation of the standard pattern.

Another variation of the standard pattern; this roof blends colors, widths and lengths with both new and recycled slates.

Graduated slate roofs typically have varied lengths, widths and thicknesses of the slate.

Traditional German slating utilizes an entirely different installation style.

The longevity of a properly installed slate roof is phenomenal. A century or two can be expected, depending on the type of slate. We have been installing slate roofs in the U.S. for over 150 years with a great degree of success.



This roof was installed in September, 1887. It was 115 years old when restoration work was done.

No one knows how much longer this Vermont “sea green” slate roof will last.

This Scottish slate roof was installed in 1785 and still has the original slate on the original 1” board roof decking.

- This roof was 215 years old when photographed.
- Roofs of this nature can be replicated today.
- Correct materials and installation methods must be utilized.
- Roof decking materials are critically important.
- Underlayments are not.
- Long-term maintenance needs must be factored into the roof design.

Roof Decking

- Must provide a suitable, proven, long-term nailing surface for slate.
- Must have a proven longevity of at least a century, preferably two.
- Should allow for air transpiration (be able to breathe).
- Traditional, proven decking materials include 1” boards, ¾” boards, or 1.5” boards.
- For best results, avoid laminated woods and other glued decking materials.

For example, this bank roof decking was specified by the architect to be 5/8” plywood, which is unsuitable for slate. We changed it to ¾” yellow pine, an excellent material for slate roofs.

Radical departures from traditional methodologies are unproven, unnecessary, and not recommended.

The original 1” board roof deck was still solid and could have been used for reslating.

Instead, the original deck was covered with 5/8” plywood, then peel and stick, then 30 lb felt. This deck cannot breathe. The long-term performance of this deck is unknown.

- The excessive use of underlayments hinders long-term maintenance.

The slate roof on this $25 million house was installed on plywood.

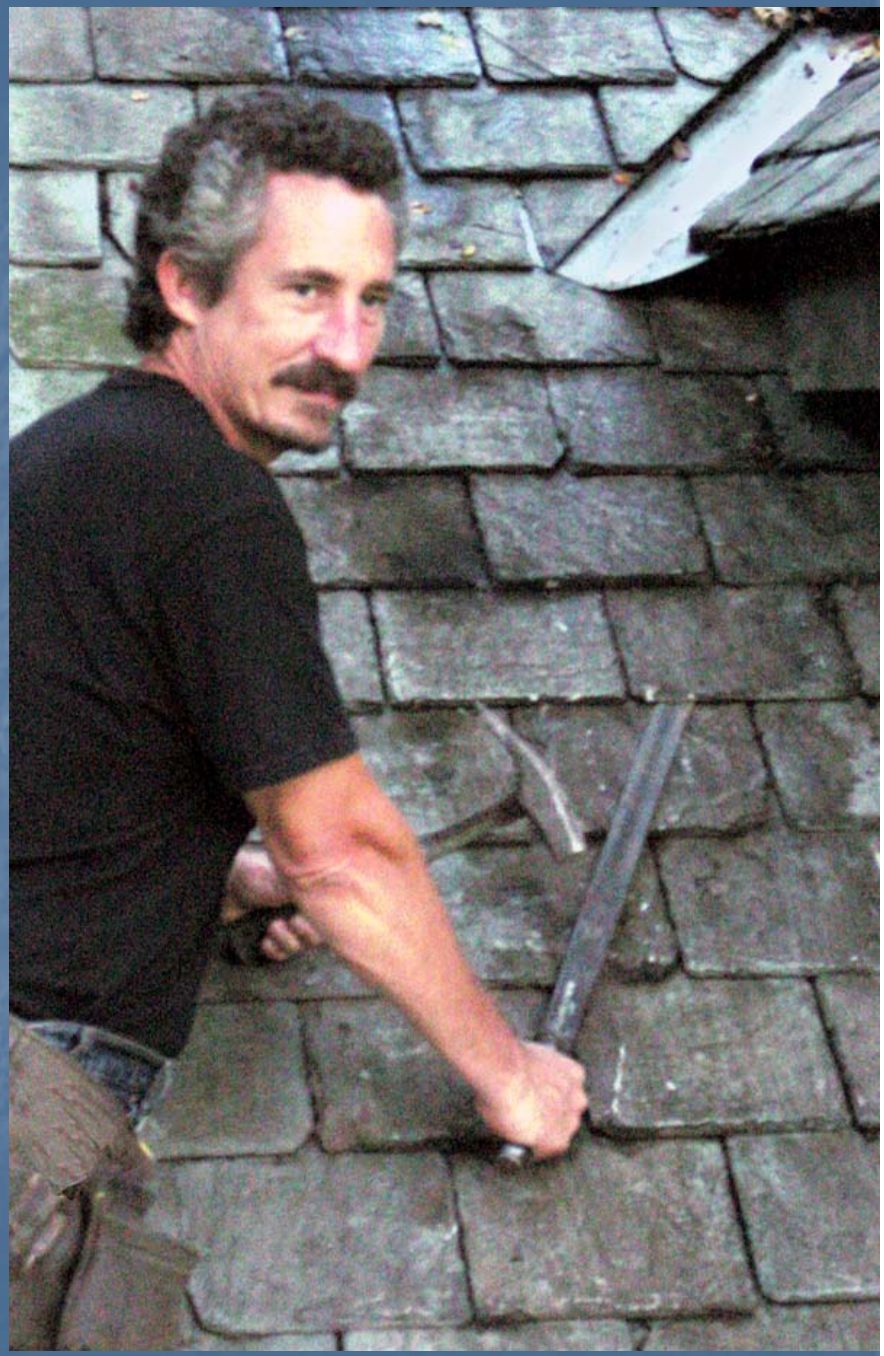
The plywood was covered with a hot mop underlayment, then 30 lb. felt before slating. Again, a radical deviation from traditional, tried and proven methods.

Underlayments

- The purpose of underlayment is to keep water out of the building until the roof is installed.
- Underlayments provide no long-term waterproofing benefits for slate roofs.
- Excessive underlayments inhibit long-term maintenance of slate roofs.
- Slate roofs do not need any underlayment at all to function properly for their entire long lifetime.

Most of these existing slate roofs were installed with no underlayment whatsoever.

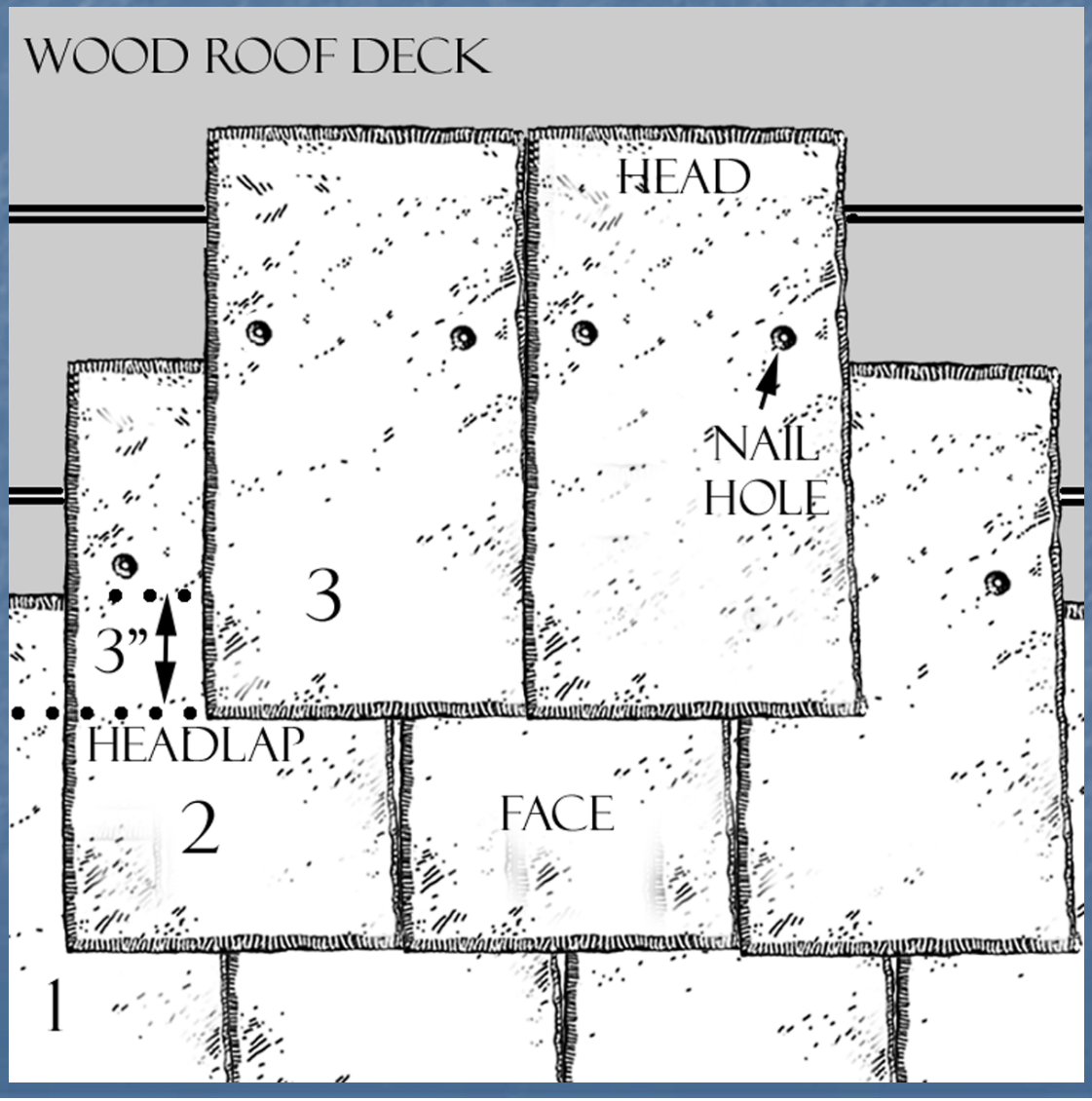
The long term maintenance of a slate roof requires free access underneath the slates by a slate ripper, the tool most often used by the slate roof restoration professional. Unnecessary underlayments severely inhibit the use of this tool.



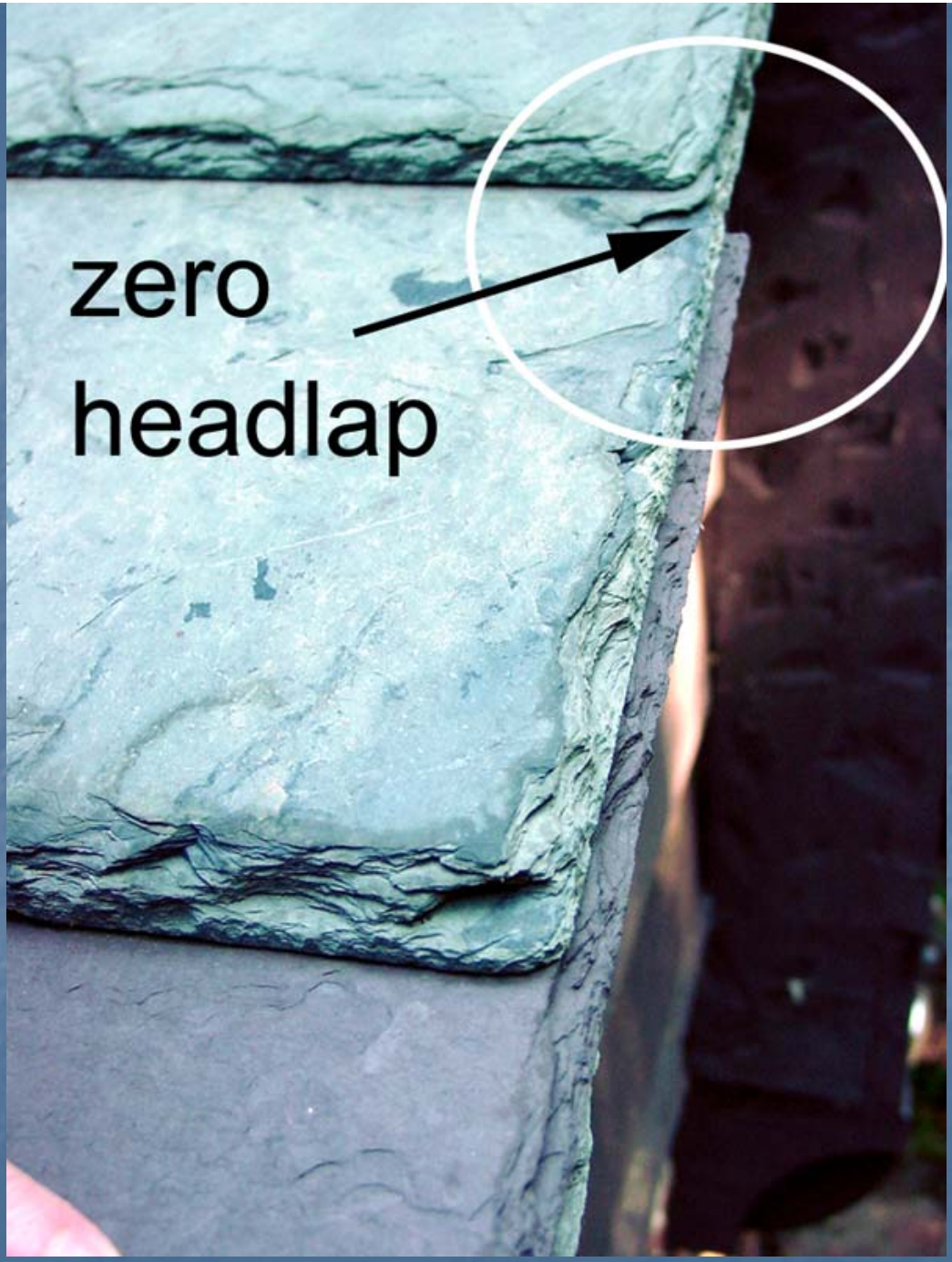
Headlap

- Headlap is the overlap each slate course has on the slates two courses below.
- Typical headlap is 3”, but varies.
- Understanding headlap is critical to installing any type of overlapping shingle roofing.
- Slate roofs with improper headlap can be disastrous.

Proper headlap is what keeps the water out.

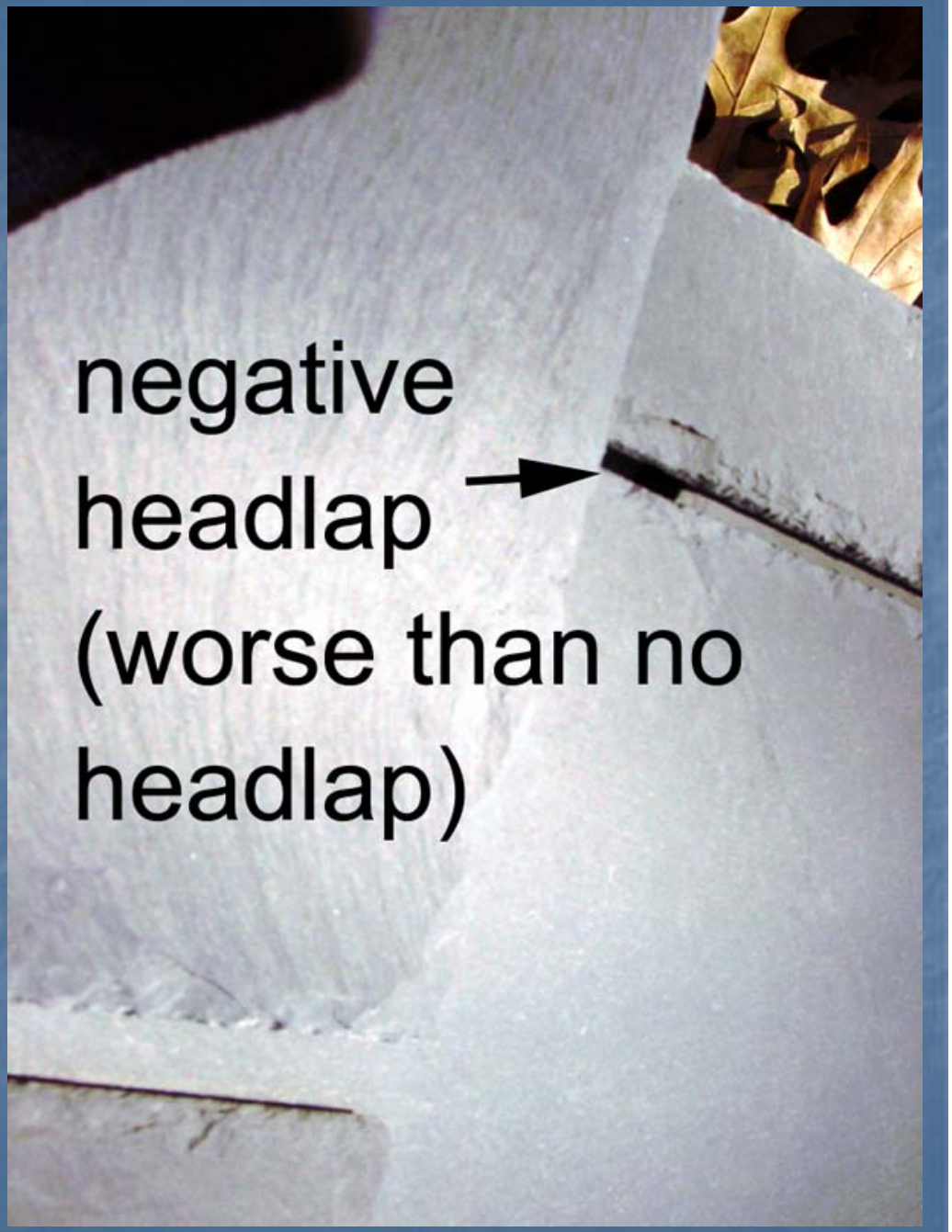


This $450,000 slate roof was installed with no headlap.

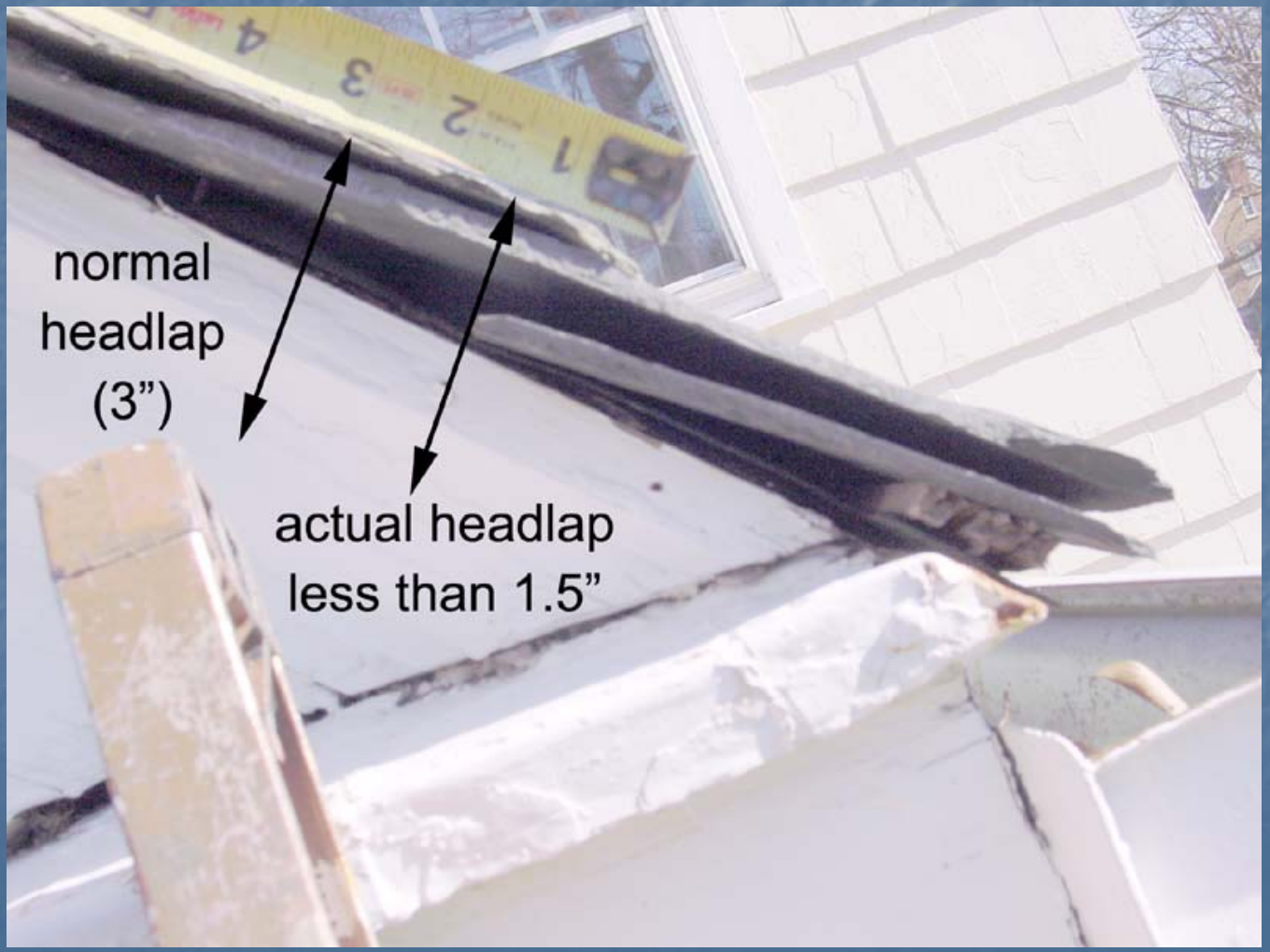


This very expensive college dormitory slate roof was installed without correct headlap.

The same dormitory showed areas of negative headlap (i.e. direct water entry).



Insufficient headlap on the starter course is a common problem.



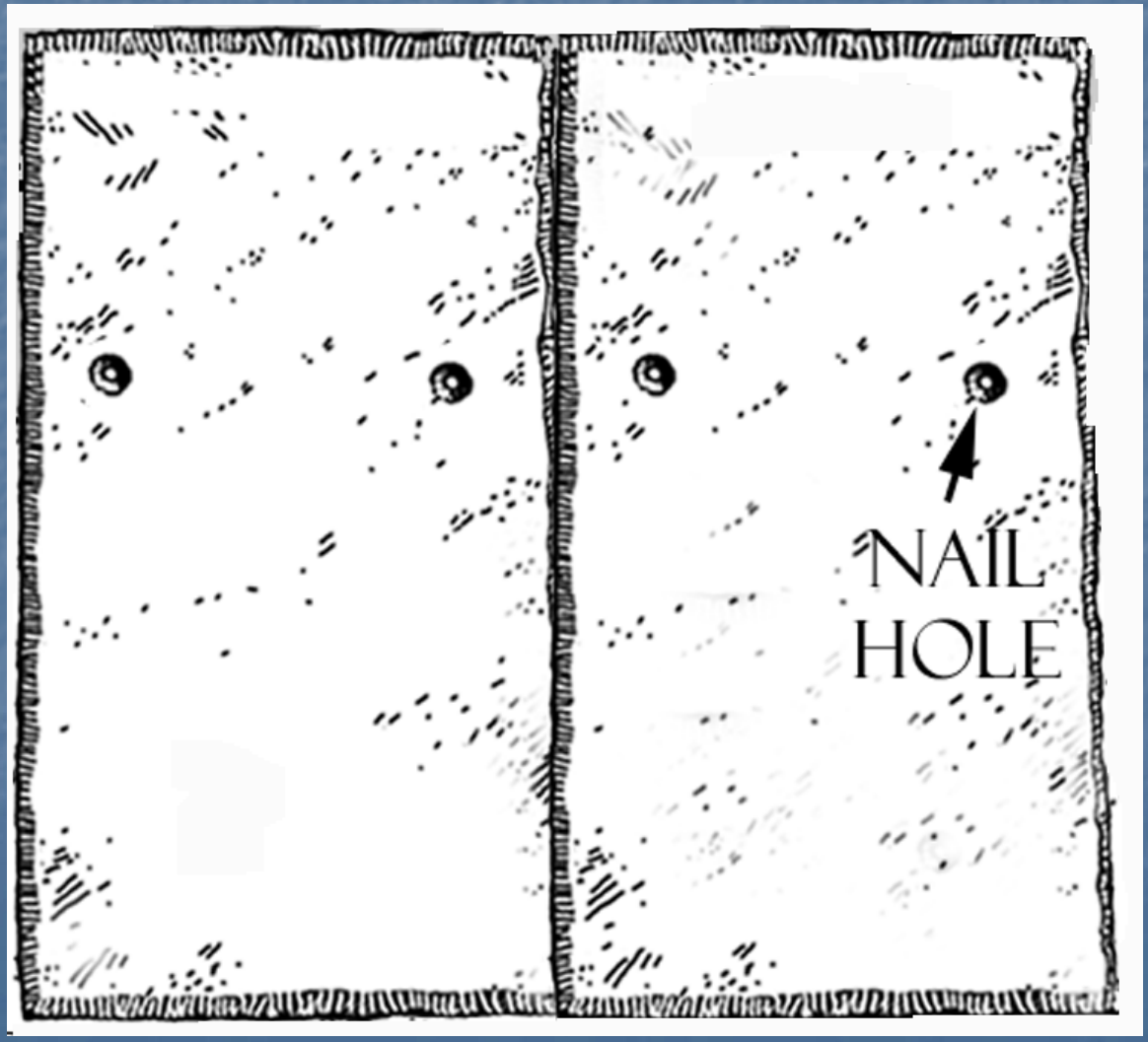
Headlap can be increased at the eaves to prevent ice-dam problems. Do not rely on underlayment to prevent ice-dam water infiltration.

This roof was installed on 1” rough-sawn lumber over 30 lb. felt, with unfading-gray slate and copper nails. We expect it to last 150 years.

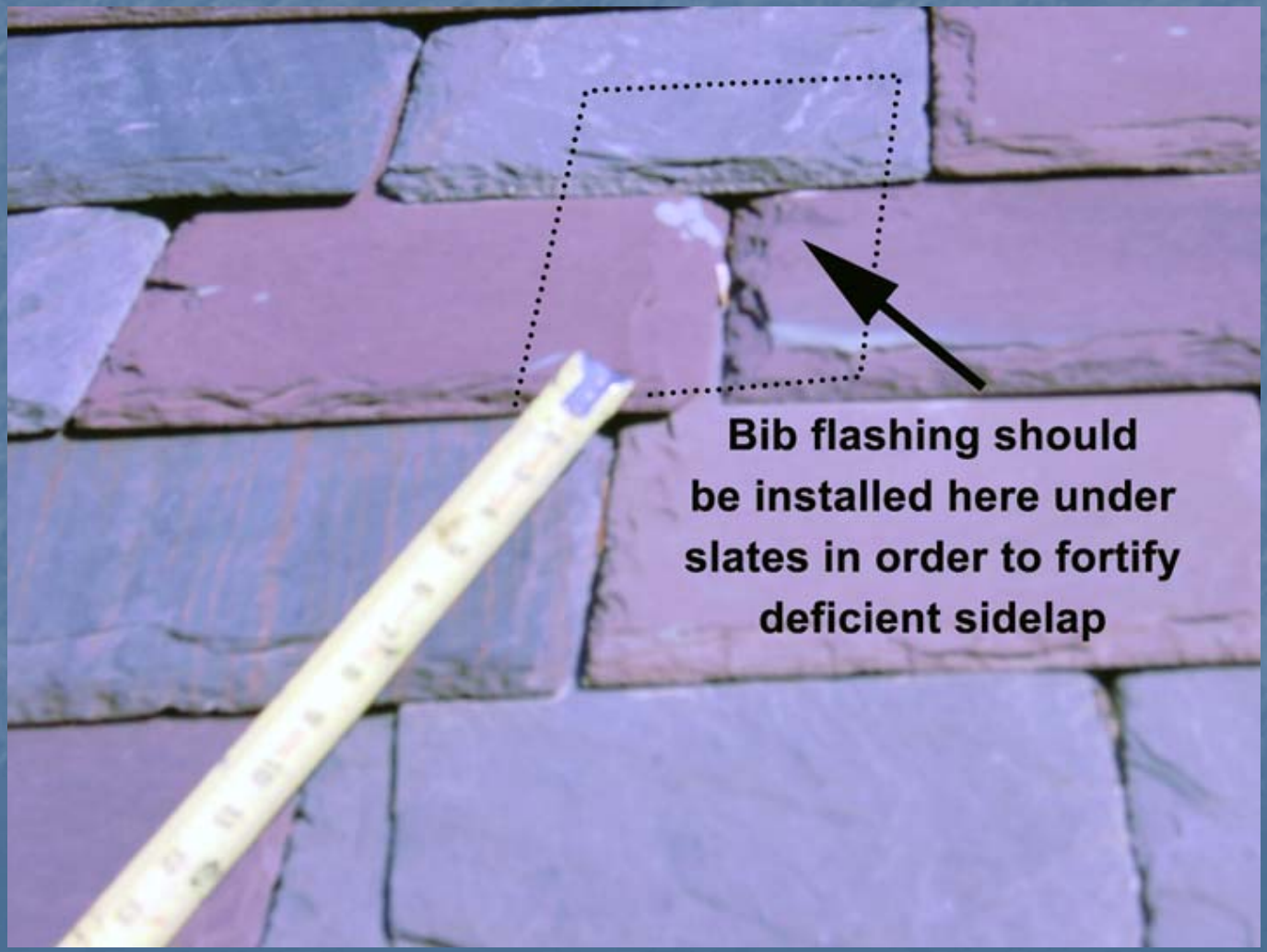
Sidelaps

- The lateral spacing of slate butt-joints should be approximately 3” minimum to keep the joints away from the nails.
- Slates must be manufactured correctly with correct nail hole placement.
- Nail holes should be 1.25” to 1.5” from the outer edge of the slate.

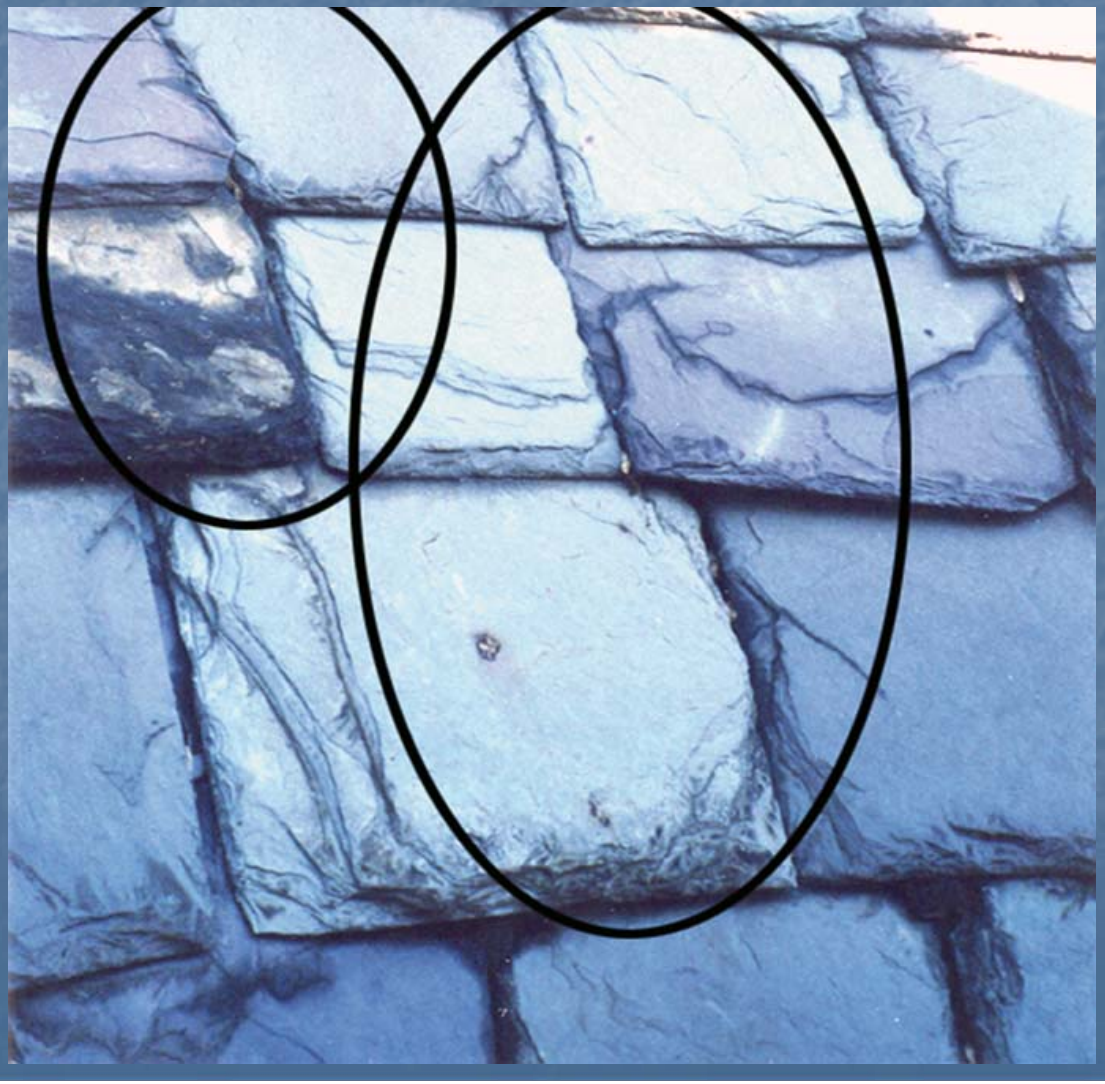
Remember where the nail holes are located.



If the butt-joint is too close to the edge of the underlying slate, it will allow water into the nail.



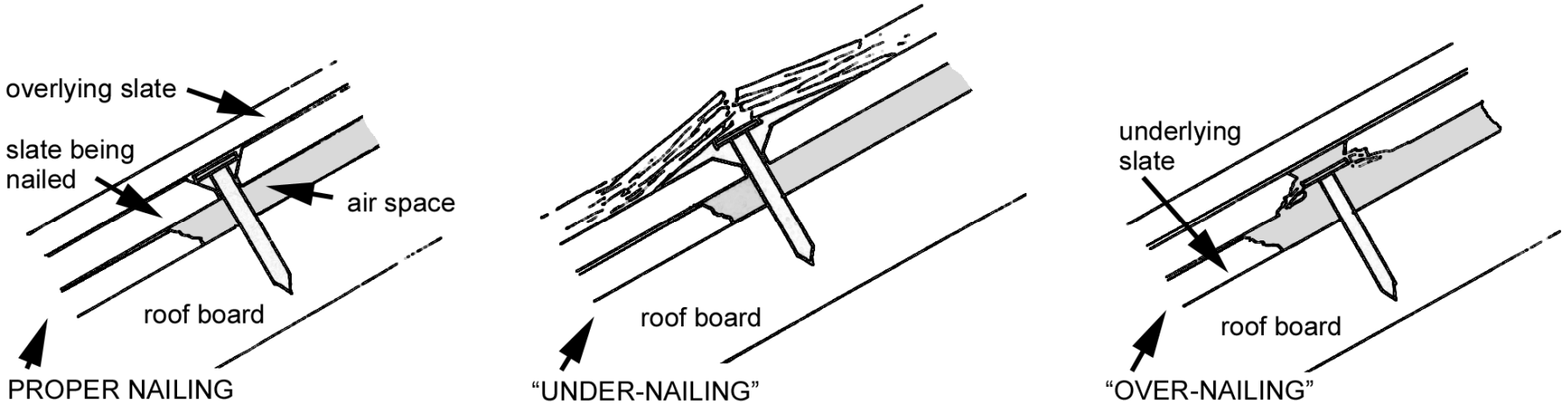
This lack of sidelaps is inexcusable.



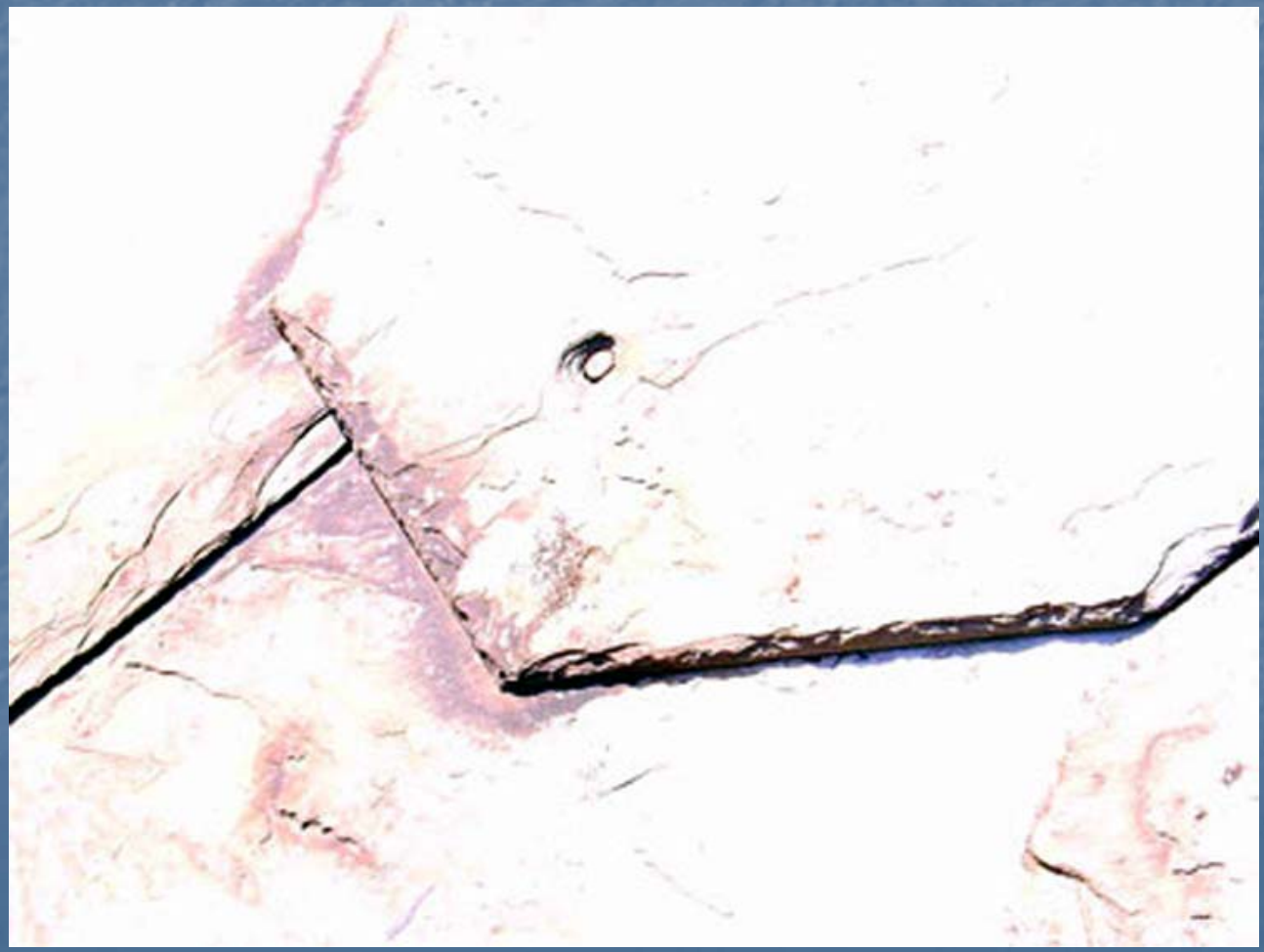
Another example of bad workmanship.

These slates were installed on a historic building with incorrect side-laps.

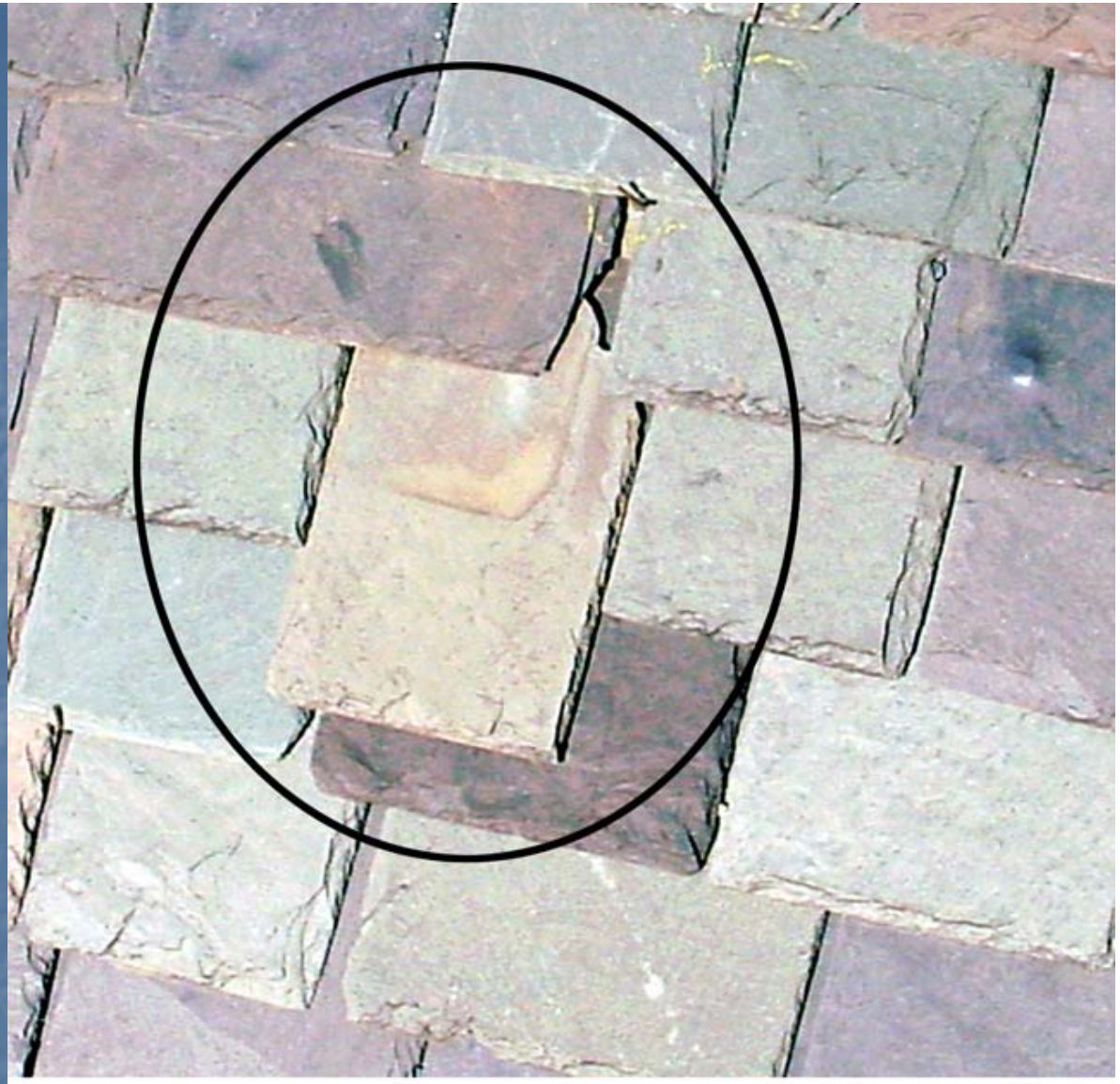
Nailing Slate:
The nails should not be over-driven or under-driven.



Under-nailing:
The nail head will work a hole in the overlying slate over time.



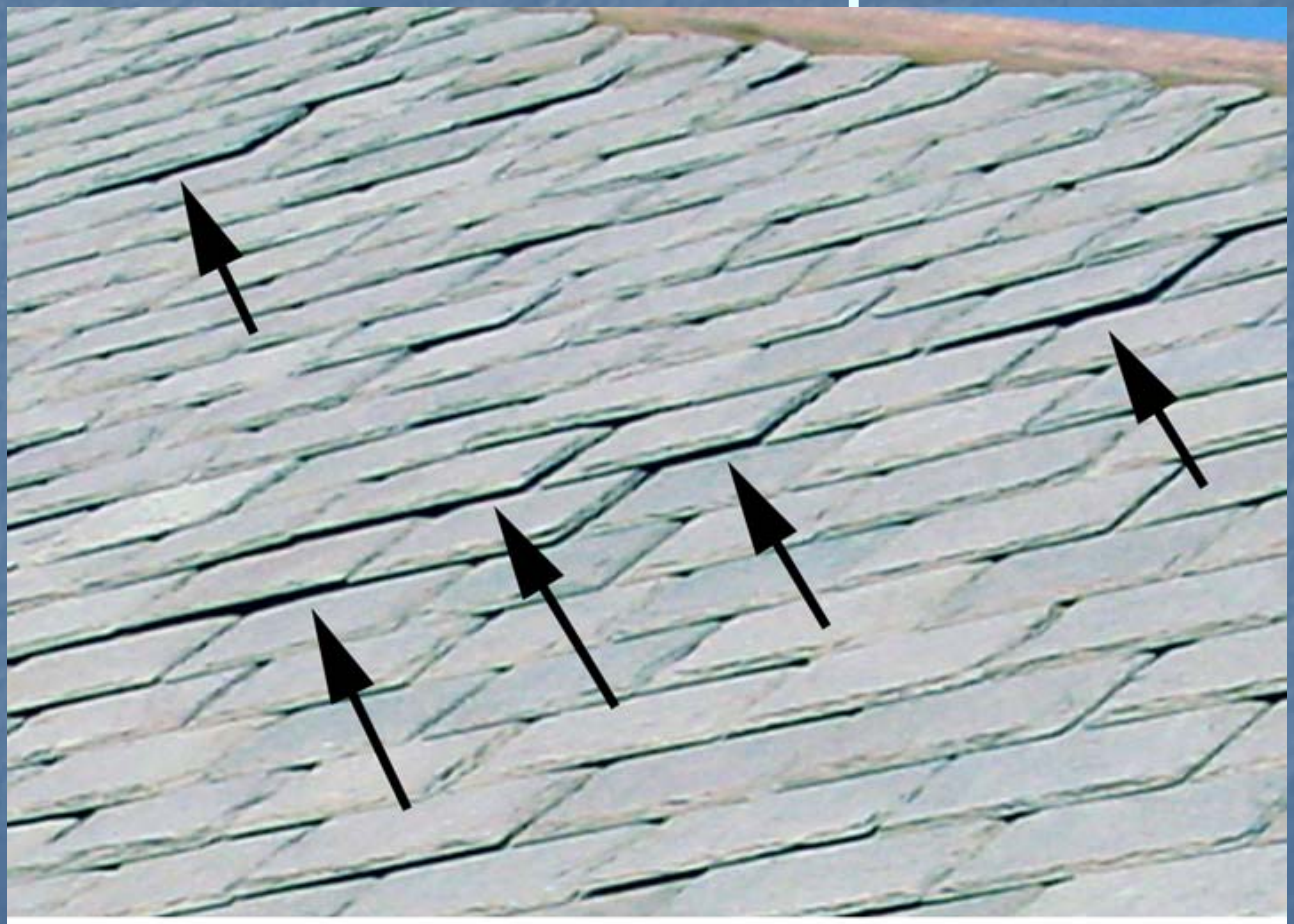
Over-nailing will result in slates sliding off the roof.



Slipping slate probably caused by "overnailing" during installation. Note broken-out nail hole.

Another example of over-nailing.

The bottom of the slate should be held down when the slate is nailed, not the top.



Slates on east-facing main roof slope are not lying flatly on the roof deck, probably due to overnailing.

The slating nails should not be too long. Nail length should be twice the thickness of the slate plus 1”.

Board decking also suffers from nails that are too long.

A properly nailed roof deck made with correct materials.

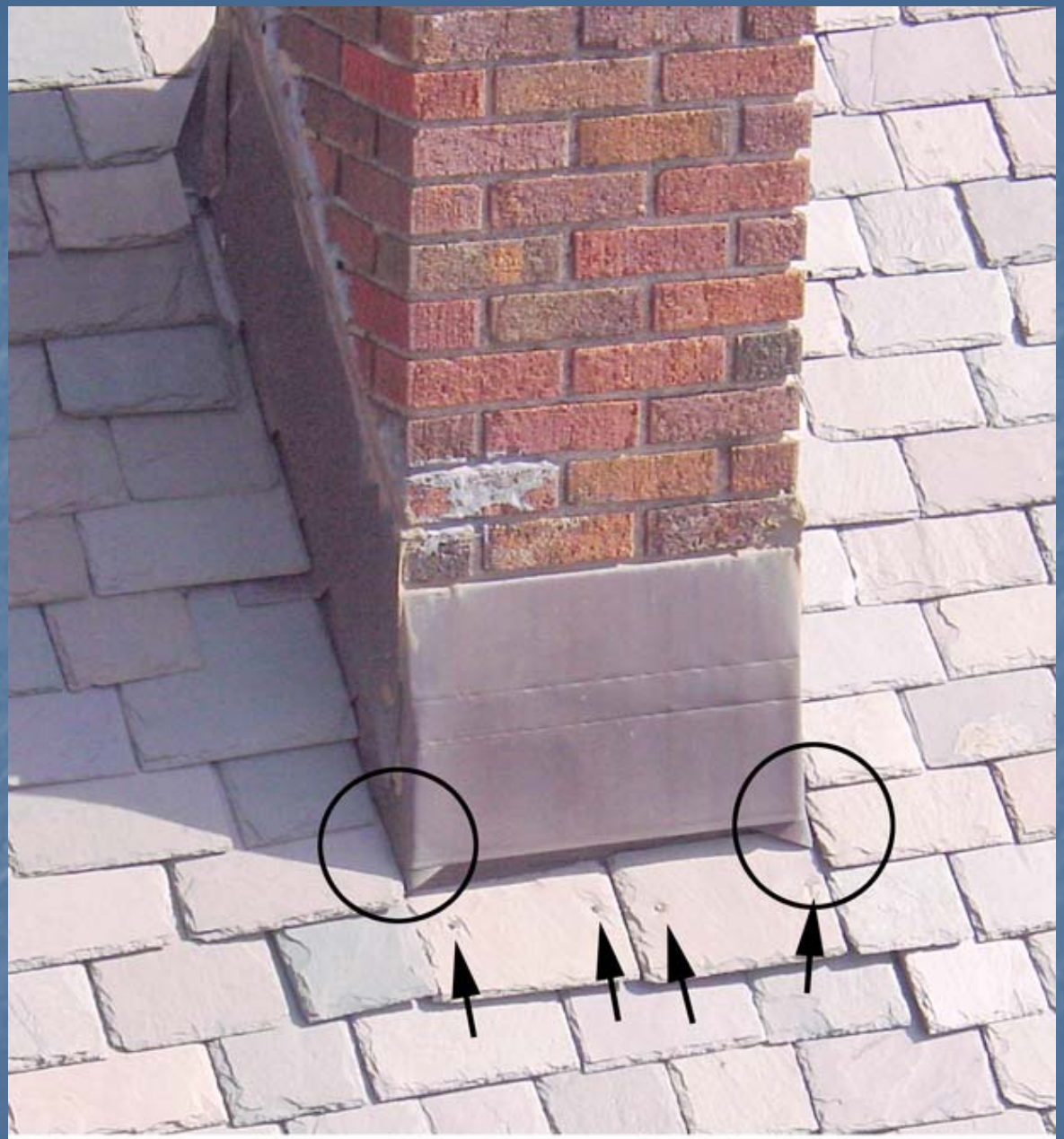
Another properly nailed roof deck. There is no nail penetration.

Common Flashing Mistakes

- Negative overlapping
- Lack of expansion joints on built-in gutters
- Failure to either fold or solder corner joints
- Wrong rivets or fasteners
- Soldering with open flame torches

Negative overlapping means the flashing is overlapped incorrectly.

Lower flashings should always be underneath upper flashings.

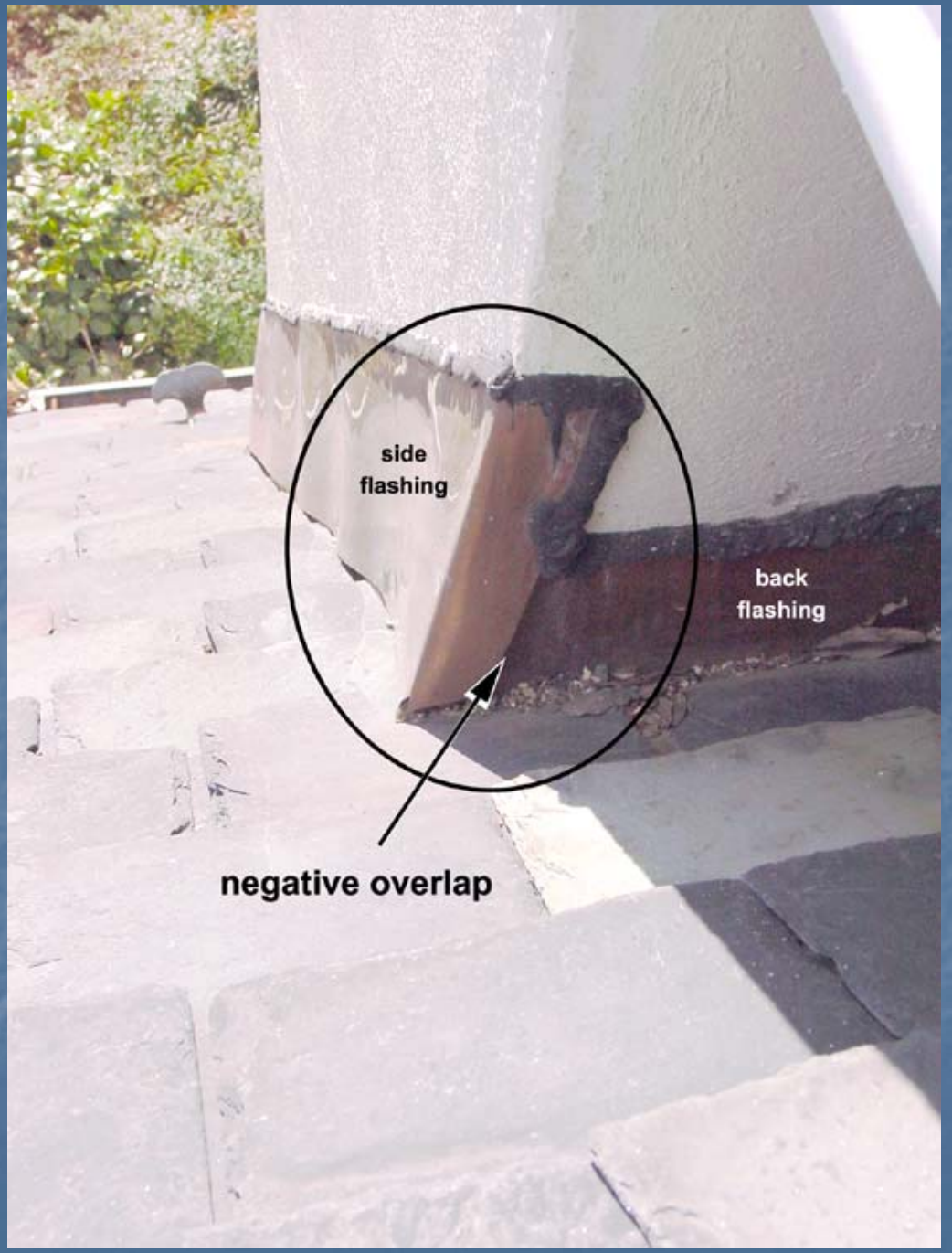


Reverse overlap on chimney corner flashing (circled).
Exposed, uncaulked nail heads (arrows).

Another example of negative overlap.

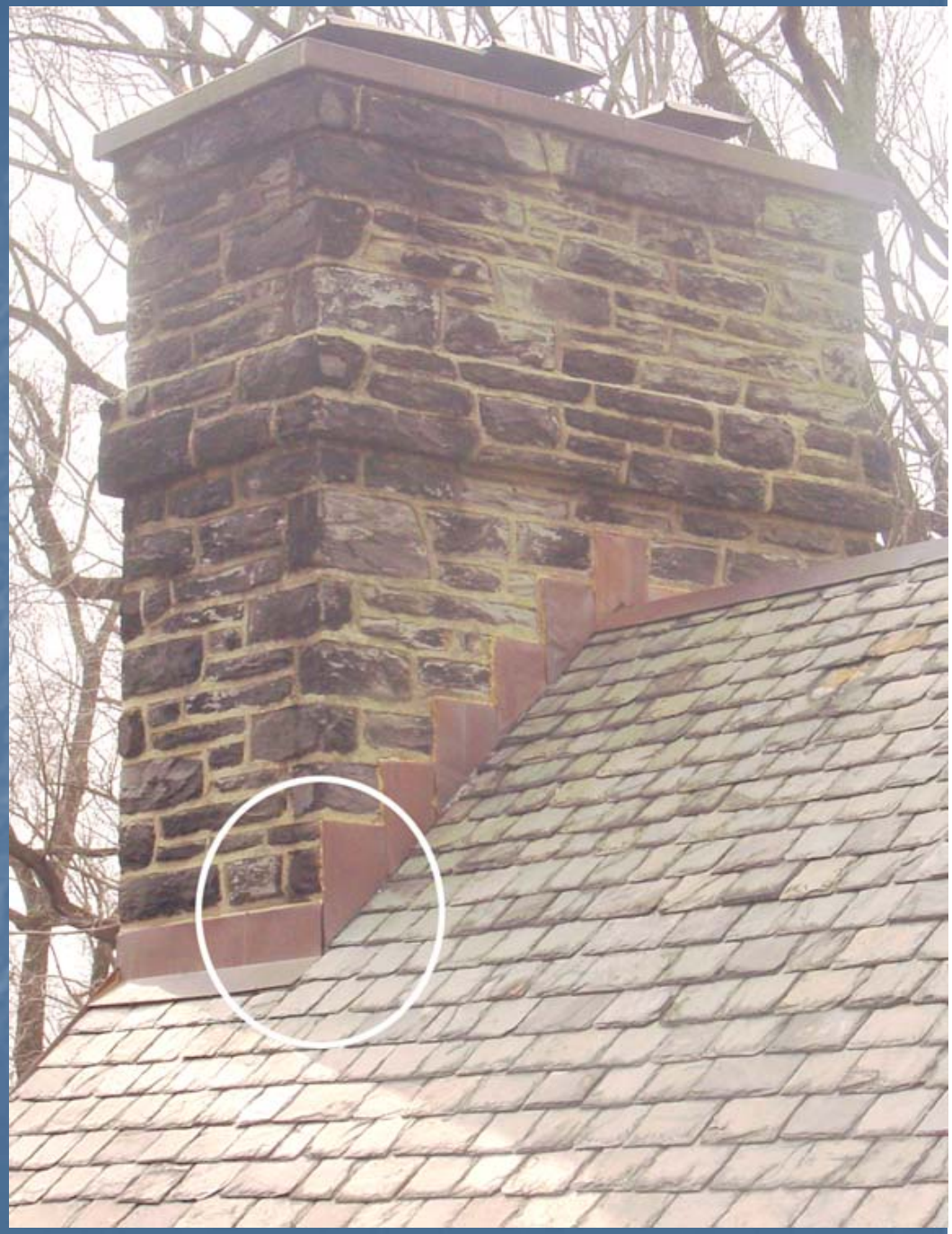
reverse overlapping on chimney flashing
(very poor workmanship)

Yet another example of negative overlap.



Corner joints must be either properly folded or soldered to prevent leakage.

Corner flashings that aren't either folded or soldered are almost certain to leak.

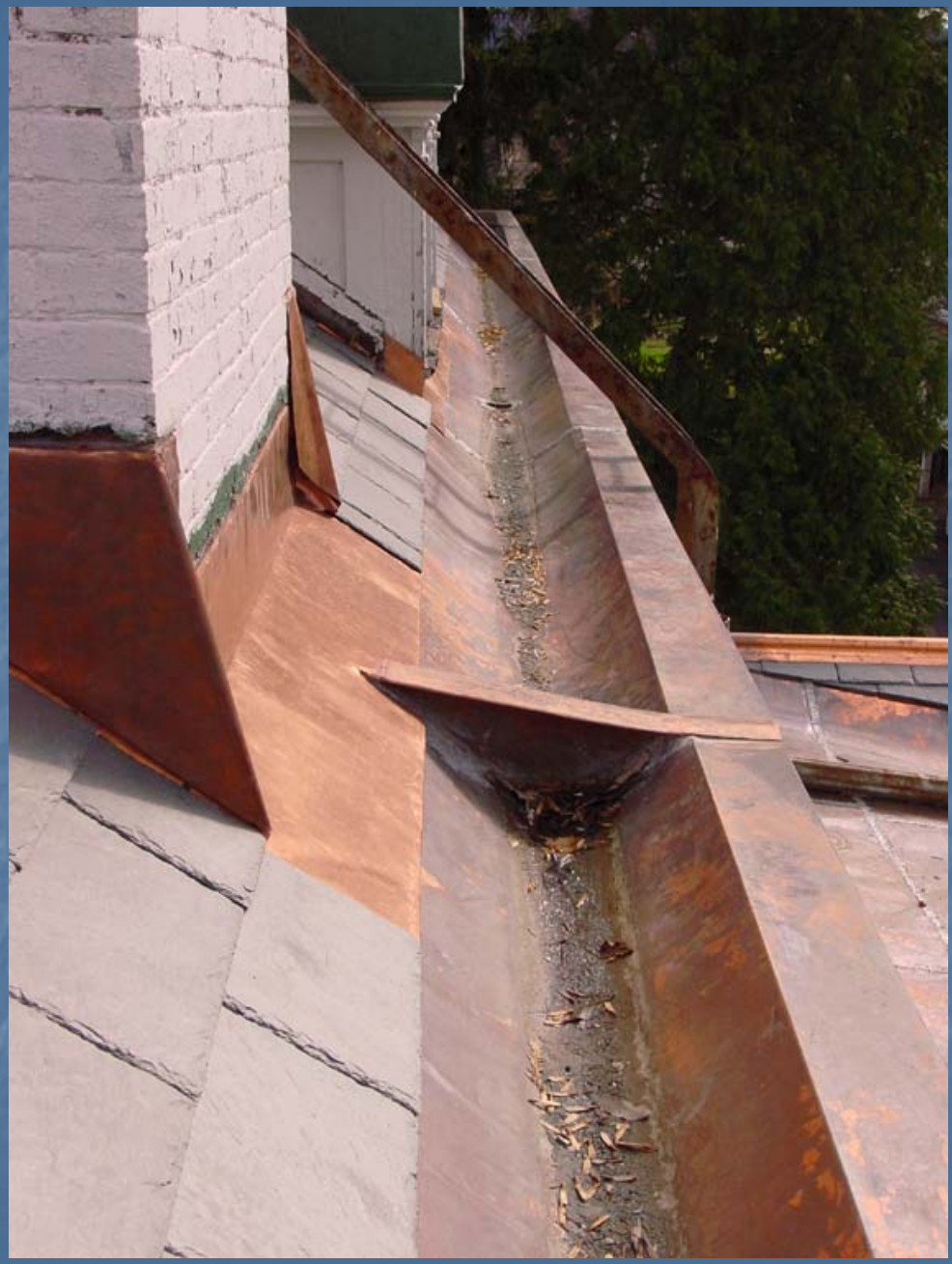


Lack of expansion joints in built-in gutters cause the solder joints to fail prematurely. Follow SMACNA guidelines.

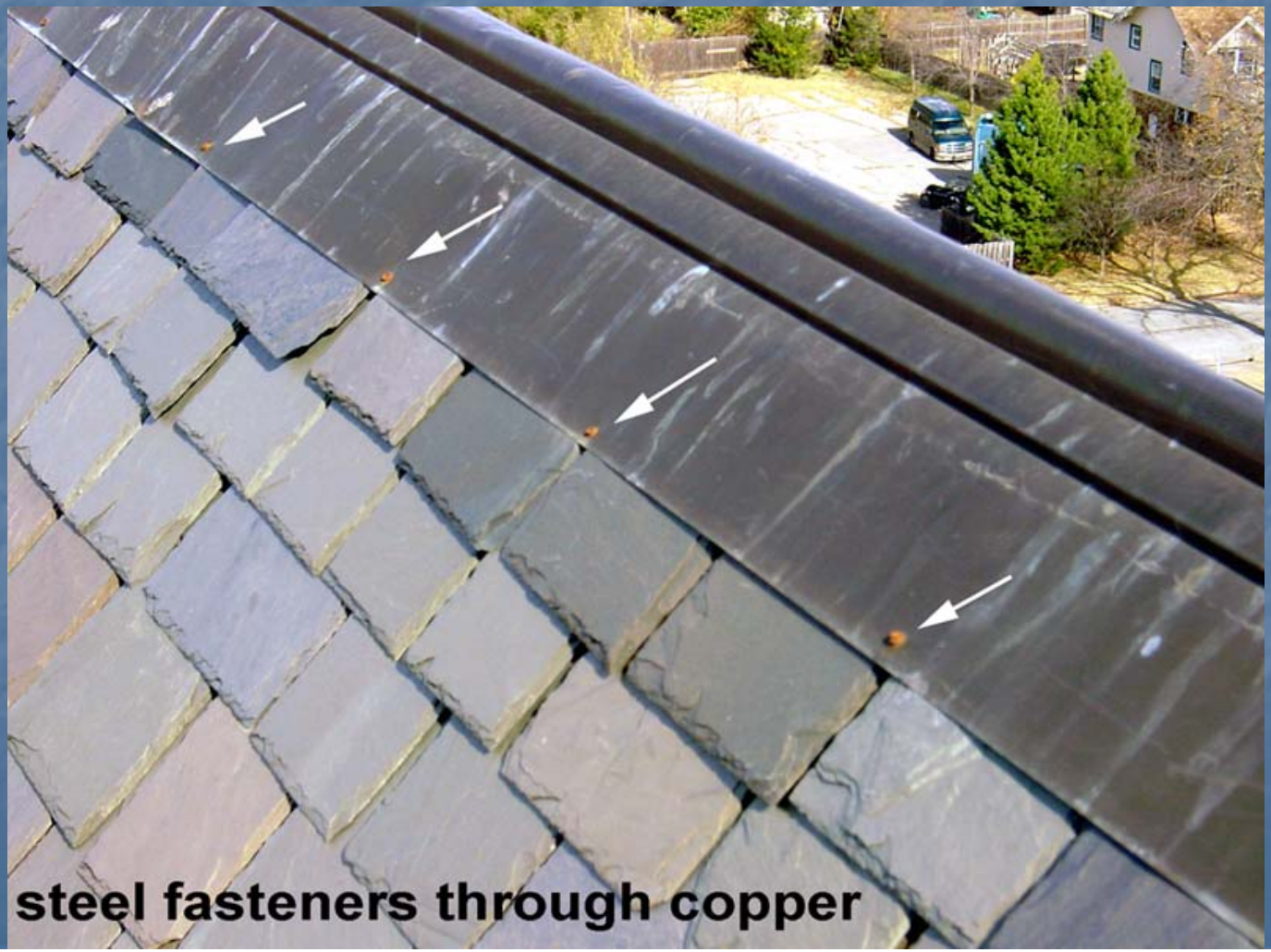
Expansion joint under construction.

Expansion joint completed.

Expansion joint at chimney apron.

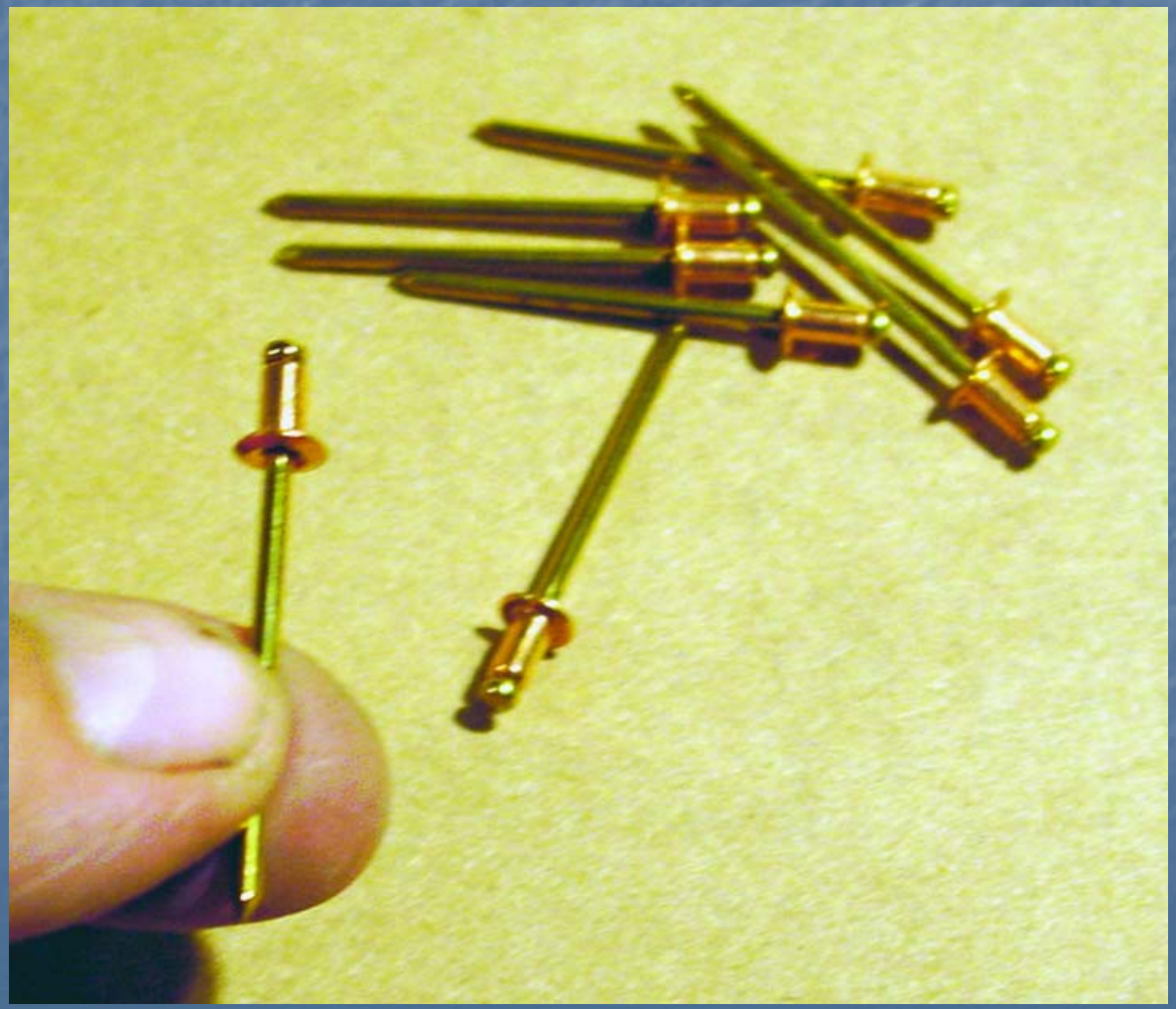


Incompatible metal fasteners: steel screws with copper flashing.



Steel screws through copper

Most copper rivets have copper-plated steel shanks and should be avoided. Only use copper rivets with brass shanks.



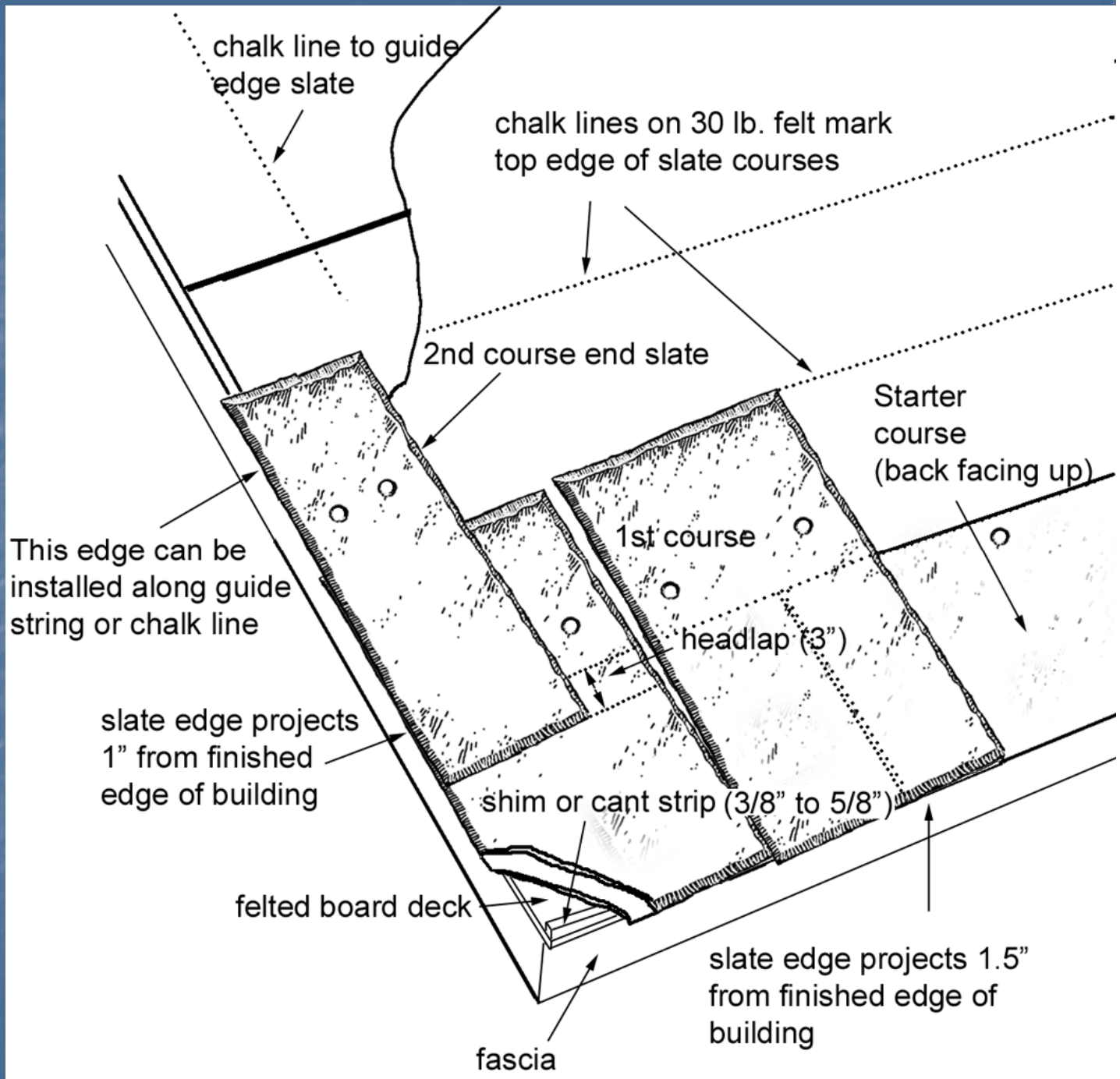
Open flame torches used on roof flashings are a quick way to start a building on fire. Use closed-flame soldering devices.

More Areas of Concern

- cant strips
- gutters
- snowguards

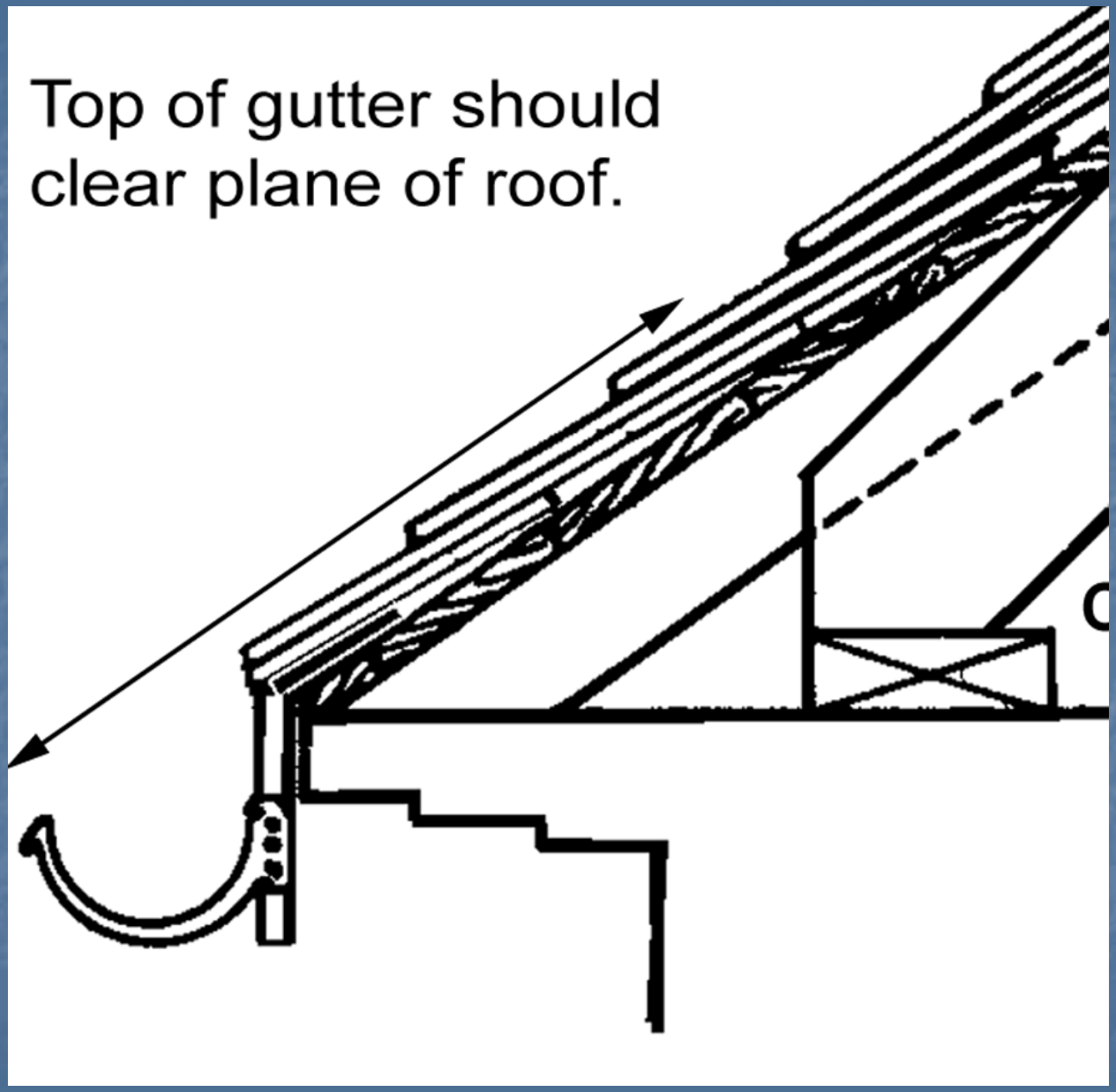
Lack of cant strip.

The cant strip raises the bottom edge of the starter slate to the correct angle.



Wooden cant strips work well. Starter slate should be back side out. Metal drip edges are not needed on slate roofs.

Gutters hung too tight against roof will be damaged by sliding ice and snow.


Top of gutter should
clear plane of roof.

Snowguards must be installed in adequate numbers.

Inadequate snowguards will not hold the snow and will pull out.

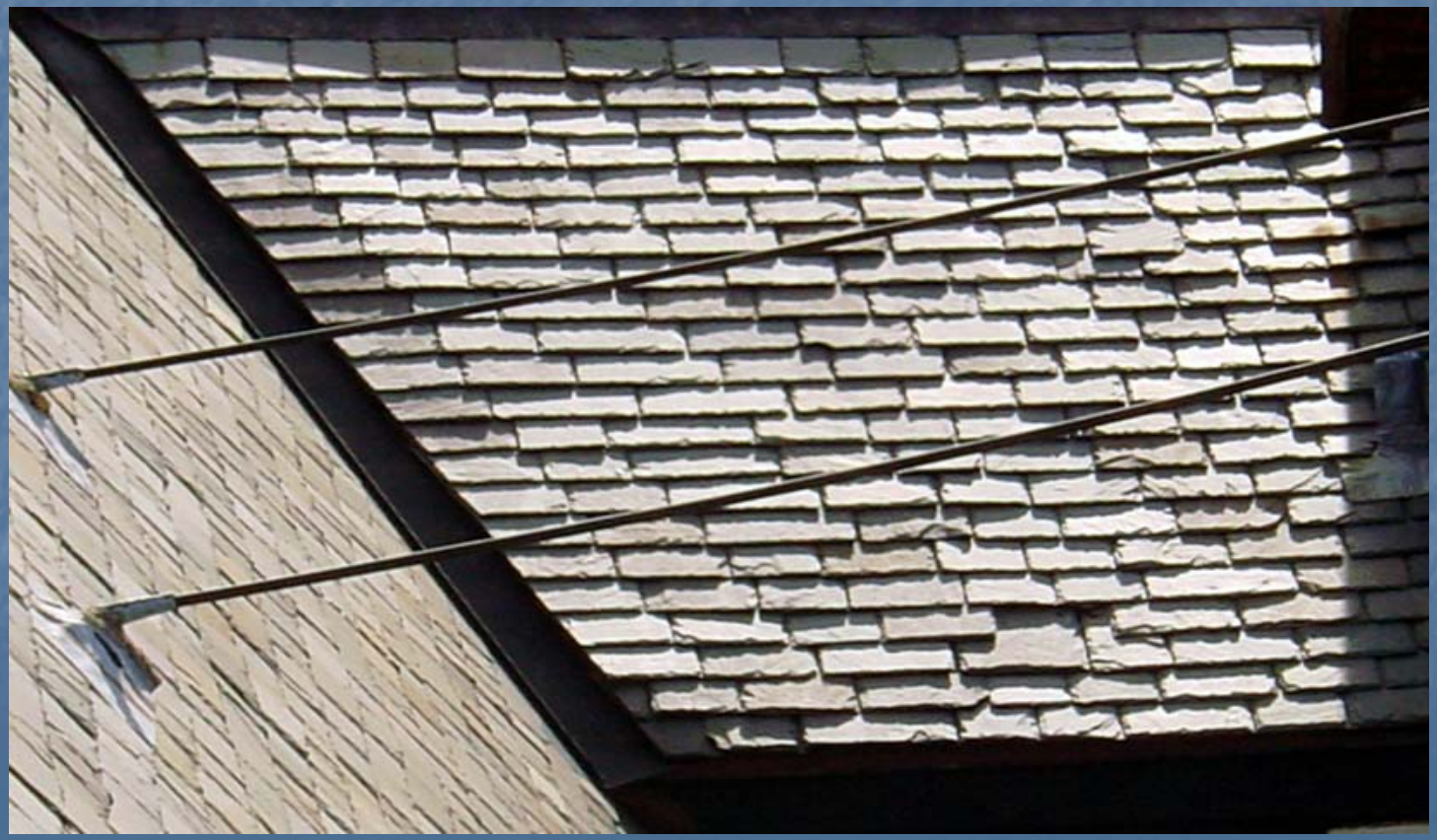
Choose the Correct Slates

- Know the origin of the slate.
- Make sure they're manufactured correctly.
- Use the correct size.
- Get a quality guarantee.
- Include detailed slate specifications in the contract documents (type, size, origin, thickness, etc.).

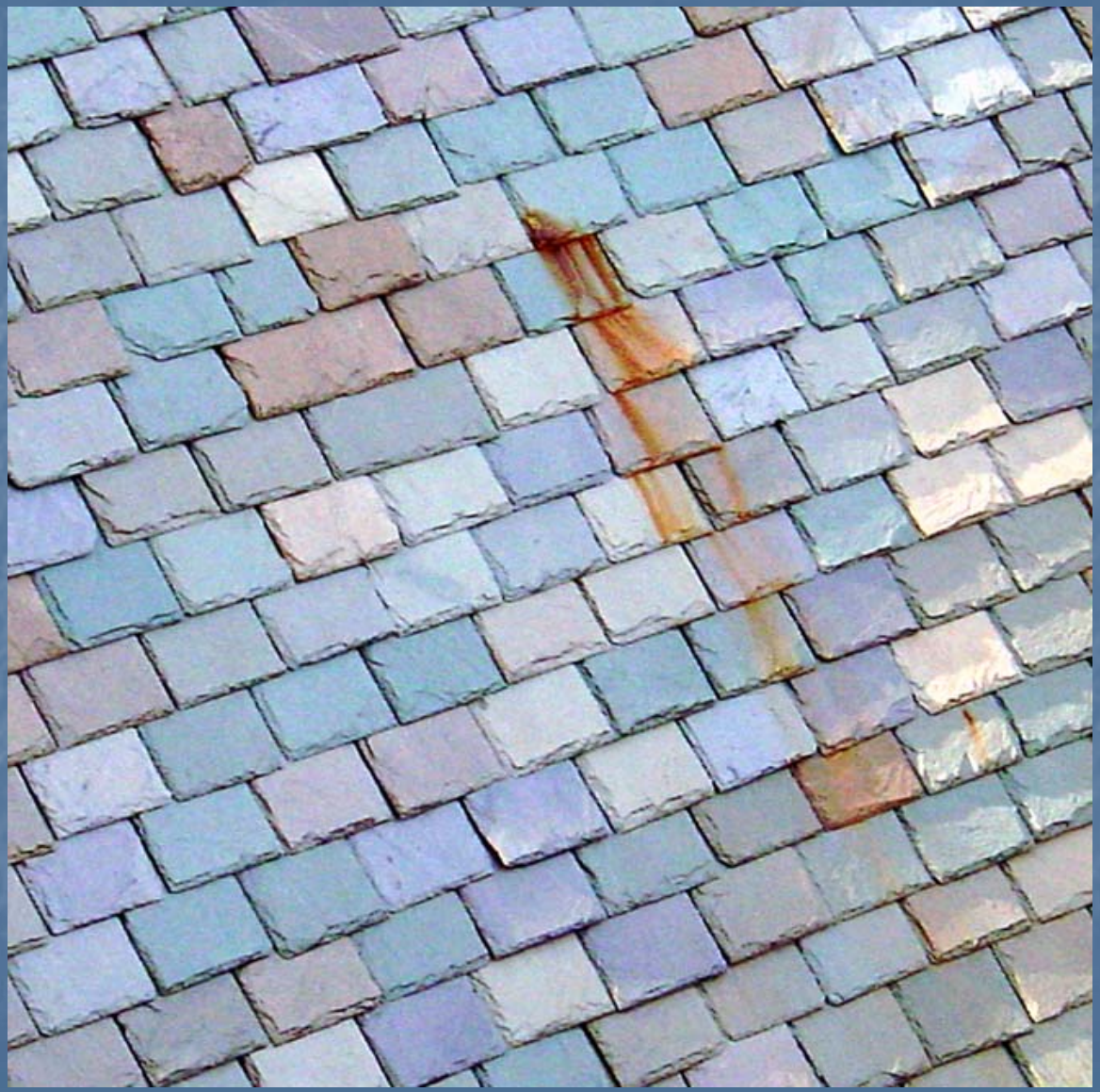
Mixed origins can create a nightmare.

The mid-length slates on this graduated roof were too thick. The slates were not checked by the contractor prior to installation.

These 12” long slates were too small for the 200 square roof. There were about 356 slates per square. A larger slate would have only required about 120 per square.



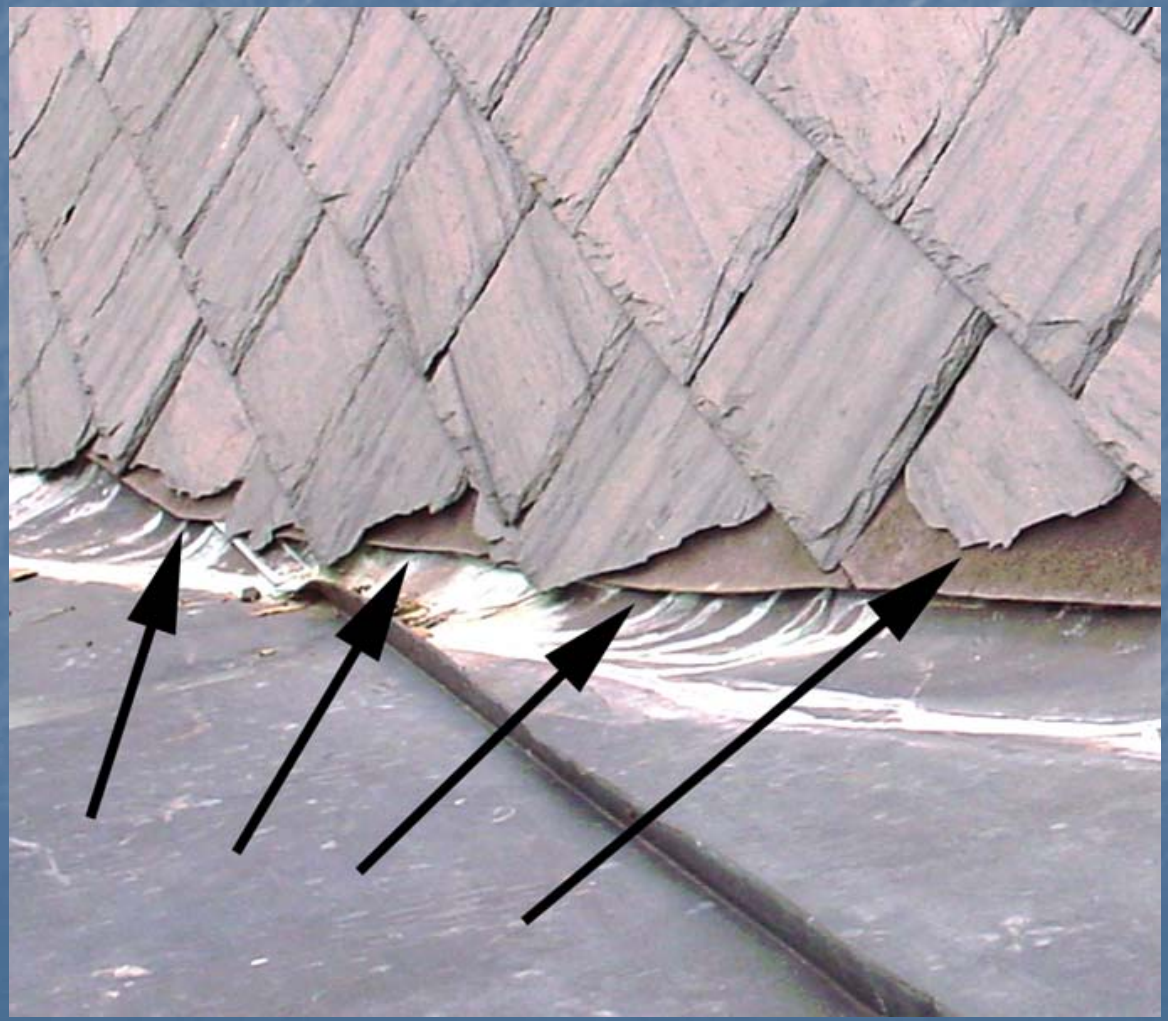
These faulty slates had iron inclusions that defaced the roof.



Use the Proper Tools

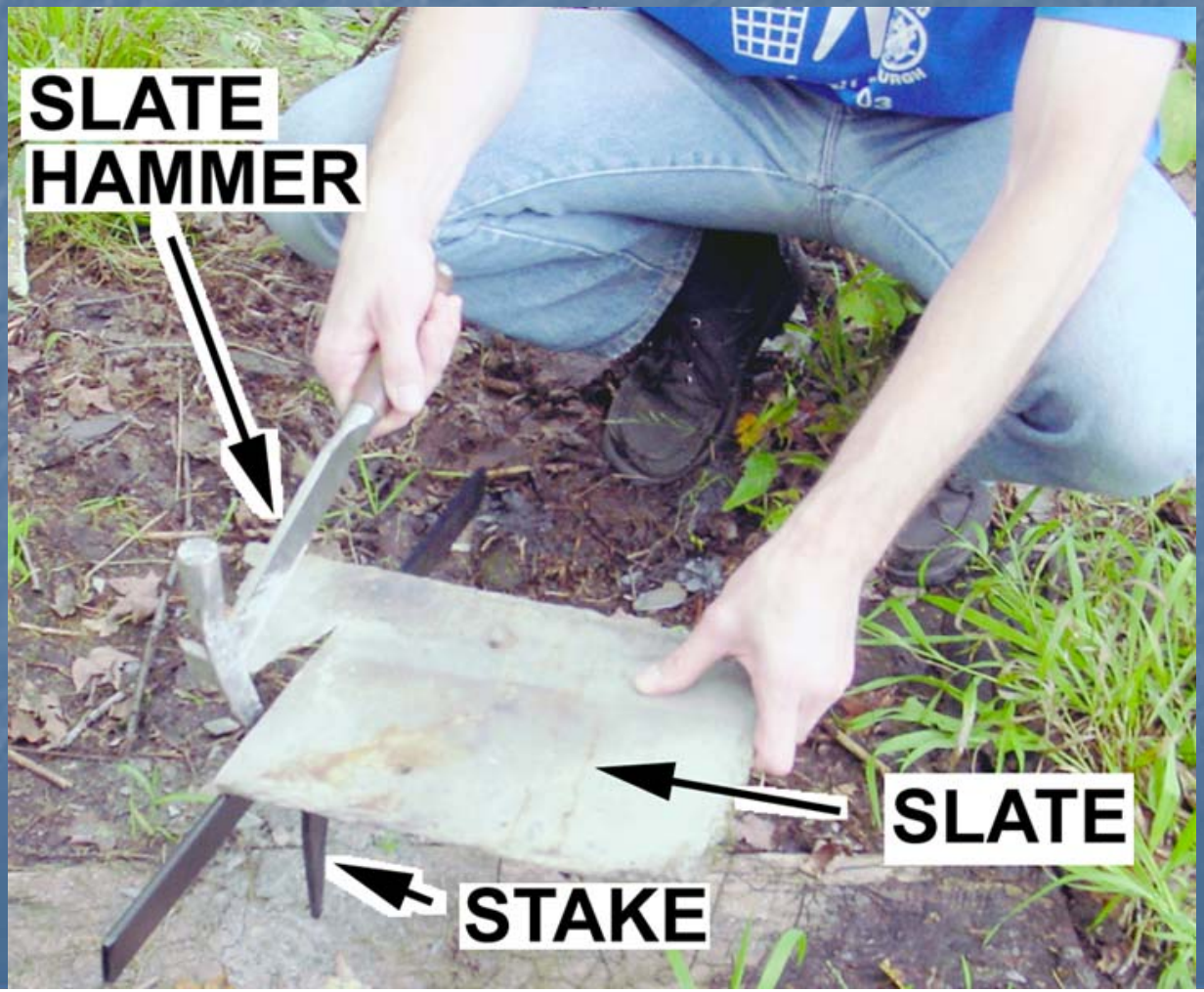
- Cut slates with either a slate cutter or stake.
- Punch slates with a slate hammer or cutter.
- Remove slates with a slate ripper.

Roof slates should be cut with slate cutters or stakes.



Slate cutters are readily available via the internet.

A stake and hammer can be used for cutting thicker slates.



Slates that are diamond sawn lose their beveled edge.

Slate roofs should not be walked on during installation or at any time.

The roof should be properly staged in order to minimize or eliminate the need to walk on the slates. Routine walking on a slate roof during installation is a mistake which will cause slates to crack and possibly break off later.

Unlike slate flooring, roof slate does not lie flat on the roof surface and can break if walked upon.

Proper staging allows the roof to be installed without damaging the slates.

Valley slates should never be hung on wires.

Summary

- Contractors unconcerned about roof longevity should not be installing slate roofs.
- Roof decking is important, underlayment is not.
- The contractor should educate himself before installing slate roofs.
- A good roof slate source is imperative.
- Proper tools and materials are required and can be bought on the internet.
- Detailed contract documents are important.
- Radical deviations from long-established installation standards is not recommended.

For more information:

- The Slate Roof Bible, 2nd edition
- Slateroofcentral.com (source of tools, etc.)
- Slateroofers.org (source of contractors)
- Traditionalroofing.com (source of articles)
- Snowguardcentral.com (source of snowguards)
- Call us toll free at 866-641-7141
- Questions?