

American Roofing Slate

History

Types of Slate

Fabrication

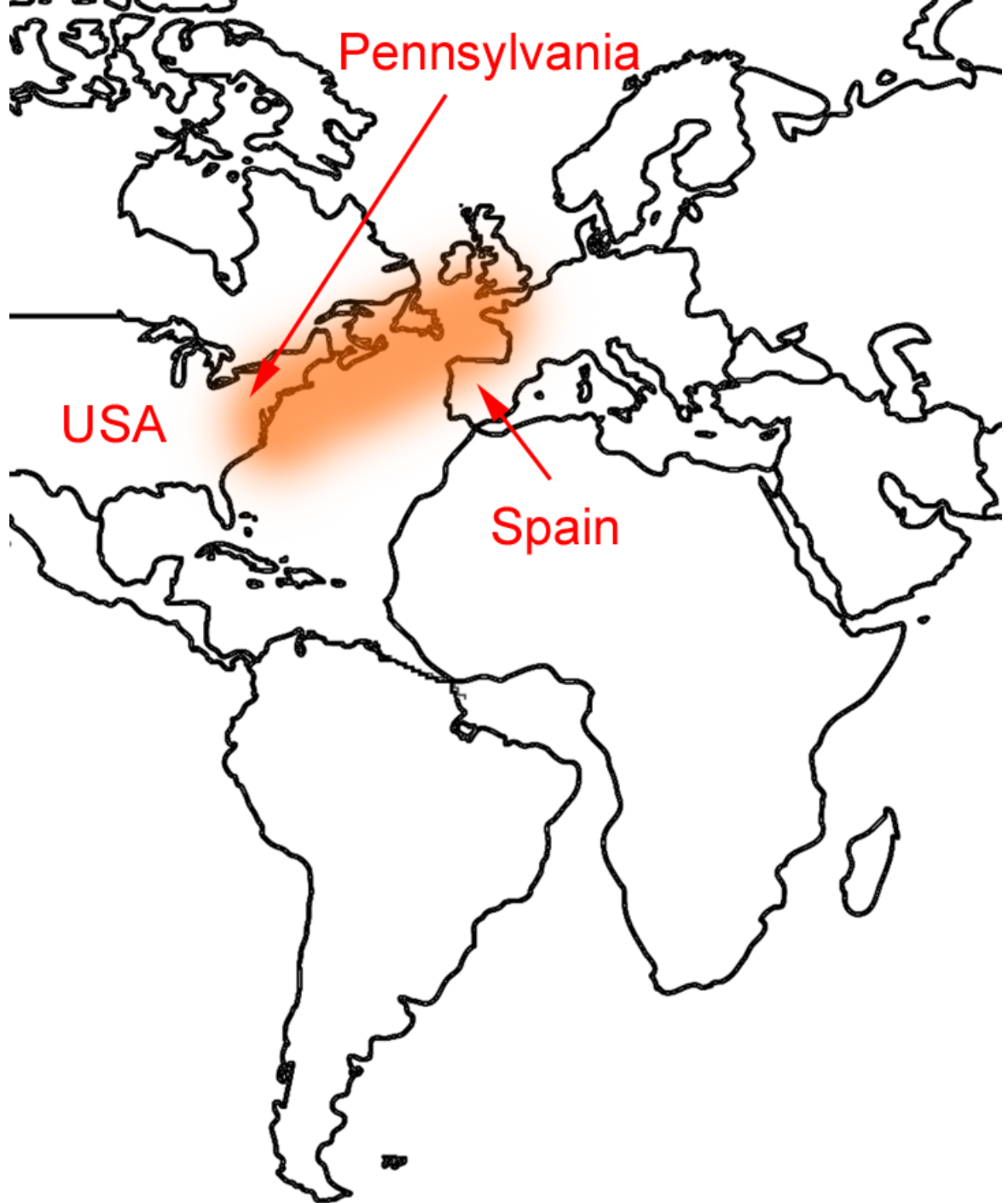
By Joe Jenkins

JosephJenkins.com

Part 1: HISTORY and TRADITIONS

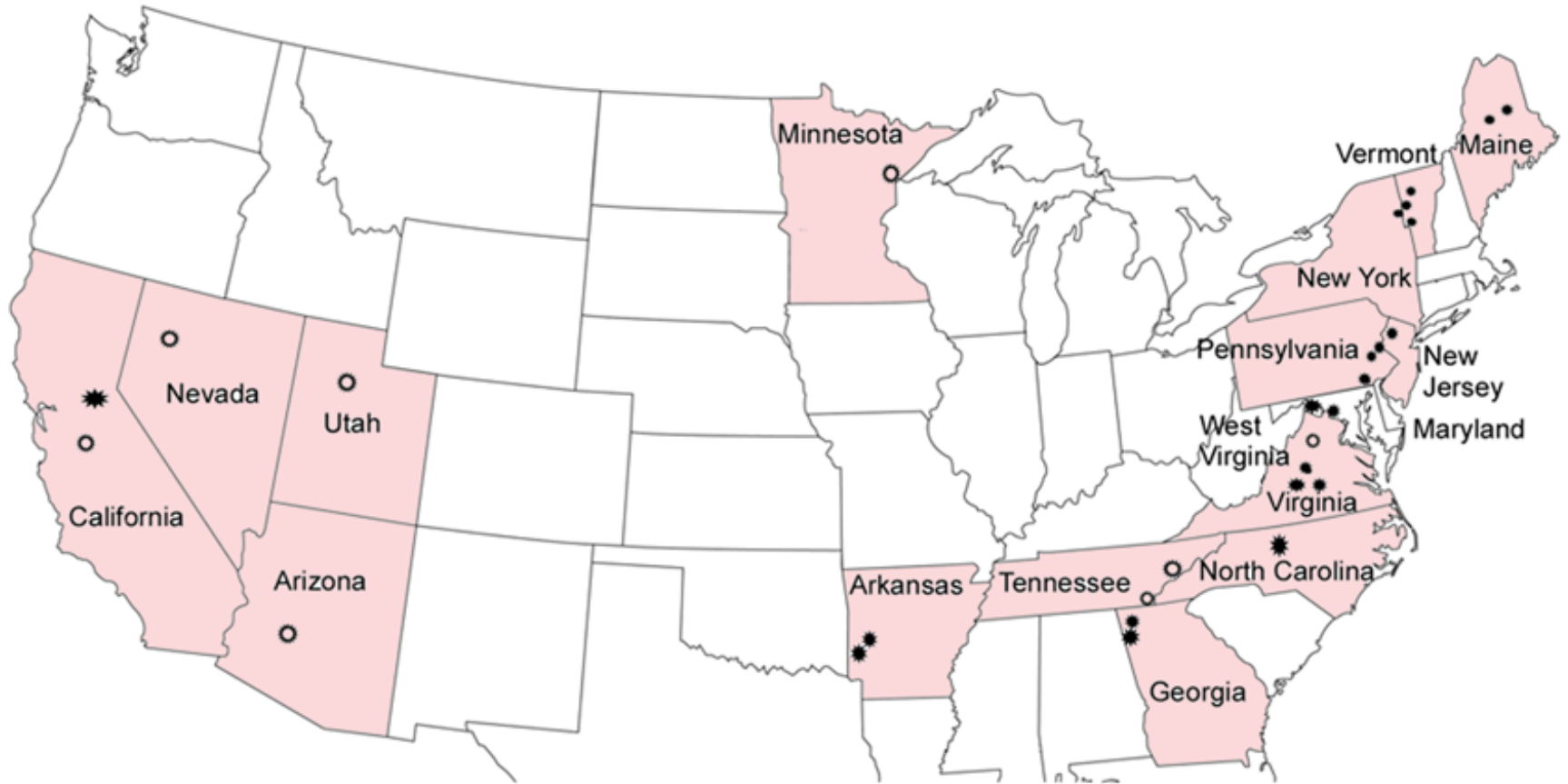
Slate was first discovered in 1734 in Pennsylvania by Welsh immigrants. Commercial production began in the early to mid 1800s.





Slate was formed hundreds of millions of years ago before the continents drifted apart. The most famous deposits include those in eastern U.S. and western Europe, including Spain. Spain was once very close to Pennsylvania.

Known slate deposits exist throughout the United States, but most were never developed.



Location of known slate deposits in the United States.

The most important slate producing states were on the east coast: Maine, New York, Vermont, Pennsylvania, Maryland and Virginia.



Most significant slate producing areas

Today, slate is only quarried in Vermont, Pennsylvania, Virginia, and a little in New York.





Many older homes still have their original slate roofs. This one, dated 1862, is made of Vermont slate.

Americans are proud of their slating traditions and the longevity of their domestic roofing slate.



This 1851 Vermont slate roof
is still in good condition.



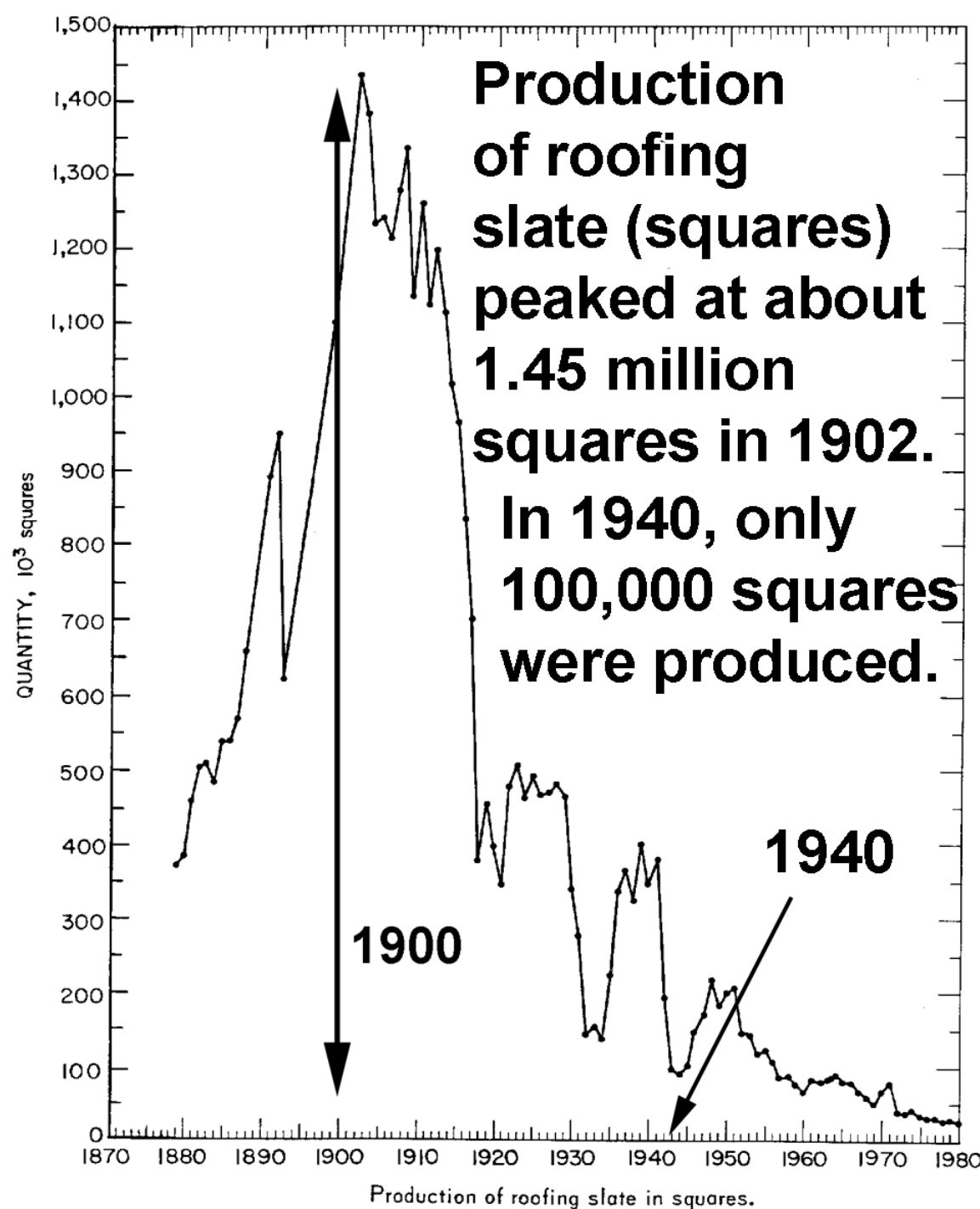
From the mid-1800s to the early 1900s, slate was the most common residential roof in the northeastern United States.



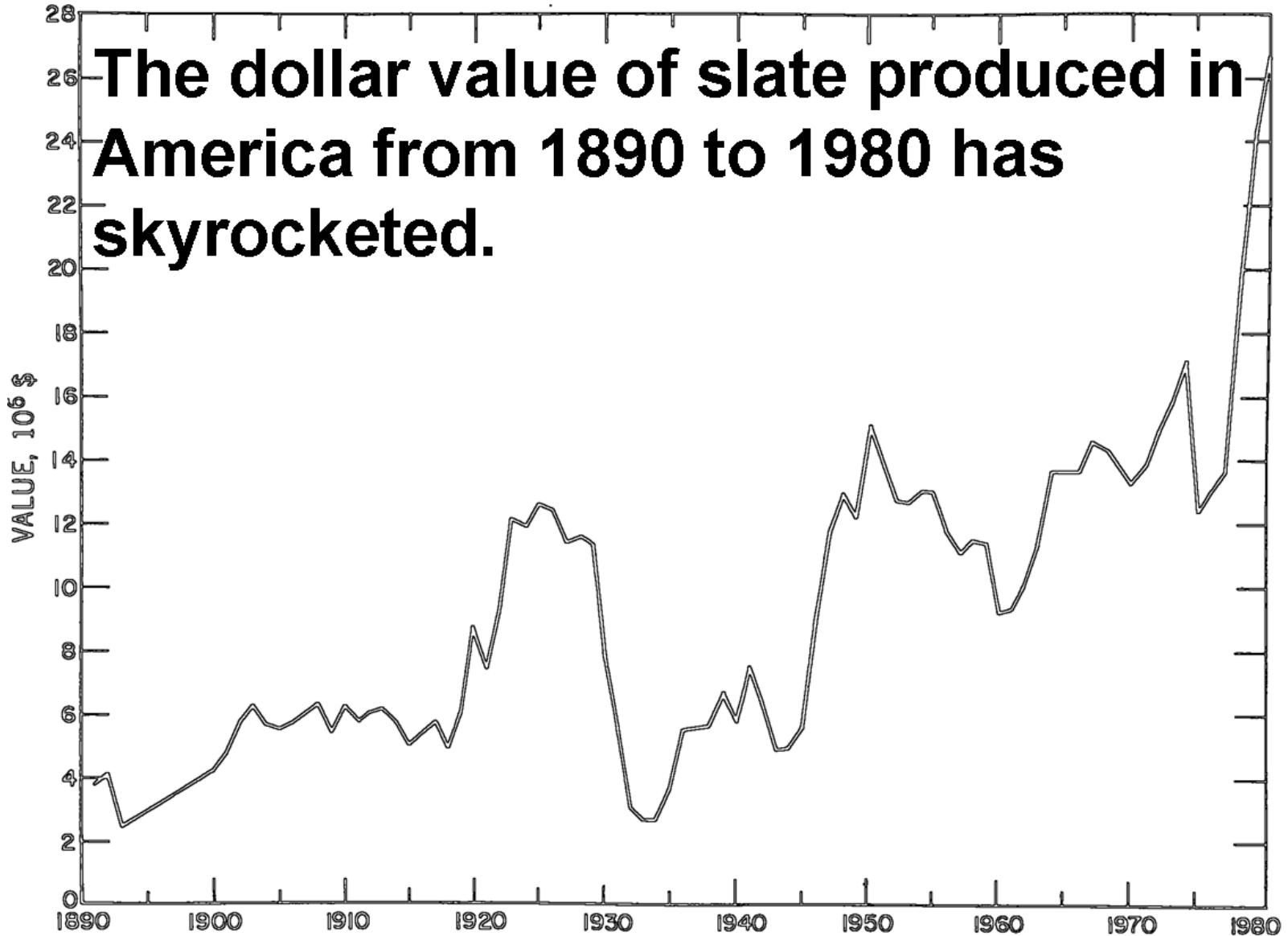
All types of buildings were covered with slate. This one in Ohio bears the date of 1889 written into the slate.



American
slate
production
peaked
around 1900,
but dropped
after WWII.



The dollar value of slate produced in America from 1890 to 1980 has skyrocketed.



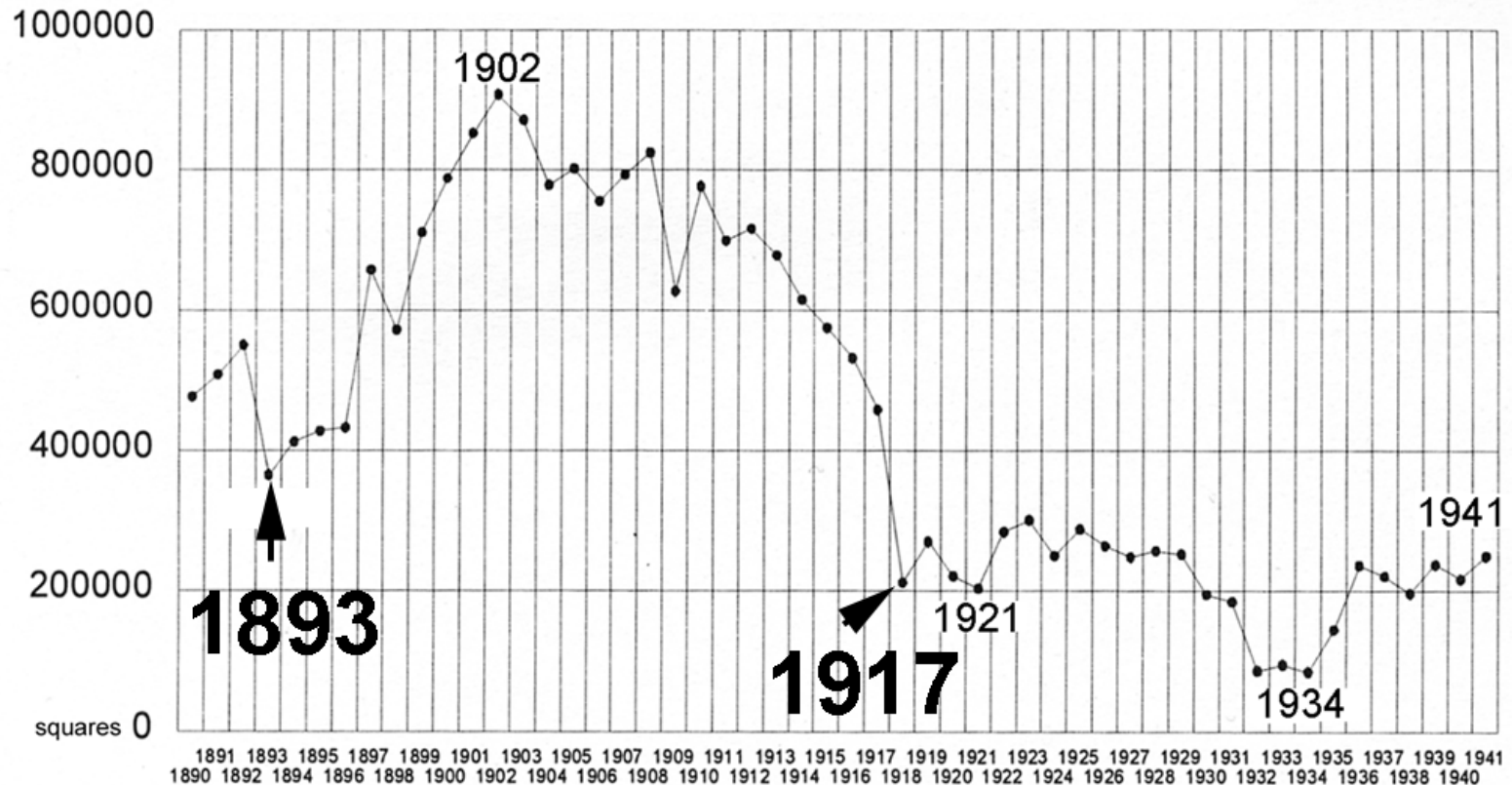
1890

Dollar value of slate produced in the United States.

1980

Pennsylvania alone had more operating quarries in the late 1800s than Spain does today. In 2004, there are only a few slate quarries operating in Pennsylvania.

Roofing Slate Sold In Pennsylvania



Slate roofing has almost become a dying art in America.

From the 1940s to the present, asphalt shingles replaced slate as the primary form of roofing in America.

No building codes required slate roofs to be replaced with slate roofing.

Slate roofing experts all but disappeared between 1940 and today.

Modern roofers in the USA today often do not know how to properly install slate.

Summary of Part 1: History

American slating history dates back to 1734.

The peak of slate production was around 1900.

Most of the original slate quarries in America now no longer exist.
Only a few remain.

Slate roofs declined in the early 1900s and new slate roof installations almost disappeared after 1940. Asphalt roofs took their place.

Part 2) Types of Slate Produced in America

Approximate Colors of American Roof Slates When New



Vermont Mottled Purple



New York Red



Vermont Gray



Pennsylvania Black or Spanish Black,
similar in tone to
Virginia slate



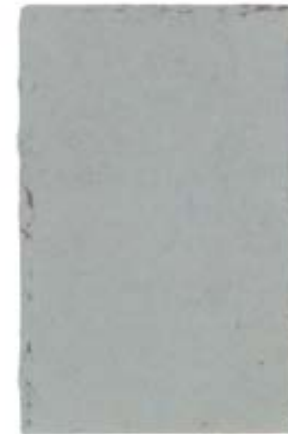
Vermont Green



Vermont Purple



Vermont Gray-Black



Vermont "Sea Green"

American slate comes in a variety of colors.
This is a blend of Vermont, New York and Virginia slates.



U.S. slate deposits are still abundant. This is Vermont purple, Vermont green, and New York red slate.



This is a Vermont weathering green roof that has weathered to brown.



This is a Virginia blue-black slate with a Vermont weathering green design.



This is a blend of Vermont
and New York slates.



These are Vermont purple and Vermont unfading green slates.



This is New York red slate.



This is Pennsylvania black slate installed in 1878,
being repaired in 2004.



Some Pennsylvania black slate does not last as long as other slates. Thousands of these roofs are now needing replaced. What America lacks is an abundant supply of long-lasting black slate. Perhaps Spanish slate will help fill that void.



Spain will have to compete, however, with Chinese black slate.



Summary of Part 2: Types of Slate

- American slate is still abundantly available.
- Our slate comes in a variety of colors, including black, red, green, purple, and others.
- American slate can be produced in any size and thickness.
- Thousands of Pennsylvania black slate roofs installed in the late 1800s are now needing replaced.

Part 3) Fabrication and Manufacturing

This is a quarry at Camara Slate Co., Vermont. Most slate in the U.S. is now quarried from open holes.



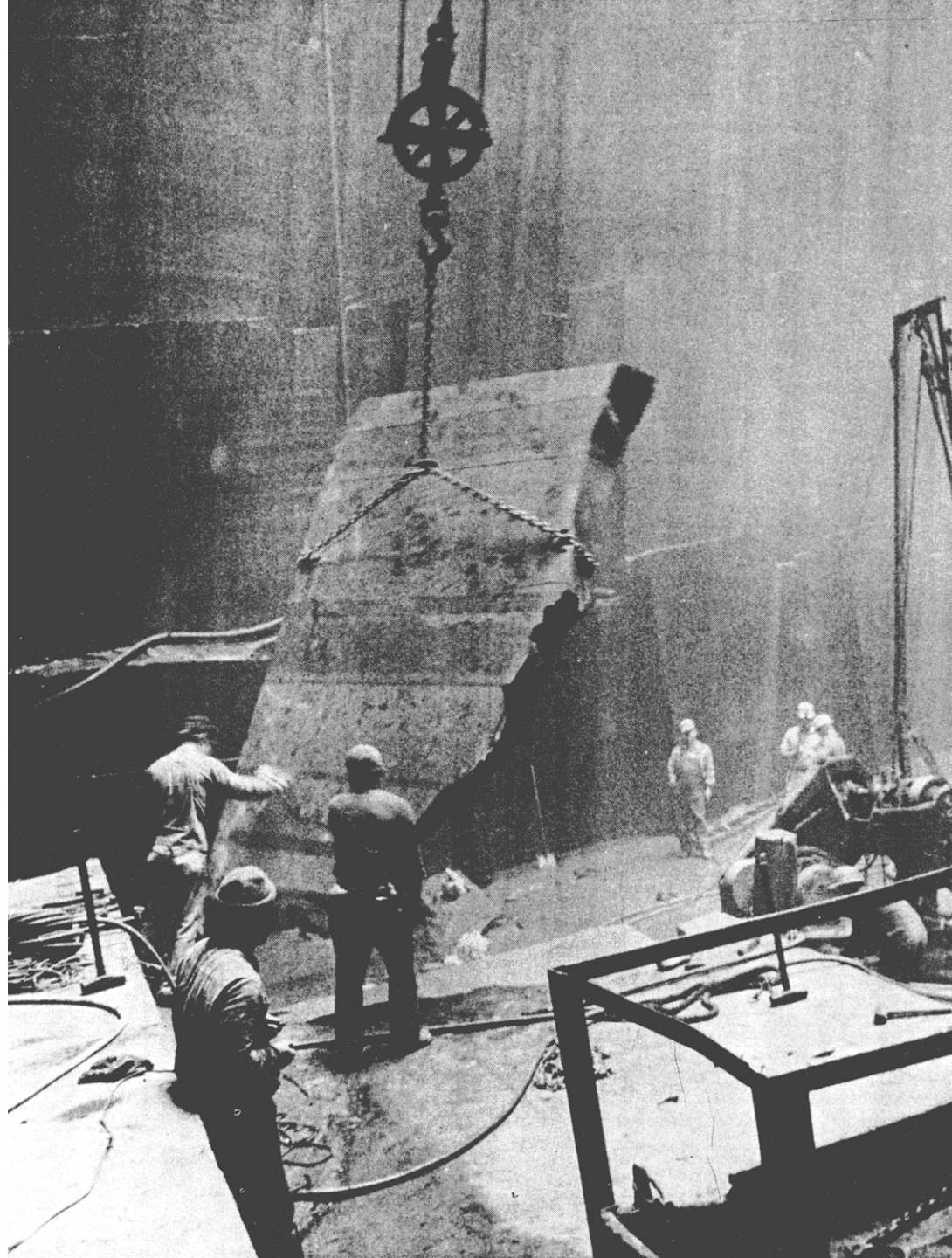
Here, slate is being extracted from a quarry by the U.S. Quarried Slate Company in Vermont.



A Pennsylvania quarry is carved into solid slate rock. A worker is circled at the bottom, right. A block is being hoisted out of the quarry on a chain. The hole is about 350' deep (107 meters).



Large blocks of stone are removed from the quarry or mine. This is an old Pennsylvania quarry photograph.



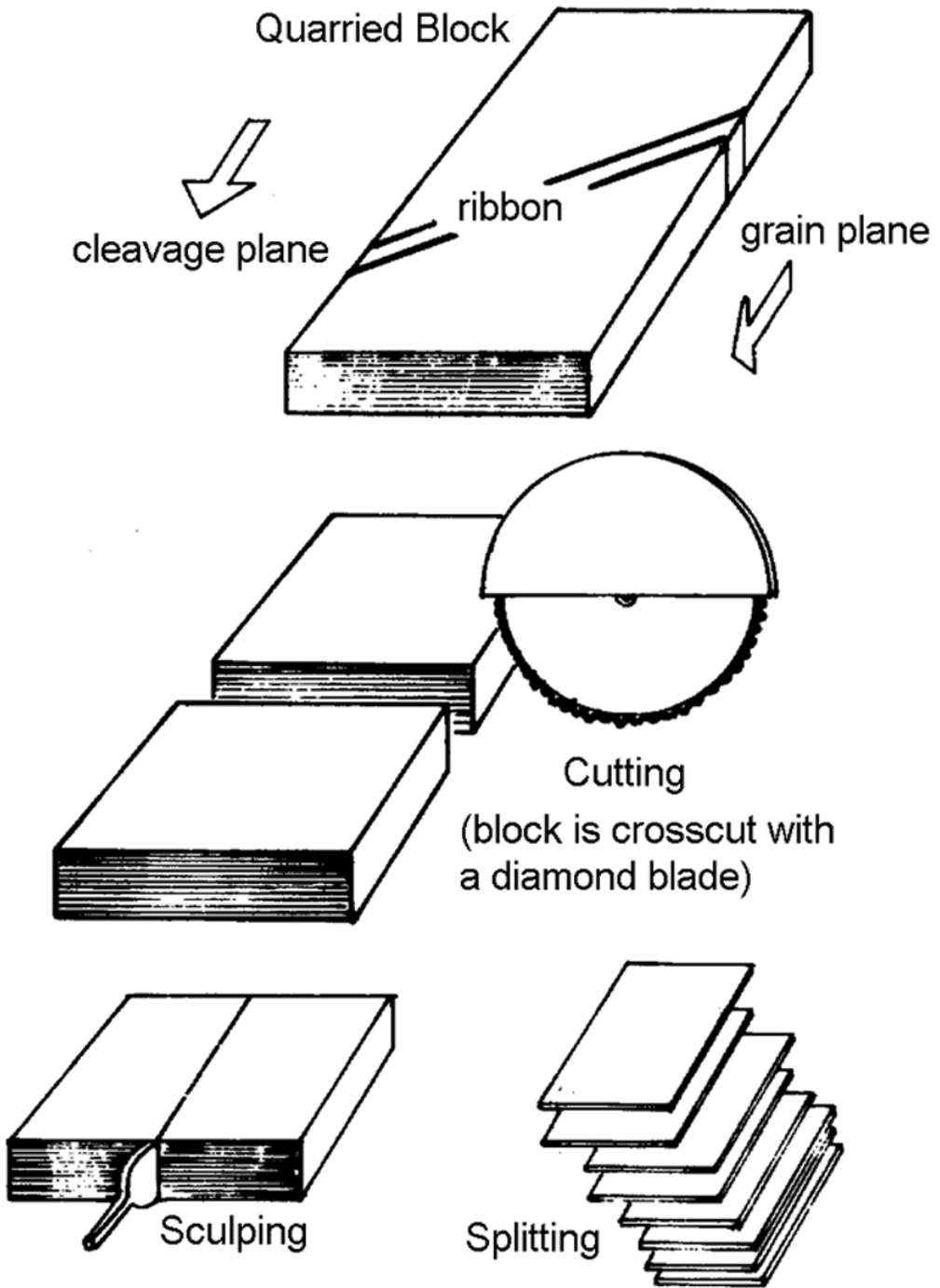
The blocks are split according to their grain and cleavage
This photo is at Vermont Structural Slate Company.



Pete Papay inspects a block at his quarry in Pennsylvania.



Smaller blocks are cut using a diamond saw.



The smaller blocks are ready to be split into shingles at Greenstone Slate Company in Vermont.



The slate is split into roofing shingles by hand with hammers and chisels, shown here at Camara Slate Company, Vermont.



Another
splitter –
this one at
Hilltop
Slate
Company,
Vermont.



Another
splitter in
Vermont.



The edges are
trimmed to
size.

This is
Pennsylvania
black slate.



This is Virginia
slate being
trimmed to
size.



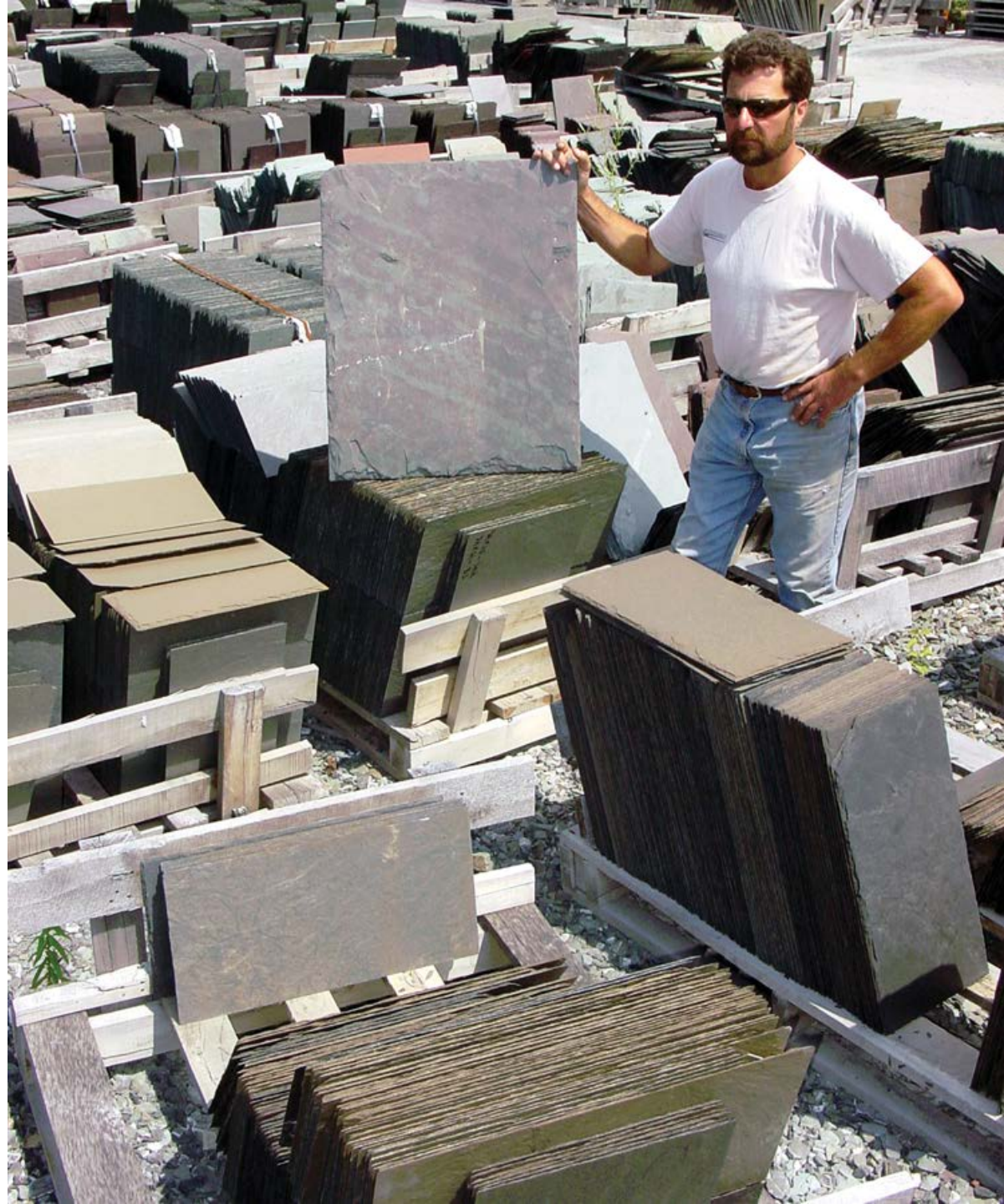
Nail holes are then punched into the slates individually. Some quarries drill nail holes, but punched holes are much preferred by professional slaters. Roof slates are not sold without nail holes.



The finished shingles are then sorted, palletted and shipped. These are “heavy” Vermont purple slates, about 1.5 cm thick.



New roofing slates of all sizes, thicknesses and colors are produced in the USA today. This is Taran Slate Company in Vermont. Steve Taran is holding a large “mottled green and purple” slate.



Standard sizes for roofing slates in the U.S. range from 6" wide x 12" high (15.24 cm. x 30.48 cm.) to 14" x 24" (35.56 cm. x 60.96 cm.).

Most common sizes range from 25 to 35 cm wide to 40 to 60 cm high.

Standard thickness for American roofing slates is 3/16" to 1/4 inch (4.7mm to 6.3mm). Thinner slates are rejected.

Larger sizes and thicknesses are available upon request.

The finished shingles are fastened to the roof deck with nails, not hooks, preferably by experienced slaters (which are hard to find in the U.S. today).

NEXT: INSTALLATION
TECHNIQUES



Summary of Part 3: Fabrication

- Most American slate quarries today operate from open holes, not mine tunnels.
- Roof slates are produced at a minimum thickness of 3/16" (4.7 mm) although ¼ inch (6.3 mm) is becoming more common as a standard thickness.
- All standard roof slates are produced with nail holes.
- America's long history of slate production means that we can produce trusted slate of known quality and characteristics.

Next: Parts 4, 5 and 6

4) Installation

5) Repair and Restoration

6) Special considerations for Spanish
slate exporters

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Part 4)

Slate Roof Installation Methods and Techniques – A Brief Overview

Solid board roof decks are preferred in the USA under the roofing slate.



Sometimes wood lath is used instead of wood boards, but not very often.



This lath roof is 100 years old. No underlayment (felt paper) was used. The slate is still good – the roof did not leak.



Local, green (undried) lumber had been traditionally used under slate roofs in the United States.



Planed, kiln-dried lumber is now also used. Yellow pine is shown here being installed on a bank building in Kansas.



This sort of roof decking will last at least 150 years, if not 200 or more, which is how long we expect the slate itself to last.



Most American contractors are not very skilled at slate roofing. They use plywood roof decks under asphalt shingles. We sometimes have to struggle to get them to use boards instead of plywood.



New Vermont unfading green slate, 1.25 cm thick, installed on yellow pine decking with stainless steel nails. This roof should last 200 years.



A lath barn being reslated by adding 1x4s between the lath.



30 lb. felt underlayment, installed on top of the roof deck, keeps the rain out until the slate is installed.



The top edge of the slate is nailed along chalk lines. Most roofs are installed with a 3" (7.6 cm) headlap.



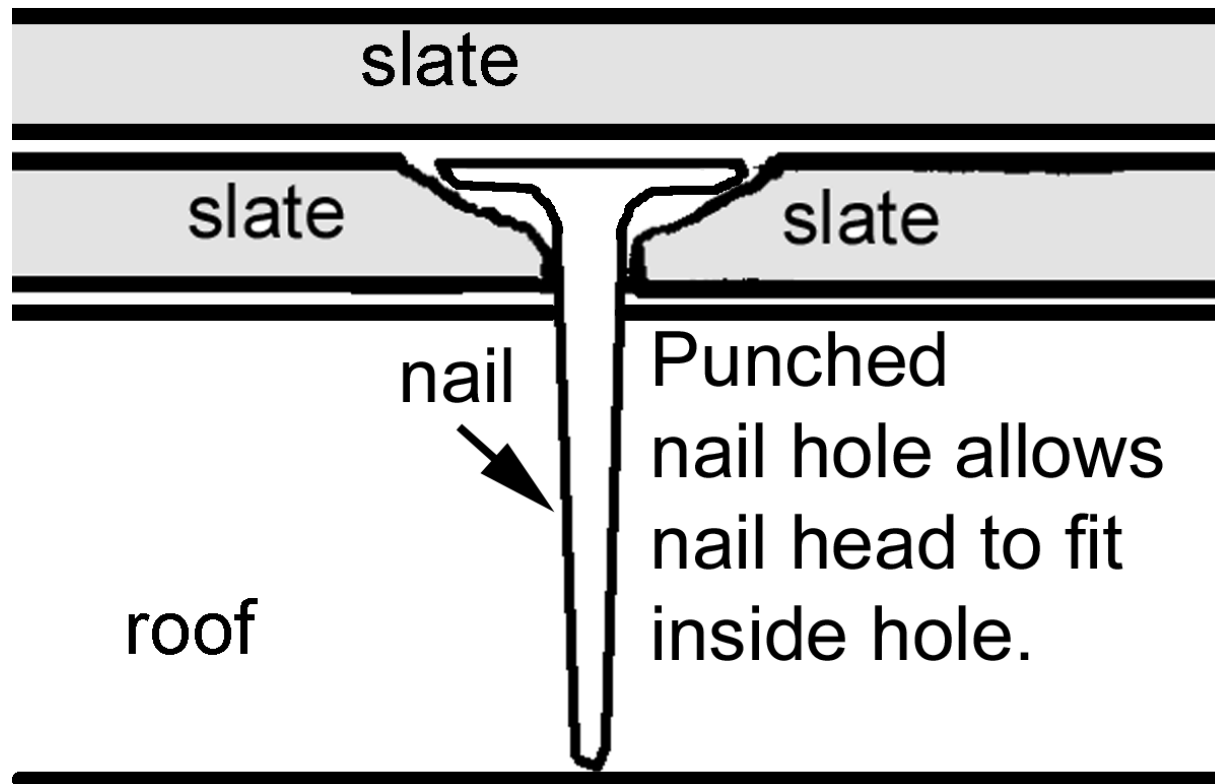
The slate is installed directly over the felt by nailing each piece with two nails, usually 1.5" (3.8 cm) long.



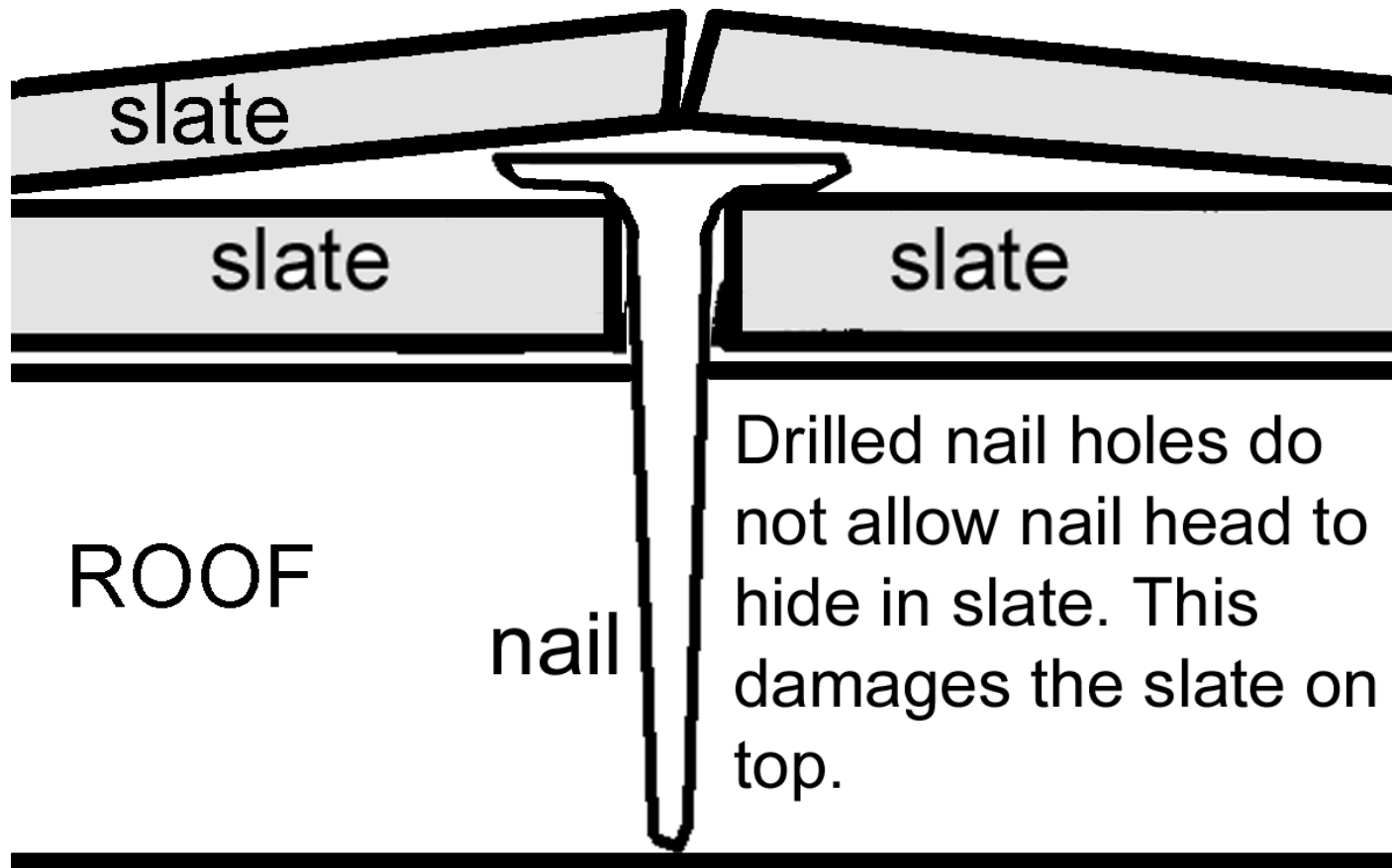
Copper or stainless steel nails are most often used.



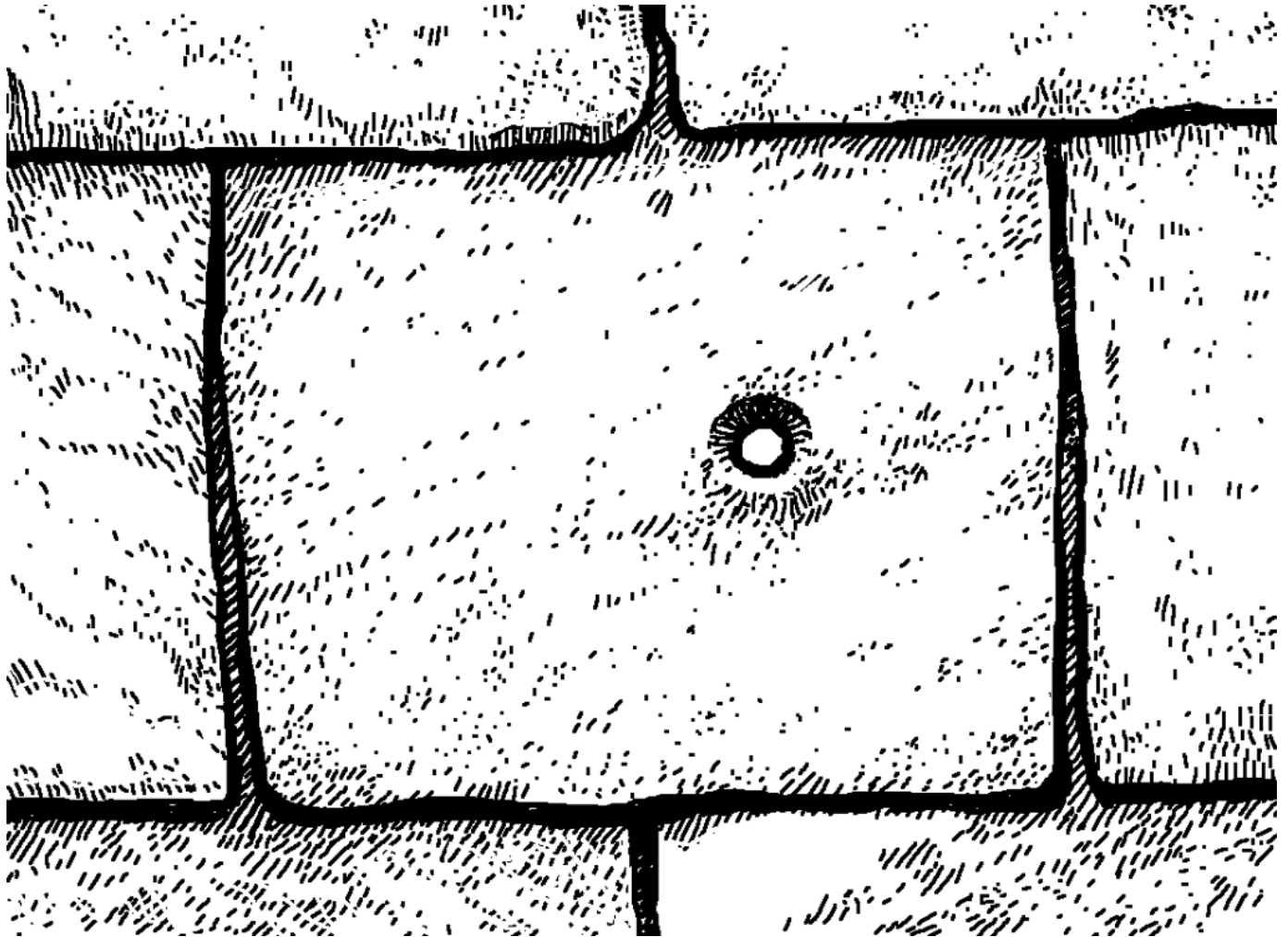
Nail holes should be punched, not drilled, except on thick slates, where drilling may be necessary.



Drilled holes cause the nail head to stick up and rub against the overlying slate.



The nail head will wear a hole in the roof over time.



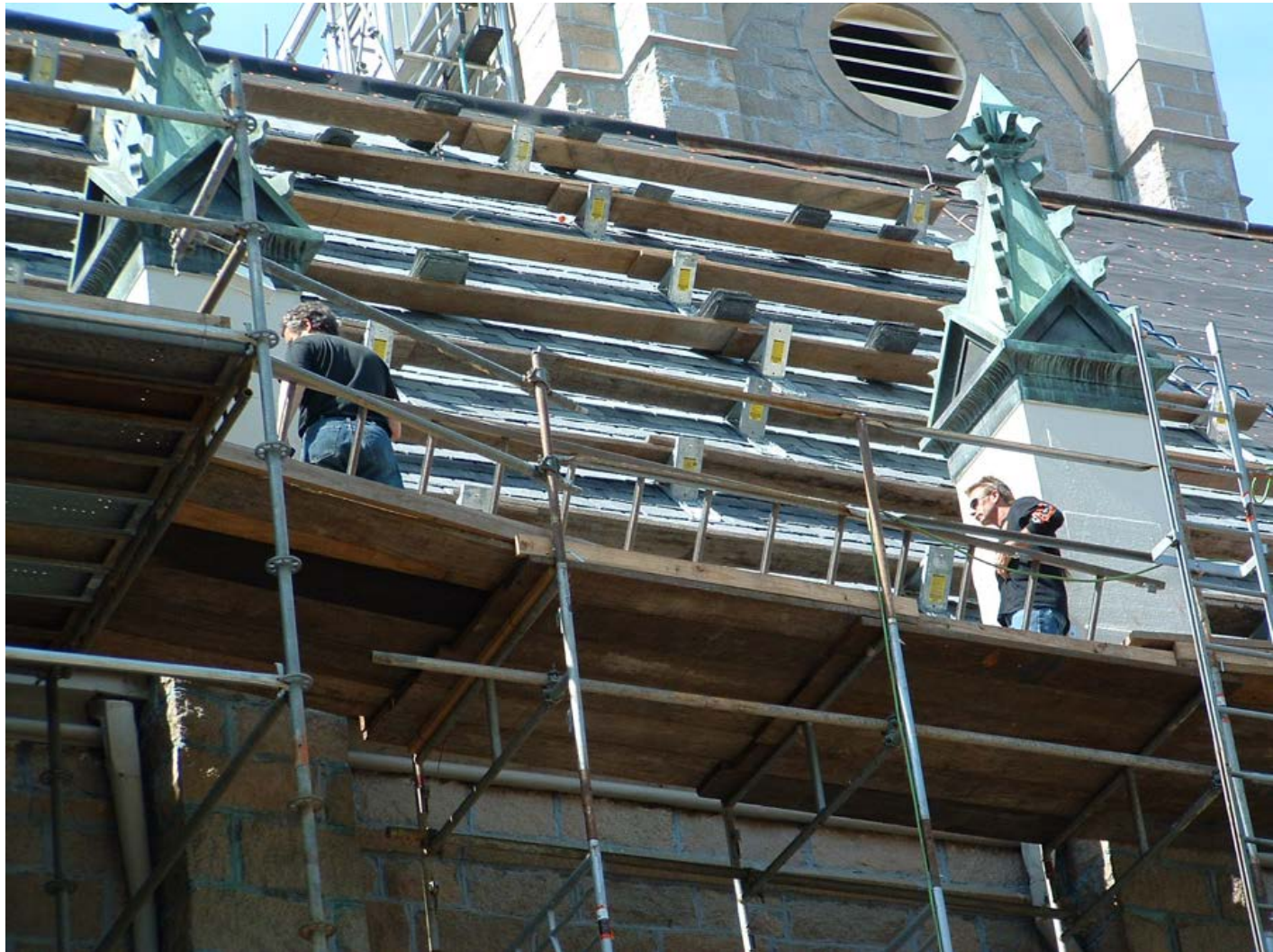
Planks are used on the roof for safety and to prevent walking on the slates during installation.



A view of a small roof being slated, in this case, with recycled slates.



A large 120 year-old roof being re-slatted with new slates from Wales and Vermont.



No exposed slate hooks are used. They would detract from the appearance of the roof.



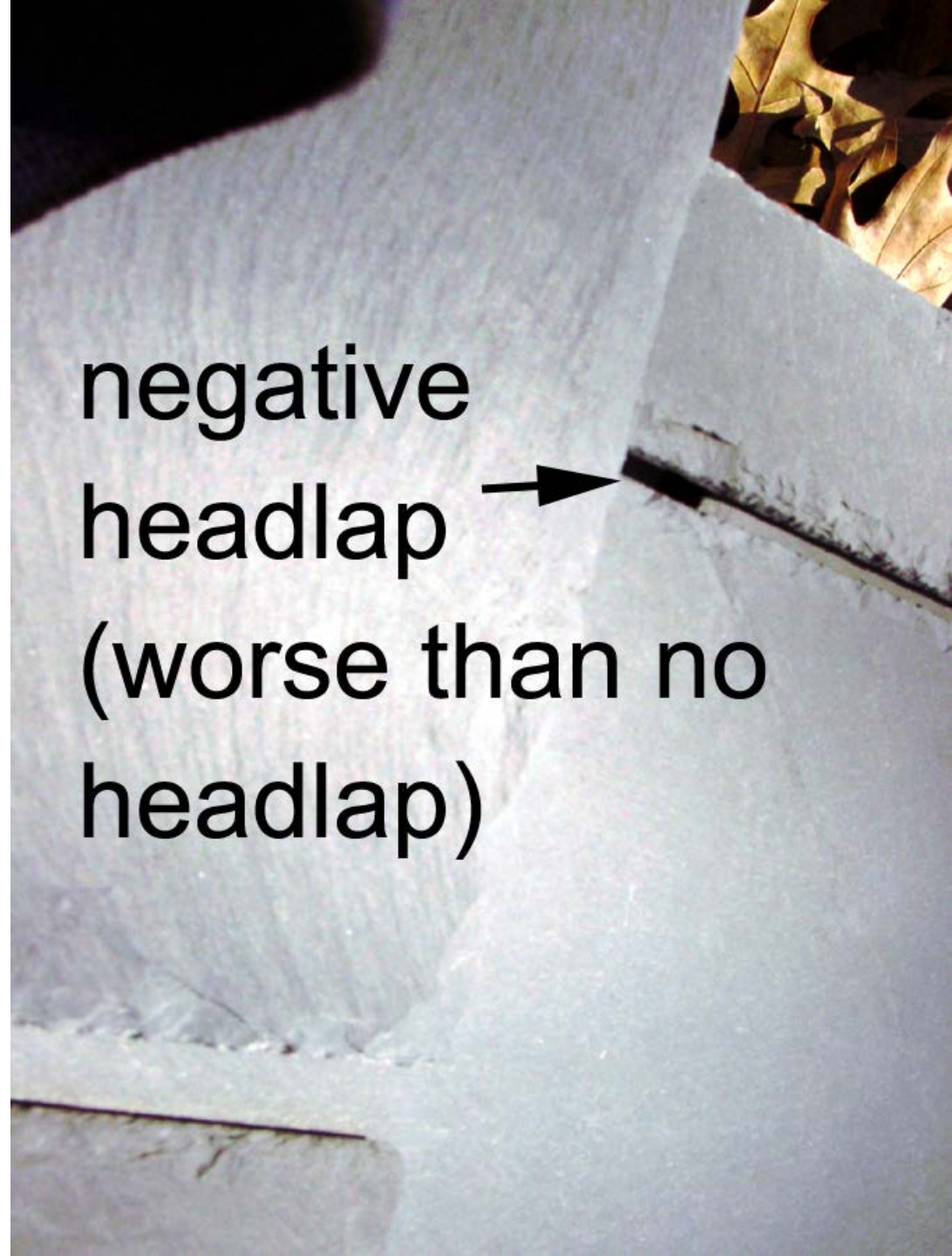
Many new slate roofs are being installed in the U.S., such as this university dormitory roof.



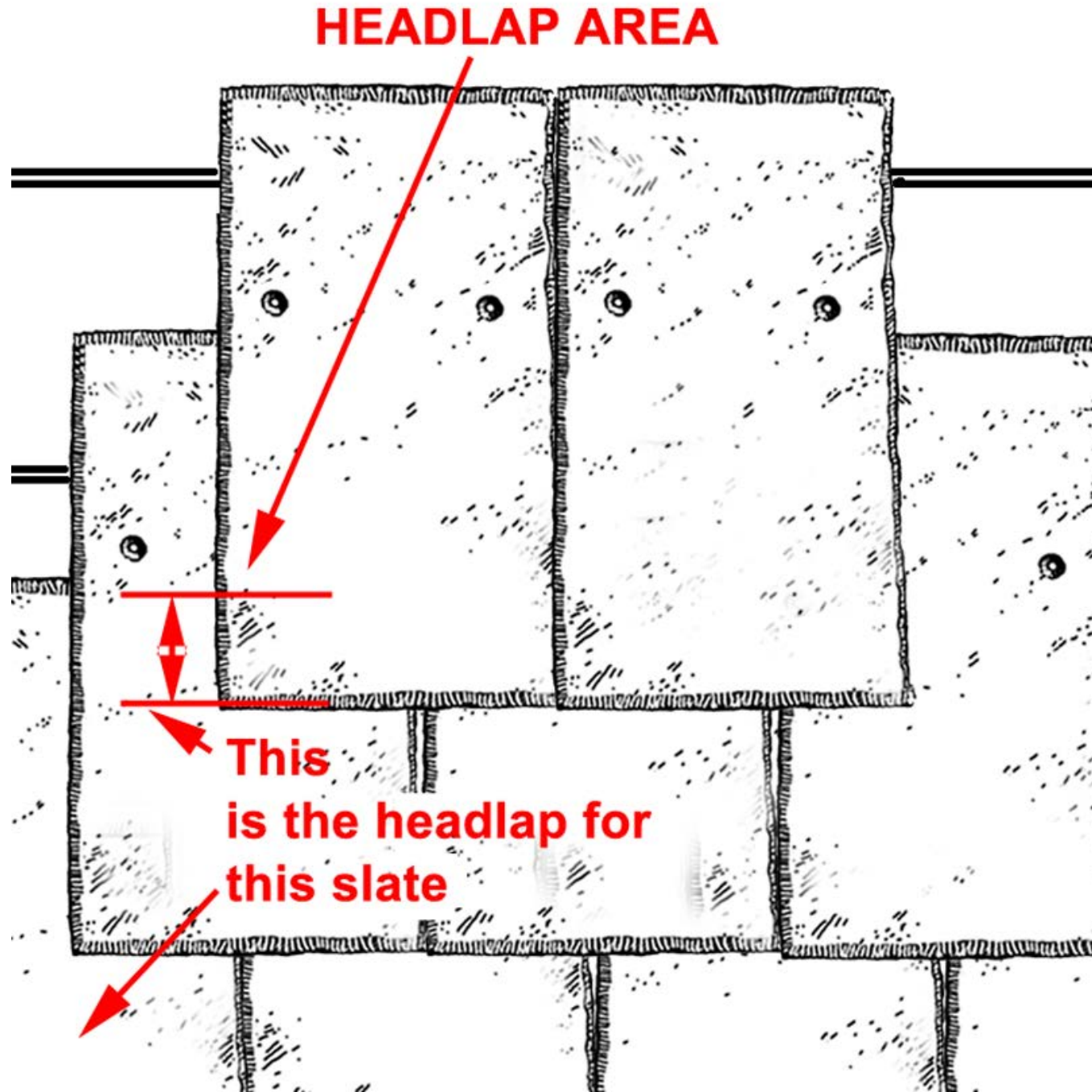
But training is lacking and many roofs are being installed incorrectly, such as this same dorm roof, made of Chinese slate. Note the lack of headlap.



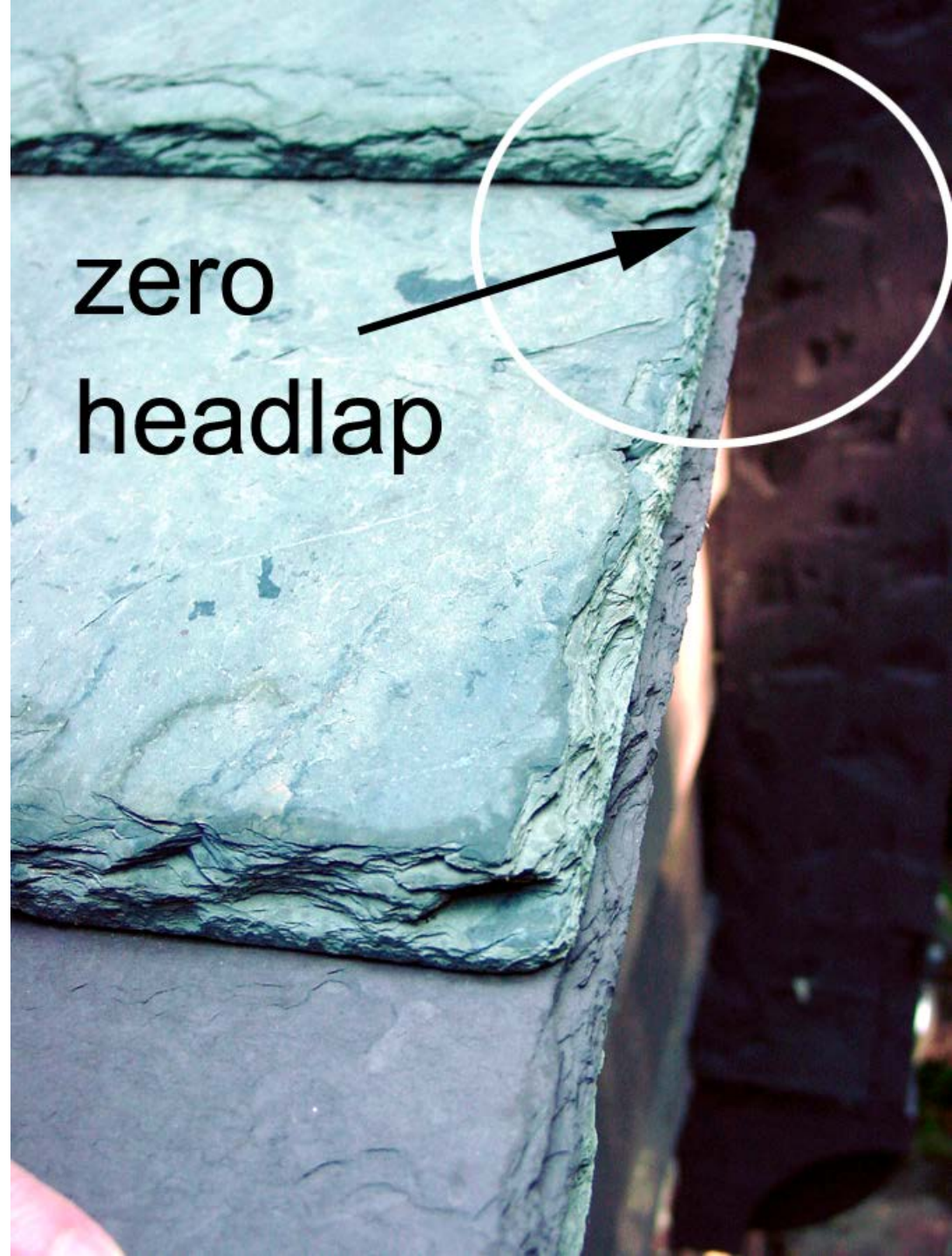
The same
dormitory
showing holes
directly through
the roof due to
faulty
installation.



Proper headlap is critical.



Another case of zero headlap -- on an historic building. The entire roof was installed incorrectly and had to be removed.



American roof slate is versatile and can be installed in many styles. The variety of colors in the U.S. allows for additional artistry in slate roof installation. This is a “ragged butt” style.



Another ragged butt slate roof.



A “staggered butt” slate roof style.



Another “staggered butt” Vermont slate roof.



A Pennsylvania black “textured” slate roof.



Another Pennsylvania black “textured”
slate roof.



Vermont green slate and Welsh black slate
with stainless steel flashings.



It's easy to create a landmark roof with contrasting colors of slate.
This is at a university in Pennsylvania.



Even modest buildings can look elegant with a designed slate roof.



This modest home now has a beautiful, 200 year durability slate roof of Vermont green and purple slate.



Dates and inscriptions on roofs are not seen much in Europe. This is on a garage in Pennsylvania.



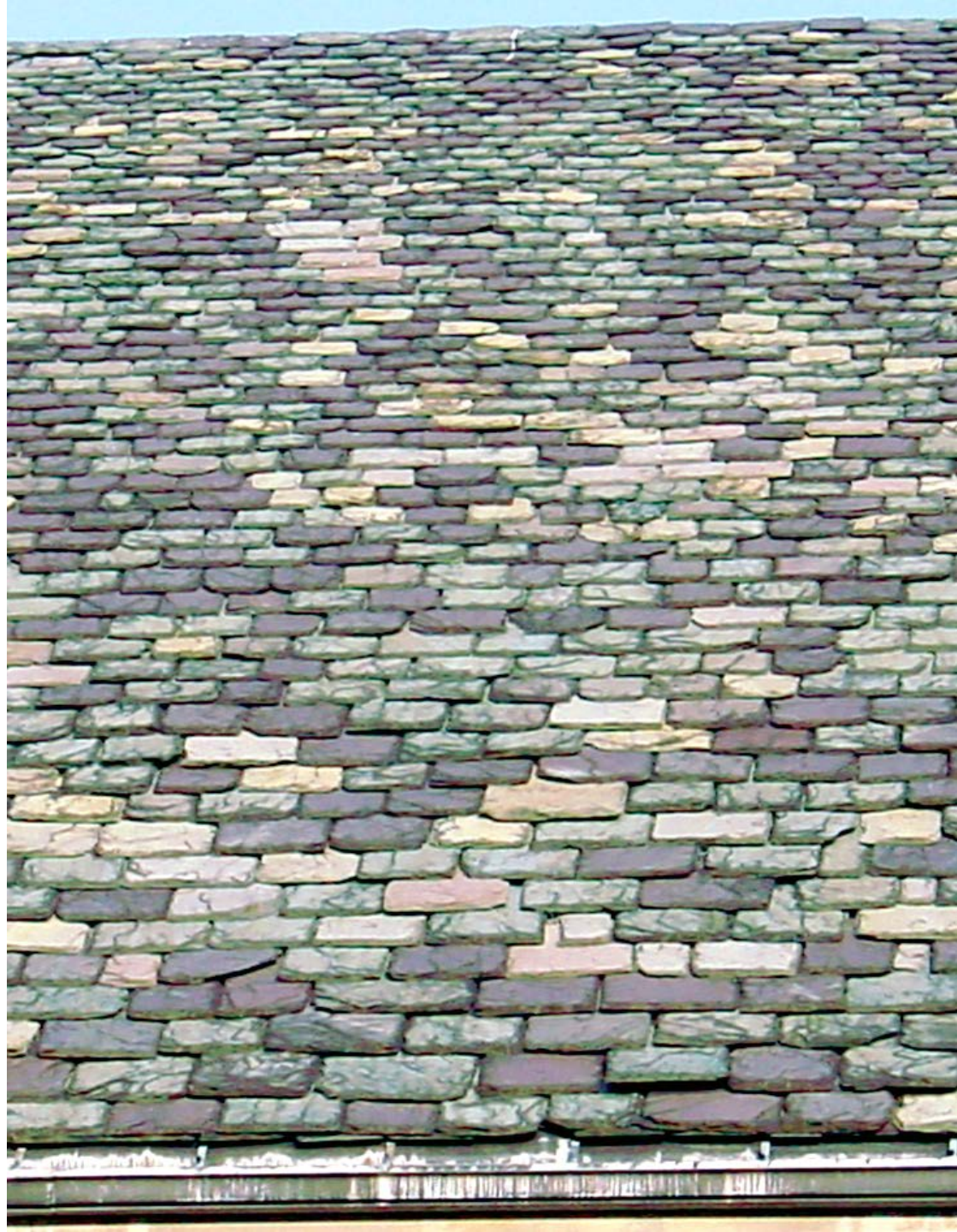
Slate roof inscriptions seem to be a more common tradition in the U.S.



A mixed color
Vermont slate
“graduated”
style slate
roof.



Another mixed-
color
graduated slate
roof on a
college chapel
in
Pennsylvania.



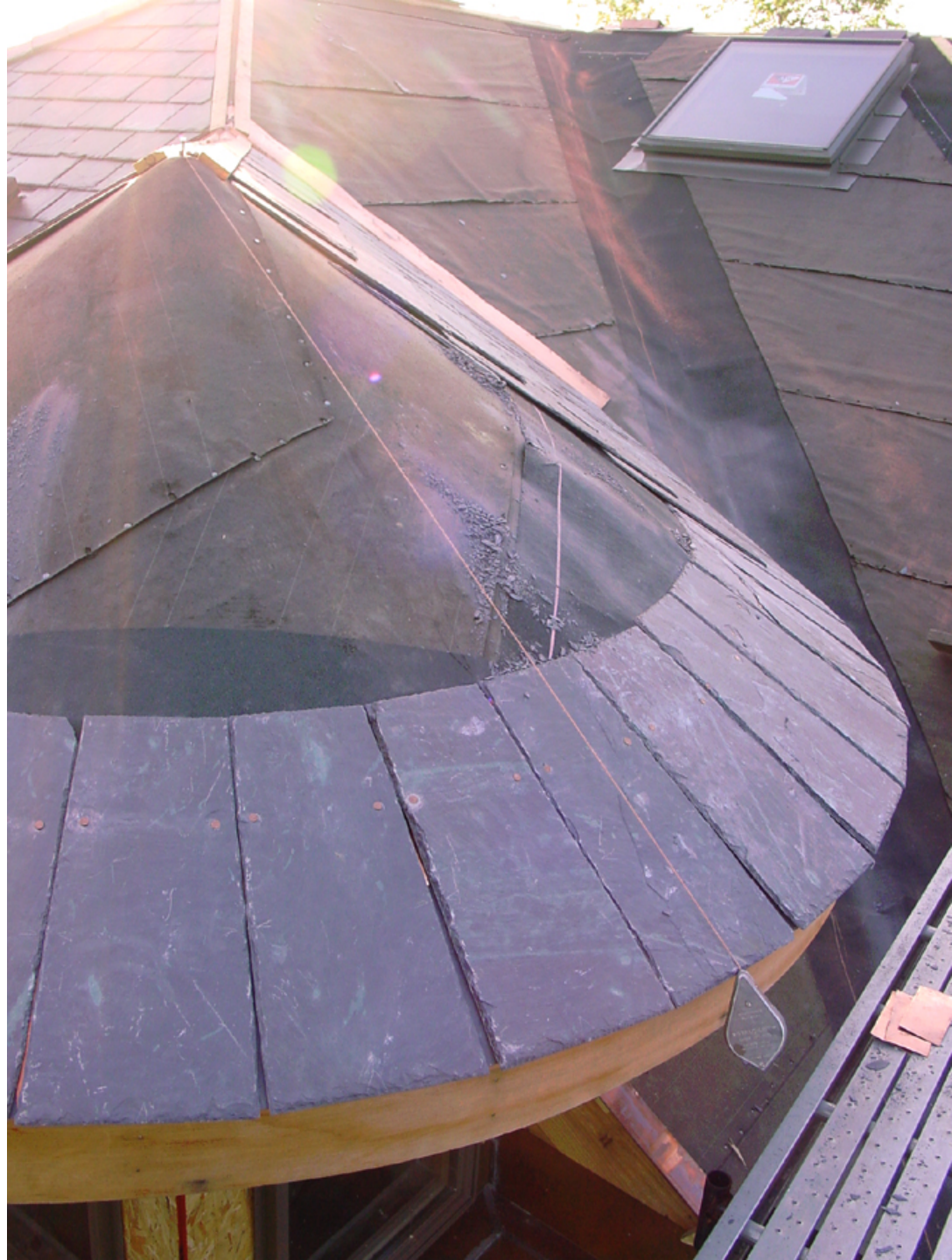
Installation procedures are too detailed to be able to fully discuss in this presentation.



Installation
procedures
vary from
job to job.



We hope to
produce a slate
roof
installation
manual for
contractors in
the near future.



New houses are being built with slate roofs across the U.S.



This is another new house
with a new slate roof.



And another...



And another...



And another.



And here is a new Spanish slate roof in the U.S.



“Fake” slates are becoming more popular. This fake slate roof is 10 years old and already has to be completely replaced.
We discourage the use of such materials.



We are now developing new organizations in the U.S. to provide training and establish standards.

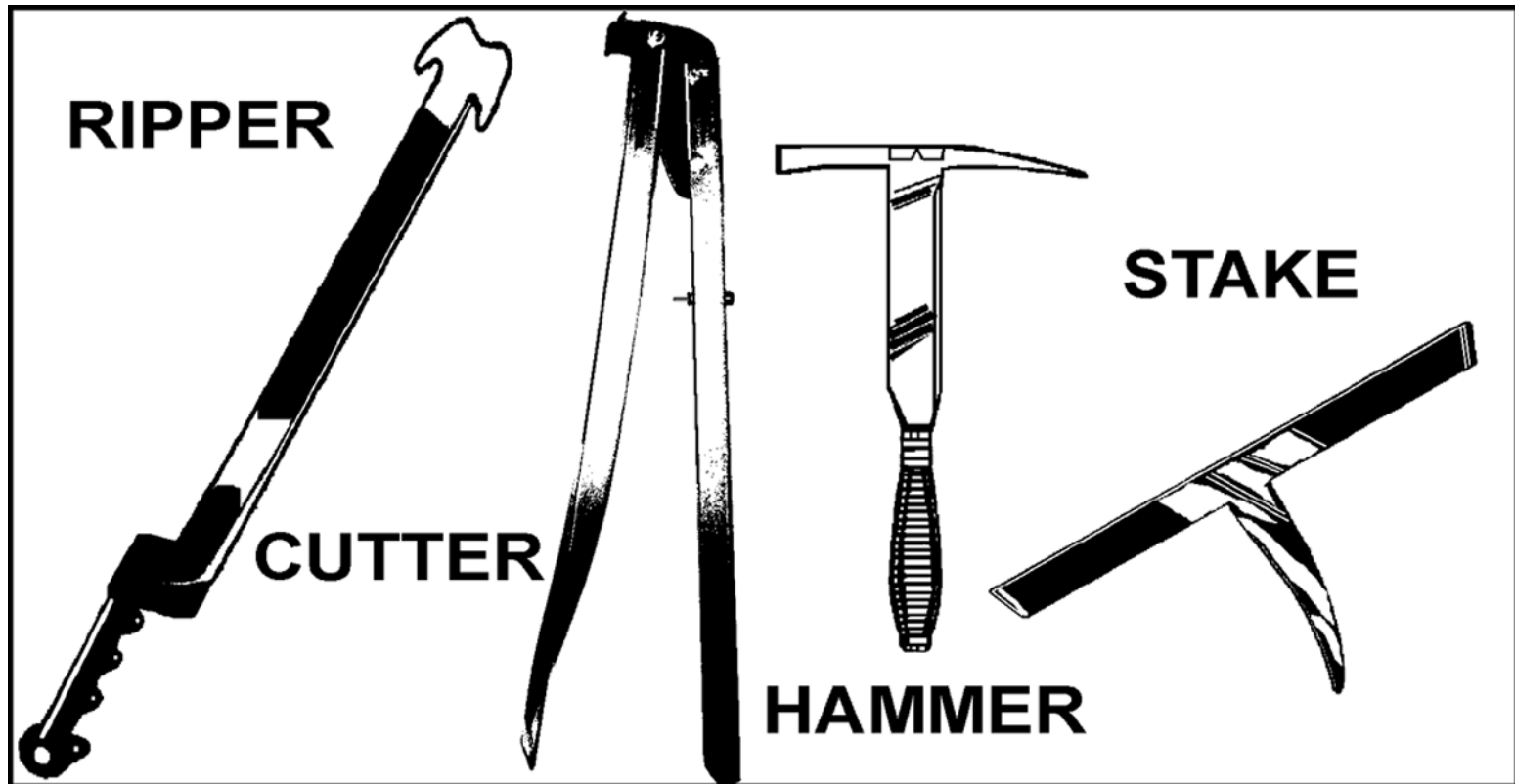


Summary: Part 4 - Installation

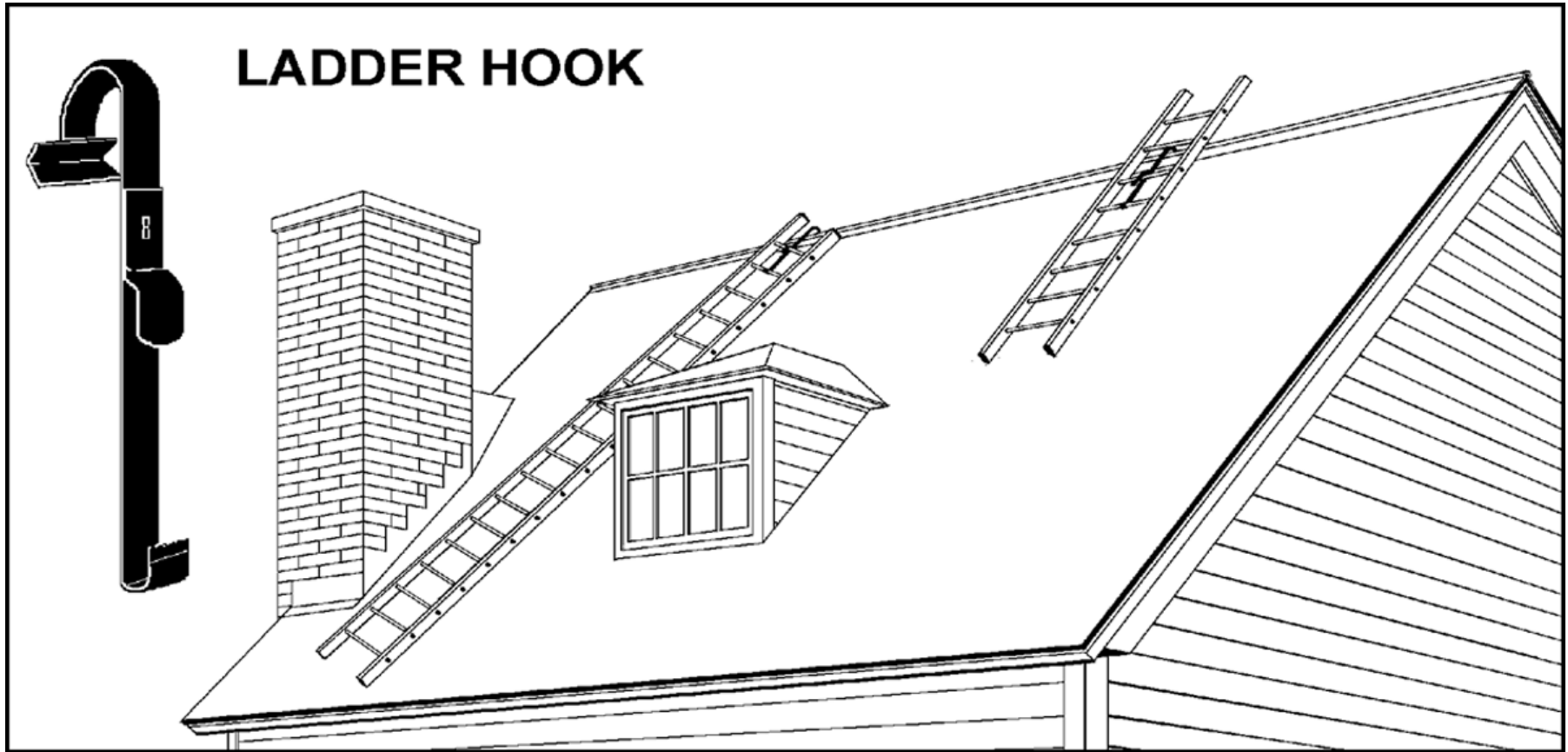
- American slate roofs are best installed on wood board decks using nails.
- Installation styles vary and may utilize slates of many colors, sizes, shapes and thicknesses.
- A gap of several generations has left America in short supply of skilled slate roofing professionals.
- New training facilities, installation standards and educational materials are planned.

Part 5) Repairing and Restoring Slate Roofs.

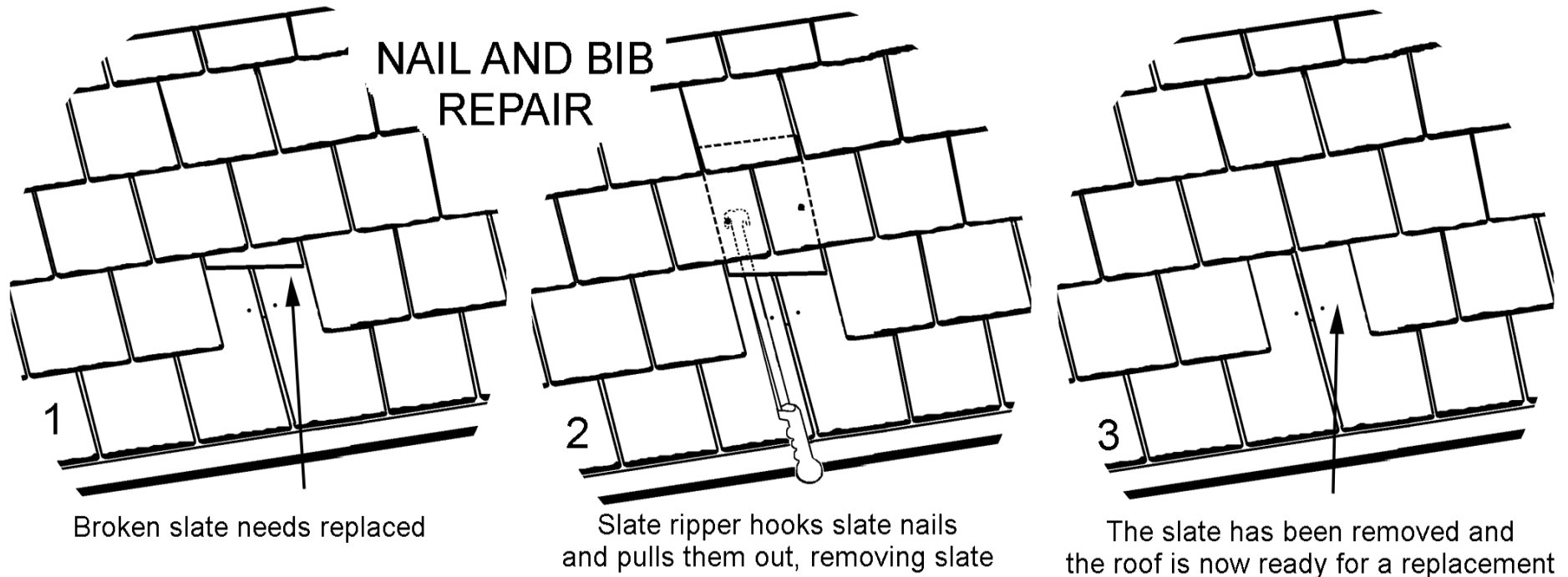
Slate roof repair and restoration is widely practiced in the U.S. Basic tools are similar to those used in Europe.



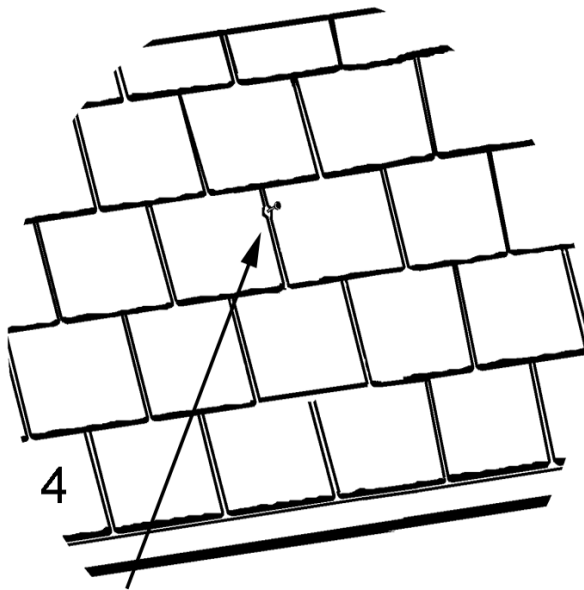
Hook ladders make access to the roofs easy and safe.



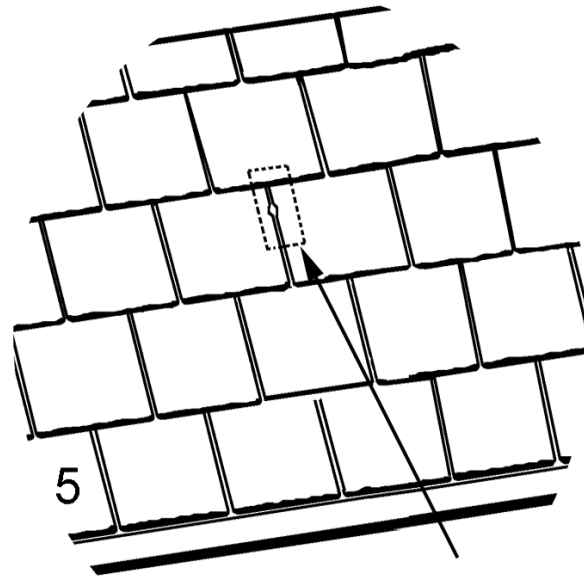
Any individual slate can be removed from the roof and replaced. The slate is pulled out using a “slate ripper,” then replaced using a nail and “bib” flashing.



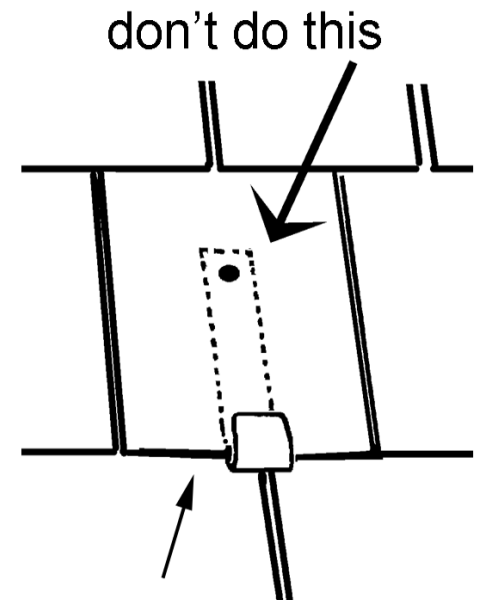
Because slate roofs are easy to repair, they can last for centuries, if the slate itself will last that long.



Replacement slate is slid into place and fastened with a nail in the slot



The roofing nail is tapped down and a bib flashing is slid under the slate but over the nail head

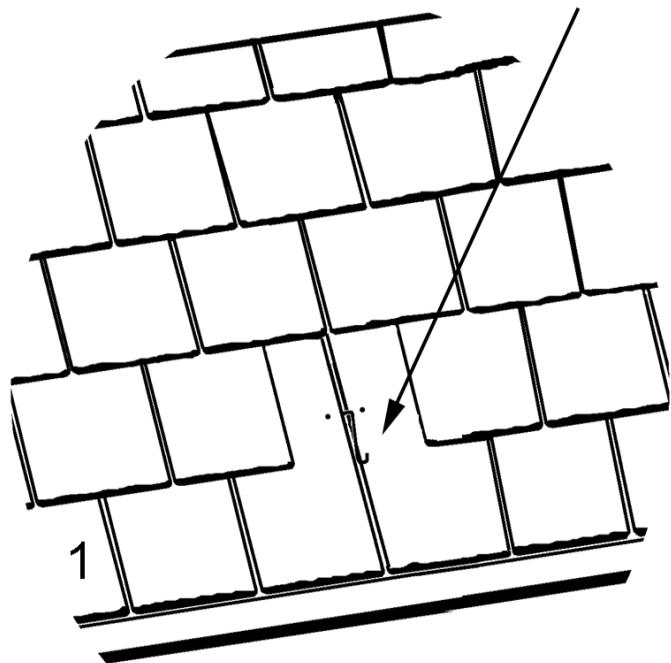


The above strap technique is undesirable for two basic reasons: it looks bad and the straps are easily bent open by sliding ice and snow

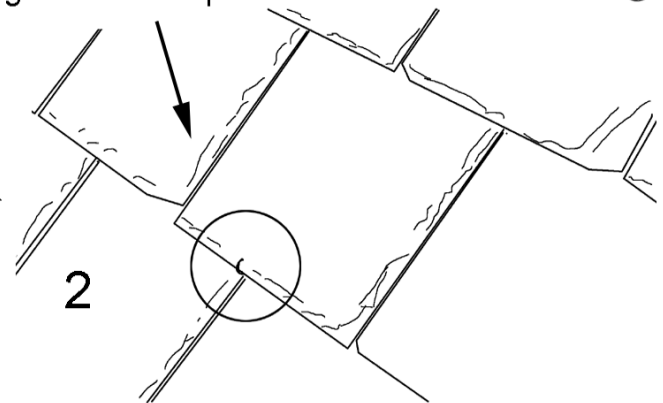
As an alternative, slate hooks are used to replace slates.

Alternatively, a copper or stainless steel slate hook can be nailed into place after the old broken slate has been removed

The replacement slate is then slid in place where it is permanently held by the slate hook. The hook can be pushed down between the underlying slates, if needed, in order to make more room for sliding the slate in place.



SLATE HOOK REPAIR



Metal flashings are routinely replaced on older slate roofs.



Sometimes
restoration
means
replacing the
entire roof with
new slate.



Slate roof repair and restoration is a skilled trade requiring years of training. There is no source for formal training in the U.S. at this time.



Summary: Part 5 – Slate Roof Restoration

- Slate roof restoration is widely practiced in the U.S.
- Slate roofs can be maintained as long as the slate itself will last, if the roof has been properly built.
- Slate roof restoration can include the entire replacement of a slate roof with new slate.

Part 6: Issues Related to Spanish Roofing Slate

- Contractor acceptability is necessary.
- Home-owner satisfaction is critical.
- Quality Control: The slate must be supplied from known and trusted sources.
- Pyrites that bleed are unacceptable.
- Slate thickness must be compatible with American traditions.
- Nail holes, punched and properly located, must be present when the slate is shipped.

Pyrites:

This Spanish slate bled rust stains all over a new \$130,000 slate roof. The entire roof had to be replaced.

This only has to happen once and a contractor will never order Spanish slate again.



Contractor Acceptability

- The roofing slate MUST have punched, properly located nail holes.
- The roofing slate cannot be thin like the slate commonly shipped to France or Germany.
- The slate cannot bleed rust stains.

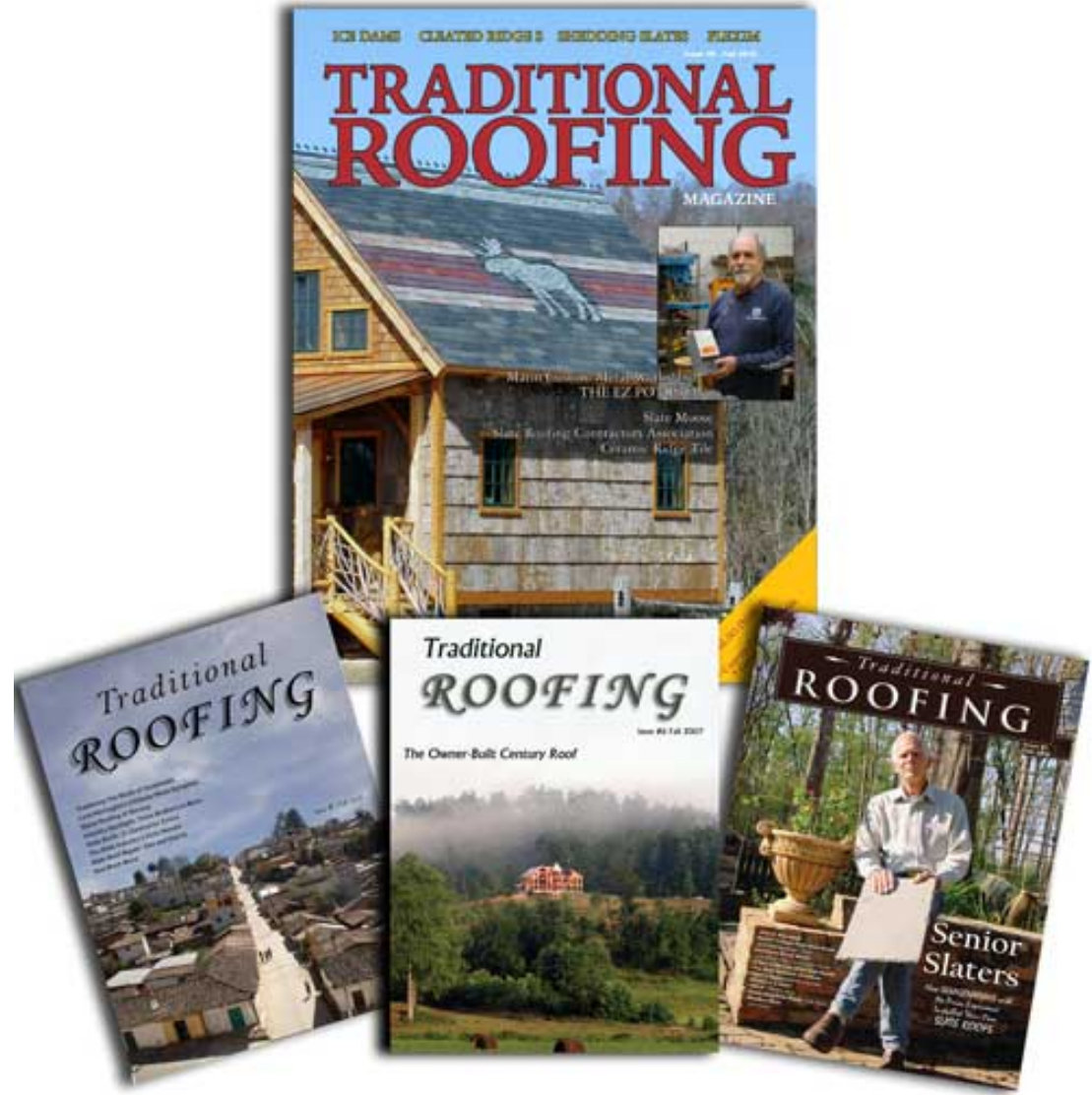
Home-owner satisfaction: The slate cannot bleed rust stains. If this happens, this is the “kiss of death” for Spanish slate.



Quality Control

- The slates must come from a known, trusted and respected source.
- This is a problem with Chinese slate imports today (unknown sources). Some slate suppliers have gone bankrupt by selling poor quality Chinese roofing slate.
- We must be guaranteed that the slate is highest quality with no chance of pyrite bleeding.
- The slate must be manufactured for the American market (proper thickness, nail holes).

Our magazine, Traditional Roofing, may provide an opportunity to re-introduce the American roofing community to Spanish slate. Perhaps a “special issue” on Spanish slate would be helpful. We should discuss this possibility.



Muchas Gracias.
Please visit my web sites for
additional information.

SlateExperts.com

TraditionalRoofing.com

SlateRoofWarehouse.com