

# 28<sup>th</sup> RCI International Convention and Trade Show



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Orlando, Florida  
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# How to Survey a Slate Roof

*Joseph Jenkins*

Joseph Jenkins, Inc., [SlateExperts.com](http://SlateExperts.com)

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# Joseph Jenkins, Introduction:

1. Began working on slate roofs in PA in 1968
2. Published Slate Roof Bible, 1<sup>st</sup> edition, in 1997
3. Started slate roof consulting in 1998 at Ford's Theater, Washington DC.



# Ford's Theater: Built 1863 Lincoln assassinated 1865

1. Buckingham slate roof
2. Two leaks in roof
3. Roof was being considered for replacement after 135 years.
4. U.S. Park Service needed a professional opinion.



My findings: the roof itself was not leaking and was only 30 years old.

The main leak was in the copper parapet coping joint where a soldered seam had popped open.



The second leak was in a wall flashing on the adjacent building.



Taxpayer  
savings due to  
professional  
consultation  
services:

\$400,000.00

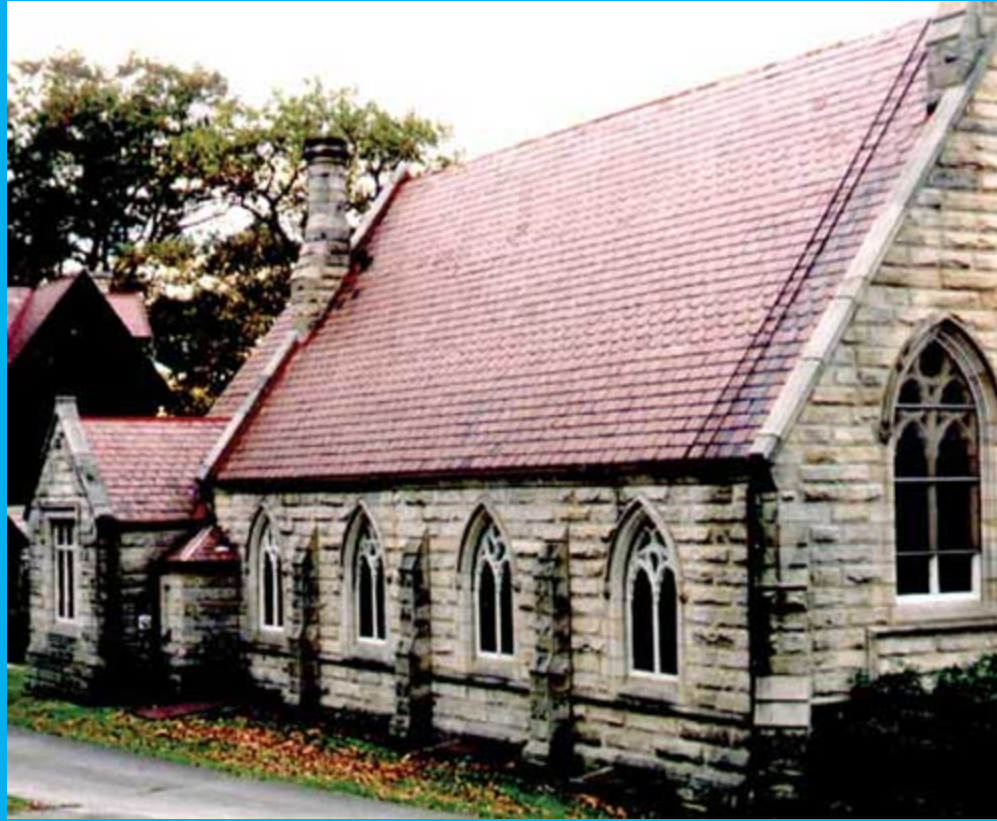


Fifteen years later, what have I learned about slate roof surveys that I can share with you in 90 minutes?





# Part 1) Slate Basics



# A typical American Slate Roof:

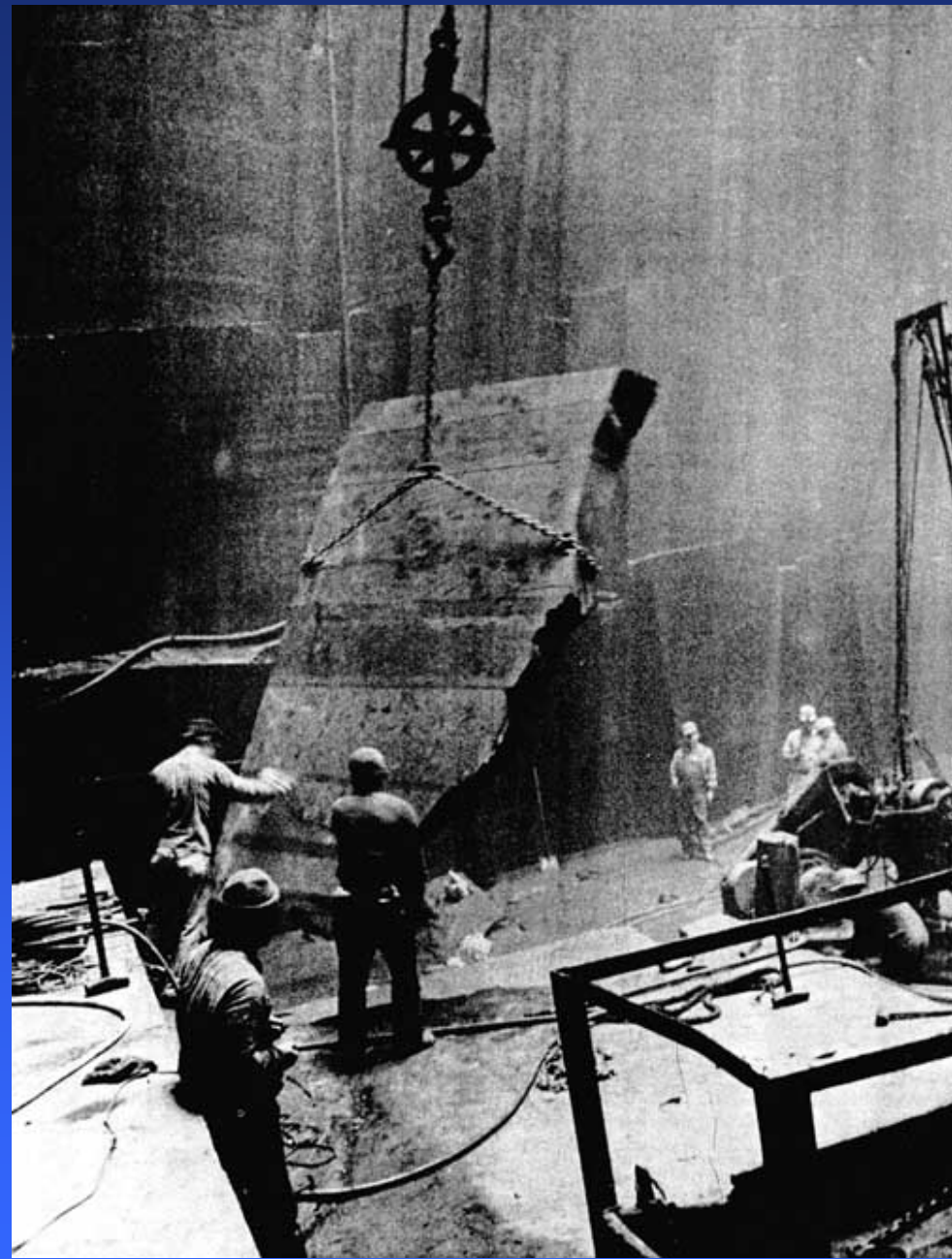
1. Stone shingles
2. Nails
3. Wood decking
4. Metal flashings



# Stone Shingles are quarried:



The stone is brought to the surface.



Slate has  
natural  
cleavage  
planes.



Split slabs  
are sawn  
into blocks.



Blocks are  
split into  
shingles.



The shingles are trimmed square to standard sizes.

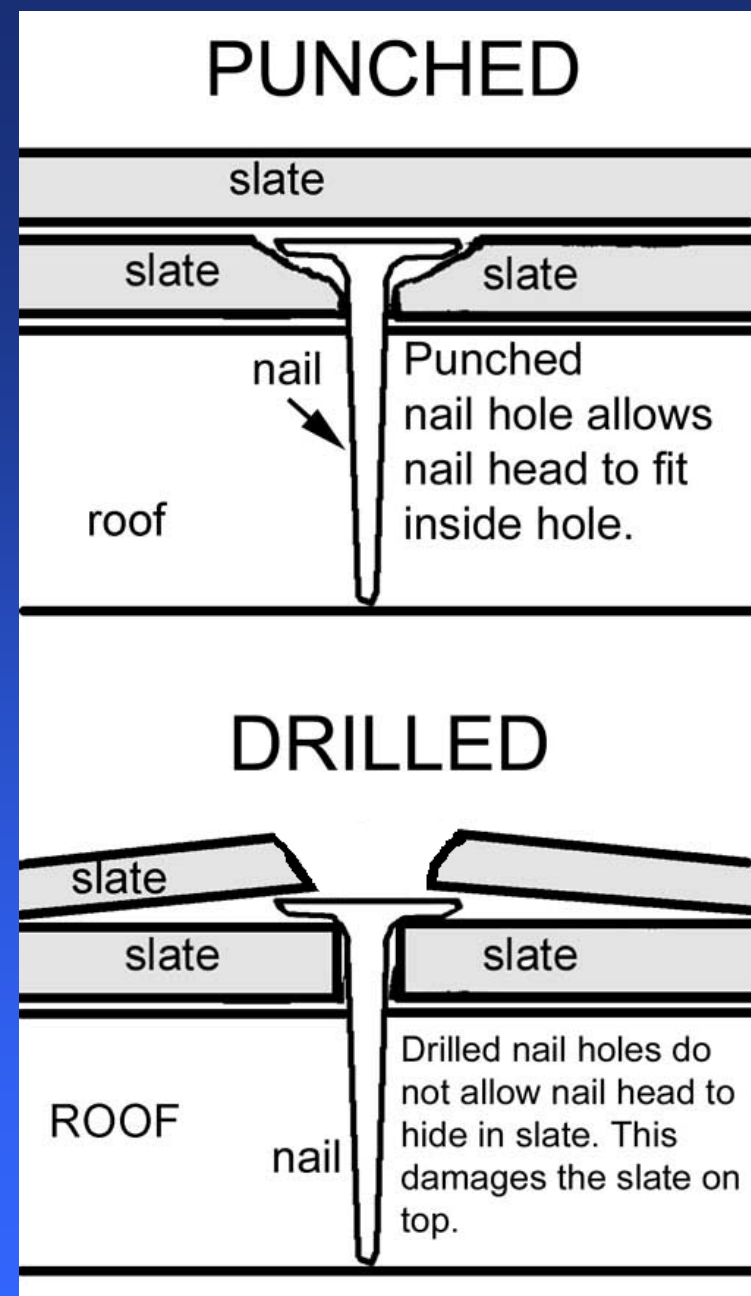




Nail holes  
are punched  
into the  
shingles.



Punched holes allow for the slating nail head to be countersunk into the slate. Thicker slates need to be drilled.



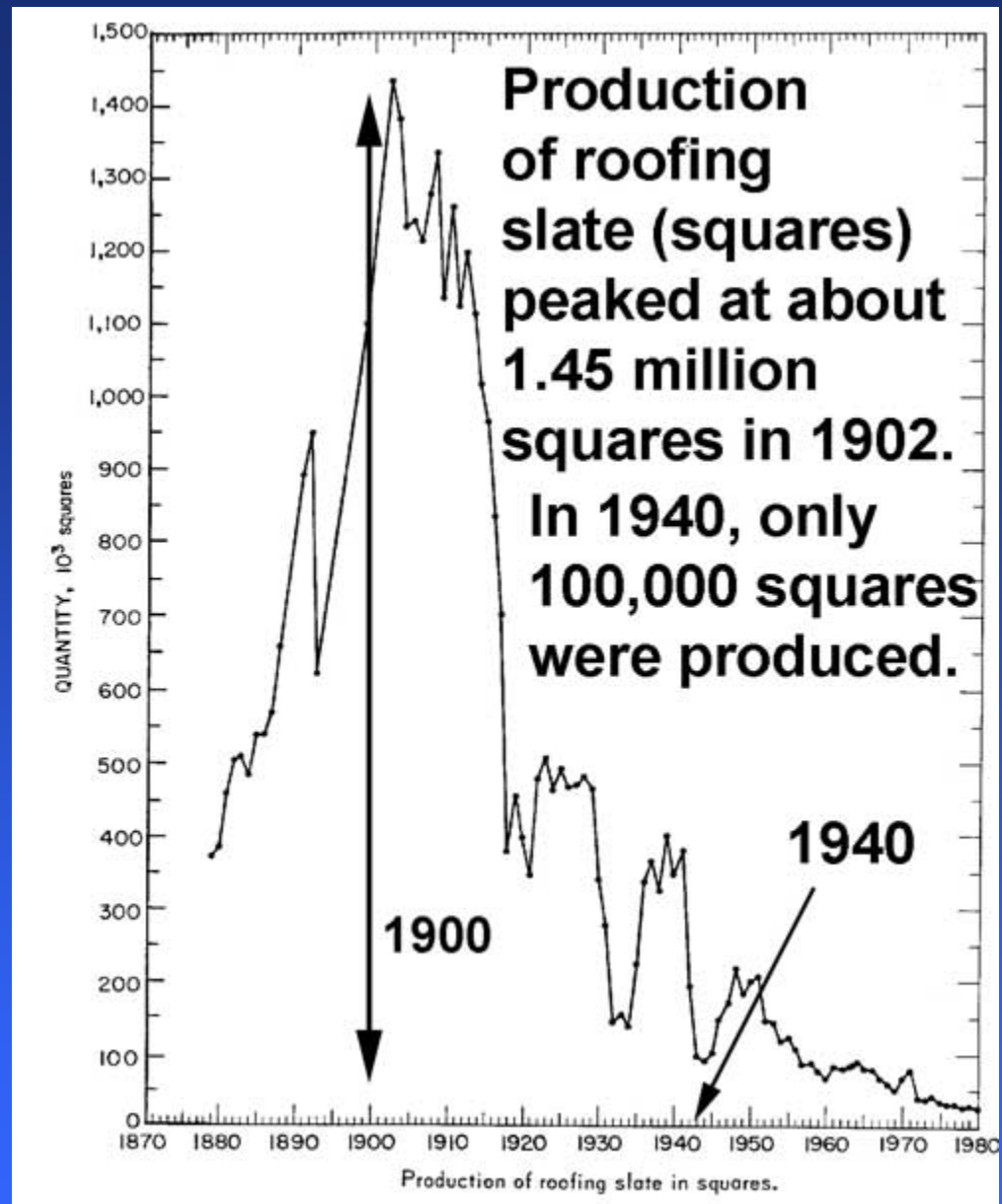
This is what it will look like after a nail head rubs on an overlying slate for too long. This is also the result of “undernailing.”



# Slate is still quarried in North America.



U.S. production peaked between 1890 and 1920. Most existing slate roofs are old.



Roofing slate is rated according to ASTM standards.

## Rating the Quality of Roofing Slate

Grade	Service Life (yrs)	Breaking Load min lbf (or N)	Absorption max, %	Depth of Softening, max. in. (mm)
S1	over 75	575 (2558)	0.25	0.002 (0.05)
S2	40 to 75	575 (2558)	0.36	0.008 (0.20)
S3	20 to 40	575 (2558)	0.45	0.014 (0.36)



# S1 slates can last 200 years.



# There are many types of slate.





This is Vermont purple slate.



This is a blend of types and sizes.



This is slate  
from India.



# Mixed Vermont types.



Mixed  
Vermont  
slates.



Bangor  
Pennsylvania  
slates. Note the  
white edges.



Bangor  
slates  
again.



# Vermont unfading green slates.





# Buckingham, VA slates, 1879 (134 Years old)



# The original slating nails (134 Years old).



# Spanish slates



Spanish  
slates can  
have rust  
problems.



American  
slates can  
also have  
rust  
problems,  
but it's much  
less likely.



# Chinese green slates



# Defective Chinese black slates.





# Chinese multi-color slates



# Defective Chinese multi-color



# Asbestos shingles: NOT slate!



# Part 2) Installation Basics



# Get a copy of the SRCA Installation Guidelines at SlateRoofers.org.



## Slate Roofing Contractors Association of North America, Inc.

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*143 Forest Lane, Grove City, PA 16127 USA; Ph: 814-786-7015*

### **GENERAL INSTALLATION GUIDELINES FOR NATURAL QUARRIED ROOFING SLATE**

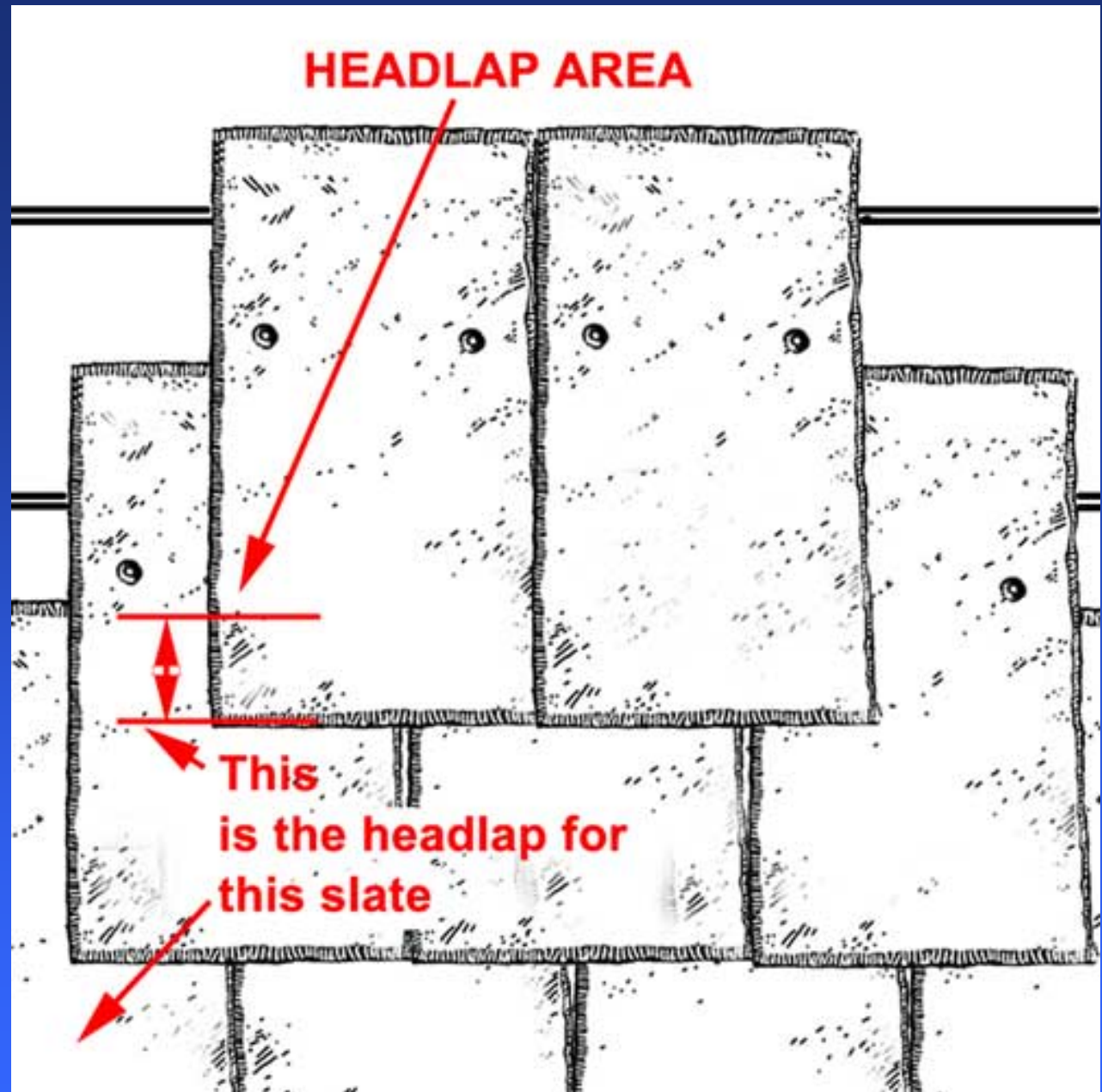
Version 1.2, Published by unanimous vote of the SRCA Board of Directors, 6/23/2012

[Download a Word version of these guidelines.](#)

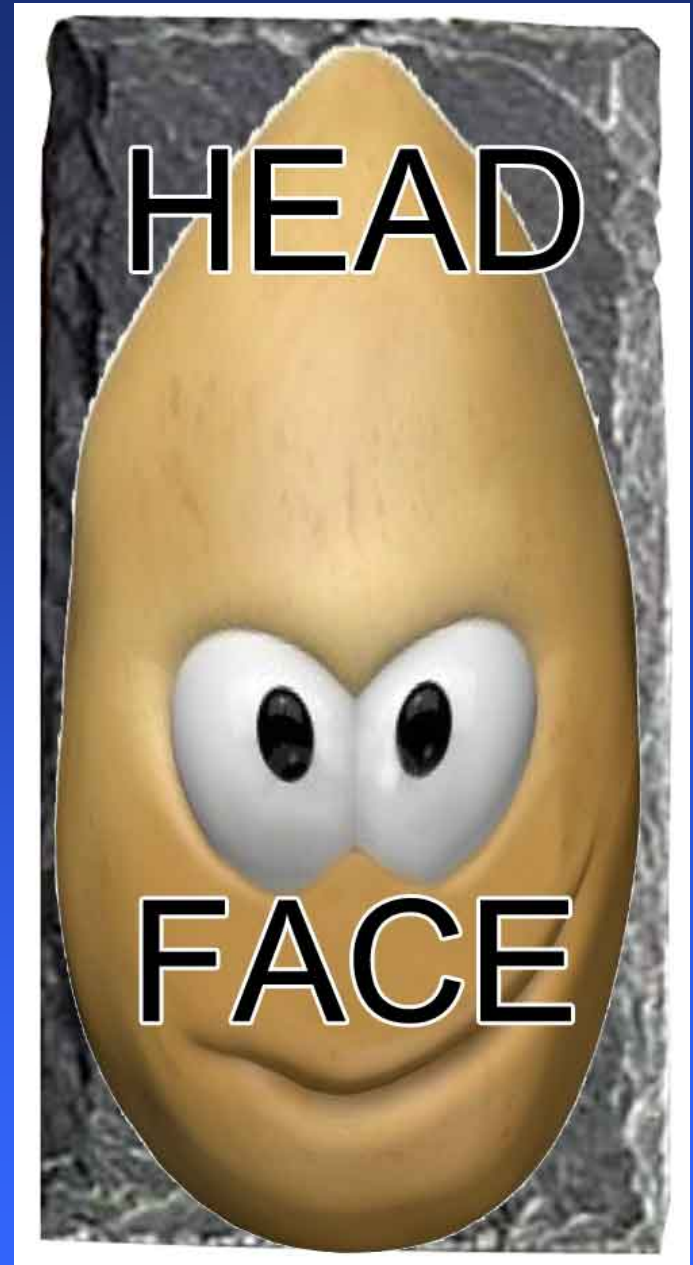


Correct overlap is critical.

Lack of headlap will condemn a new roof.



Imagine that slates had heads and faces. The top of the slate is the “head” and the bottom (what you see on the roof) is the “face.” Headlap only overlaps the head.



Headlap is generally 3 inches. Here you see one inch of headlap. This new slate roof had to be removed and replaced.



This was the building – a shopping center.





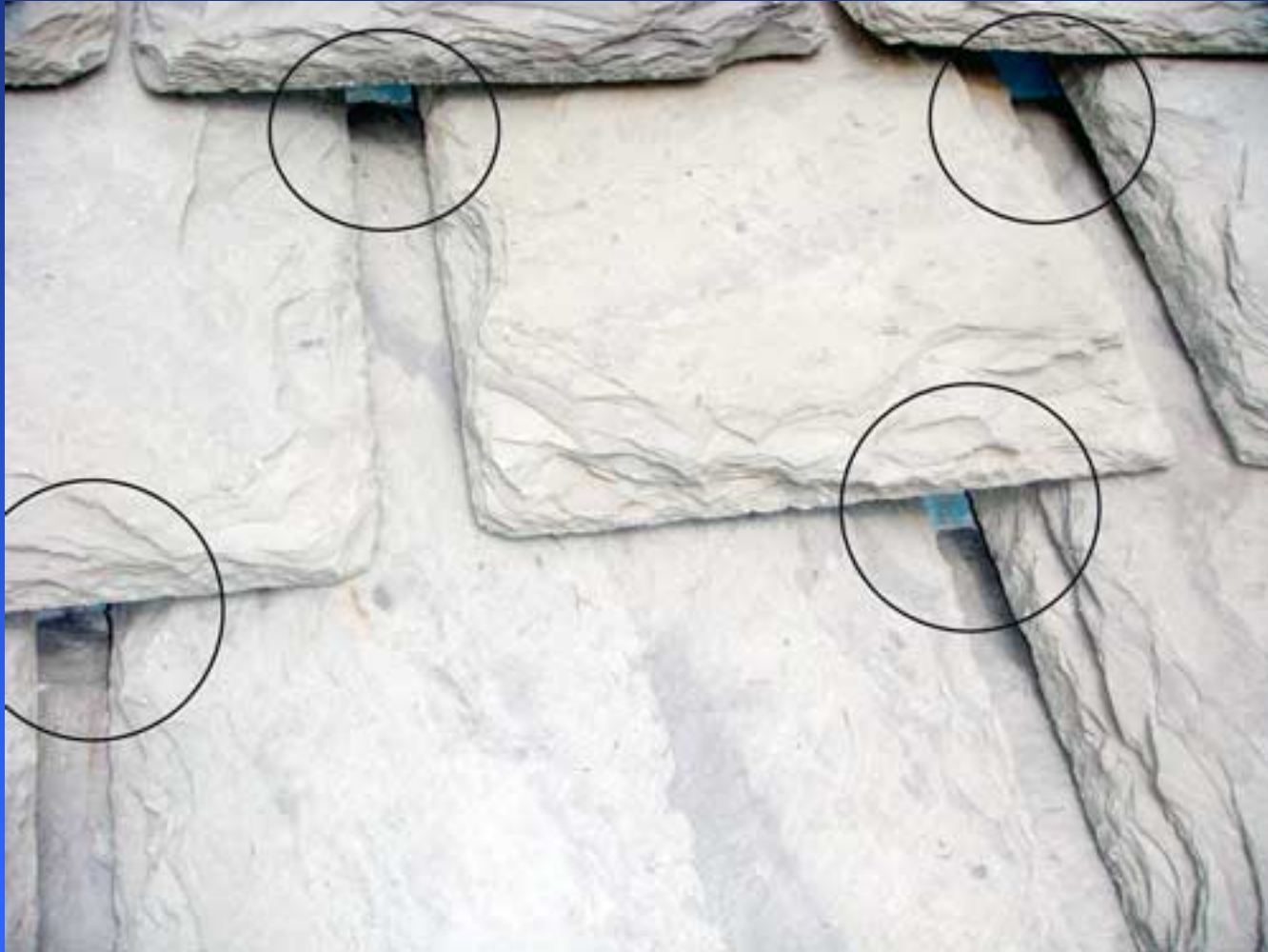
Here is stark evidence of negative headlap. This roof also had to be completely removed and reslated.



This is what that roof looked like.



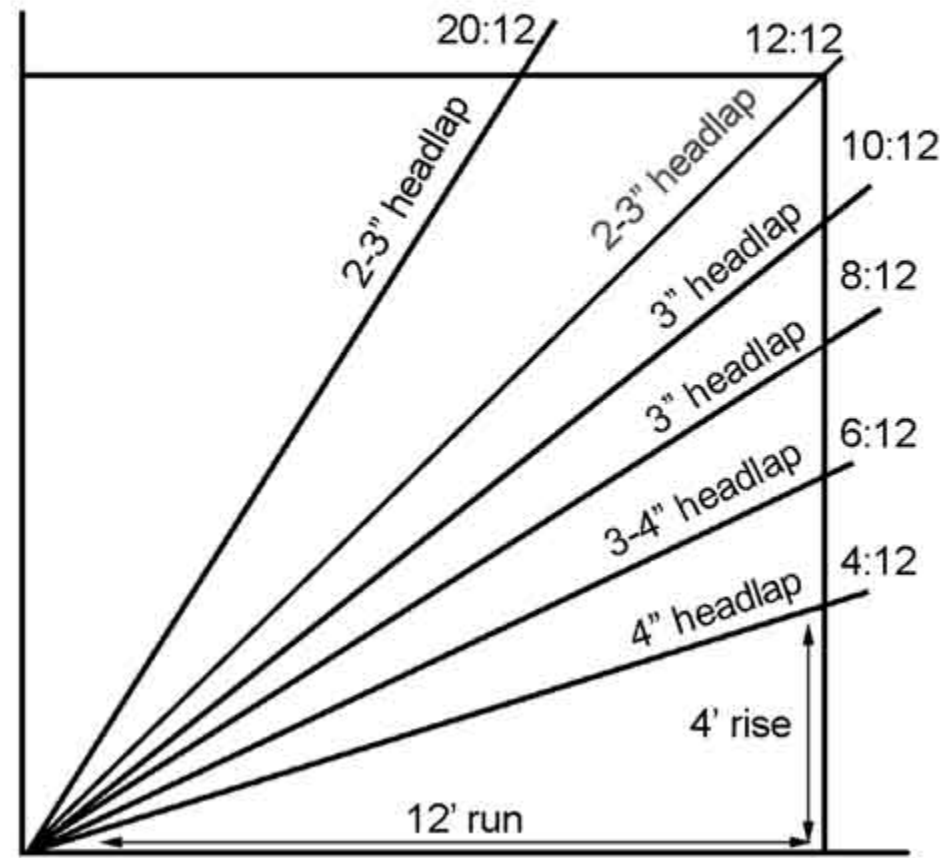
# Another look at zero headlap.



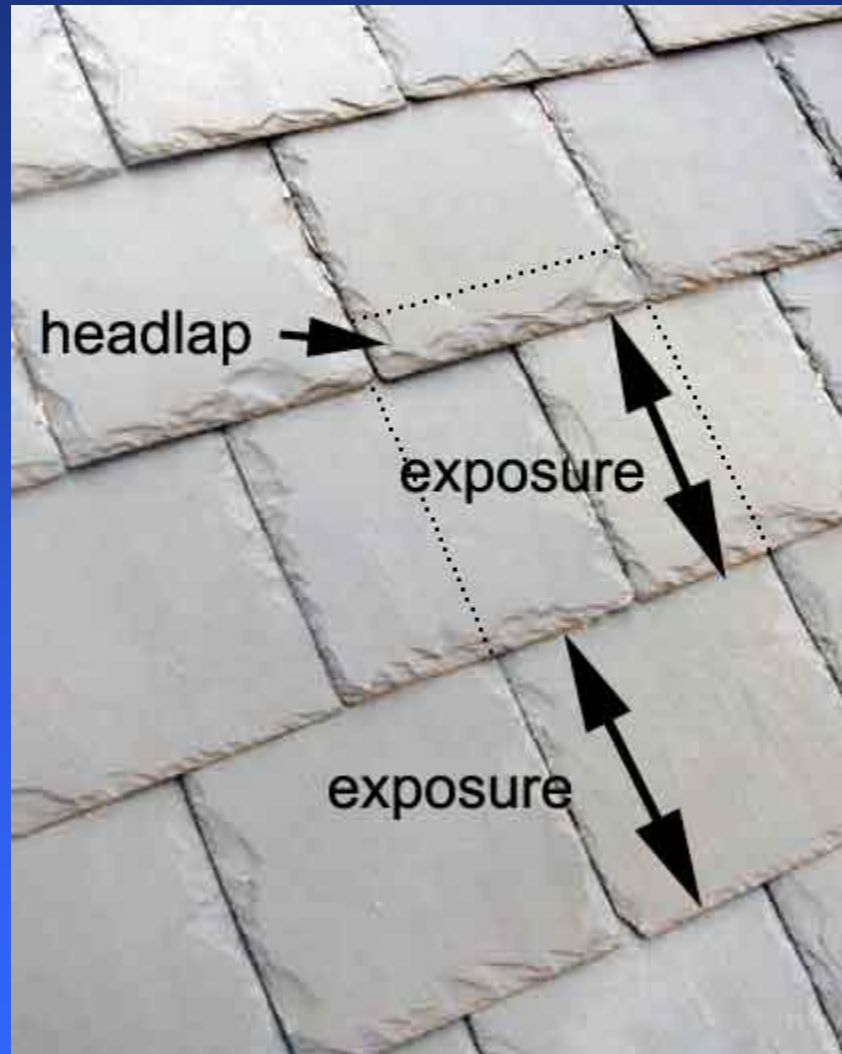
Headlap will vary with slope. The steeper the roof, the less headlap needed (2" min.).

Note that slate roofs are not to be installed on slopes less than 4:12.

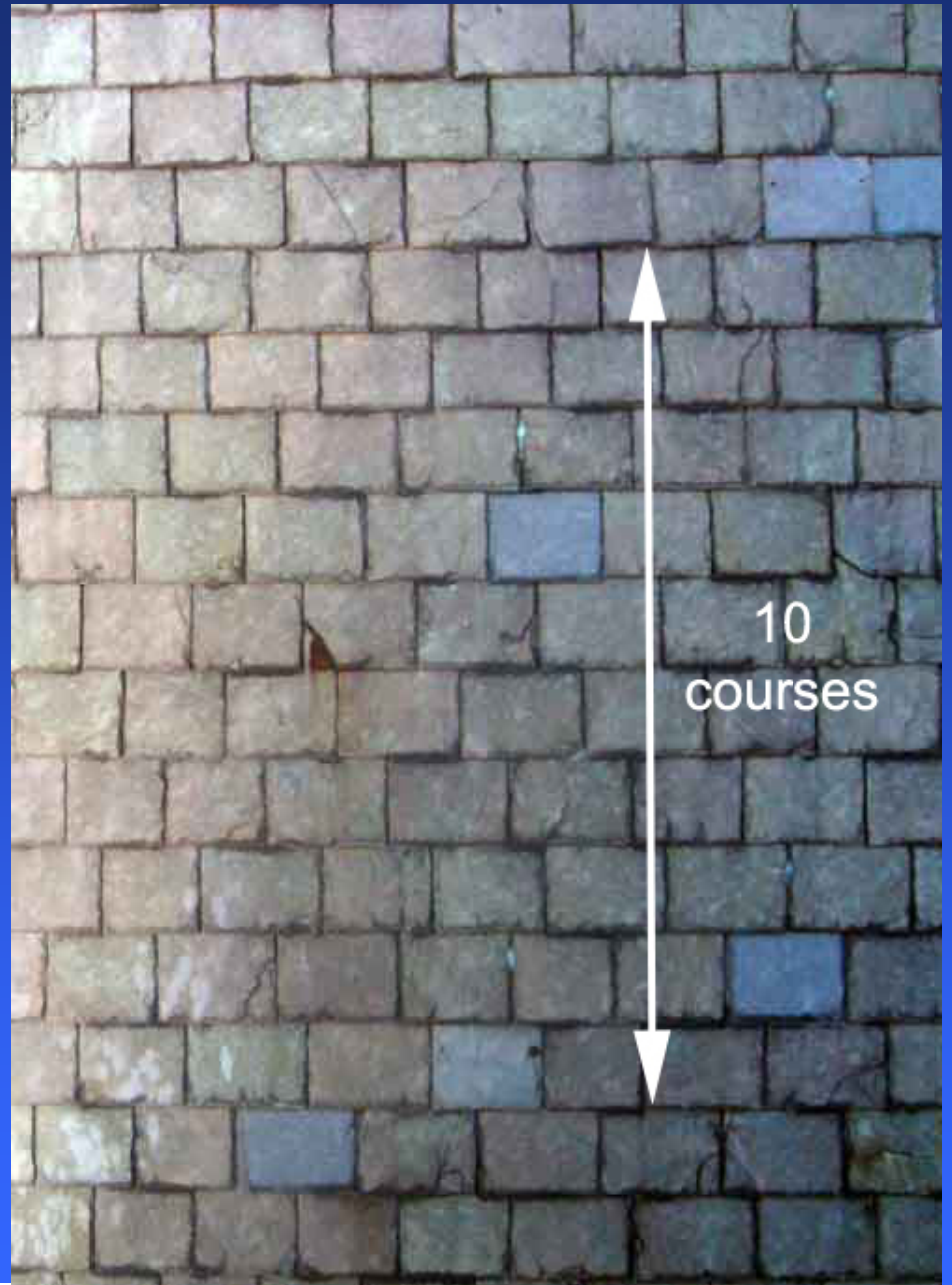
Recommended Roof Slopes for Slate Roofs  
(showing minimum headlaps)



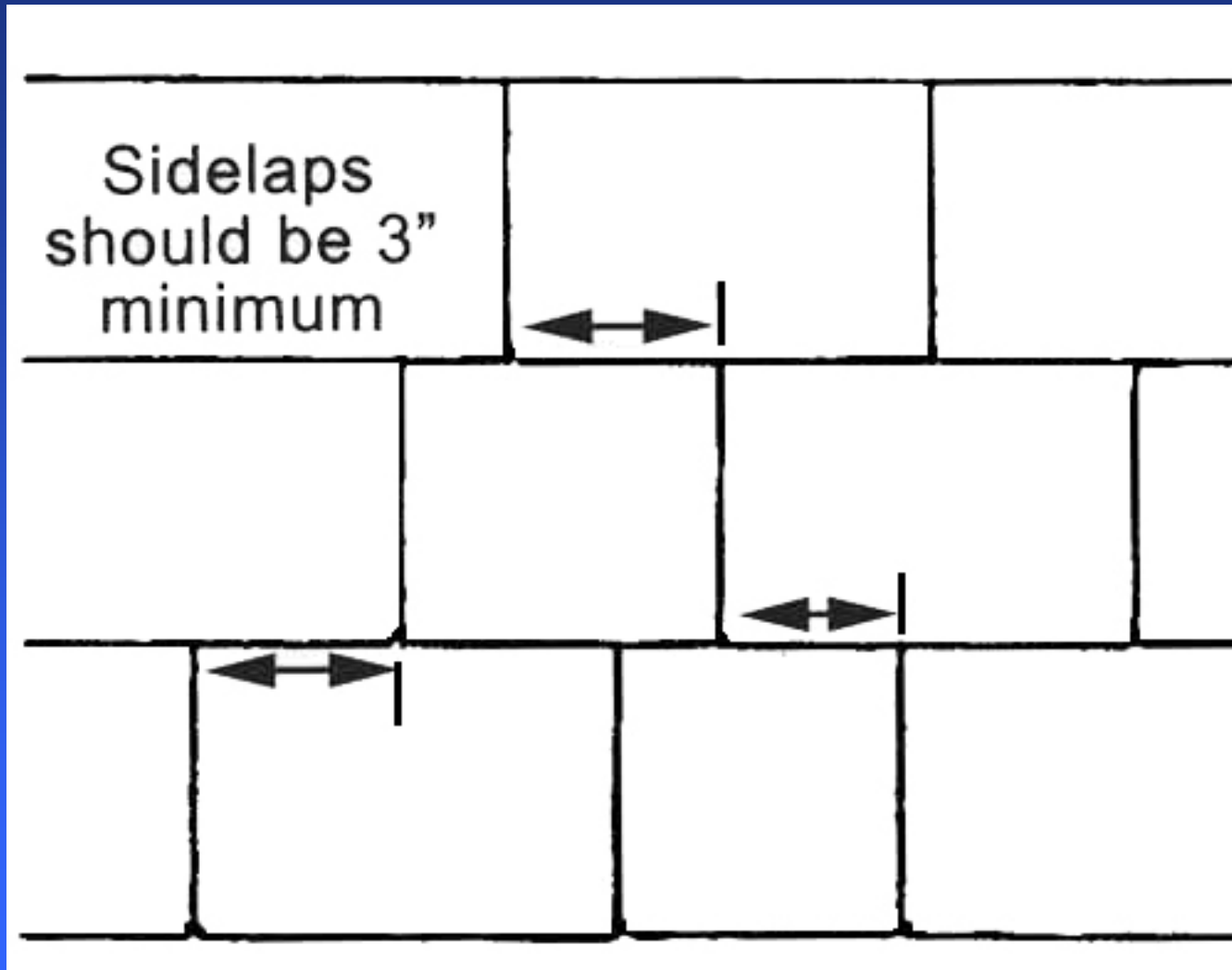
Headlap = slate length minus 2X exposure



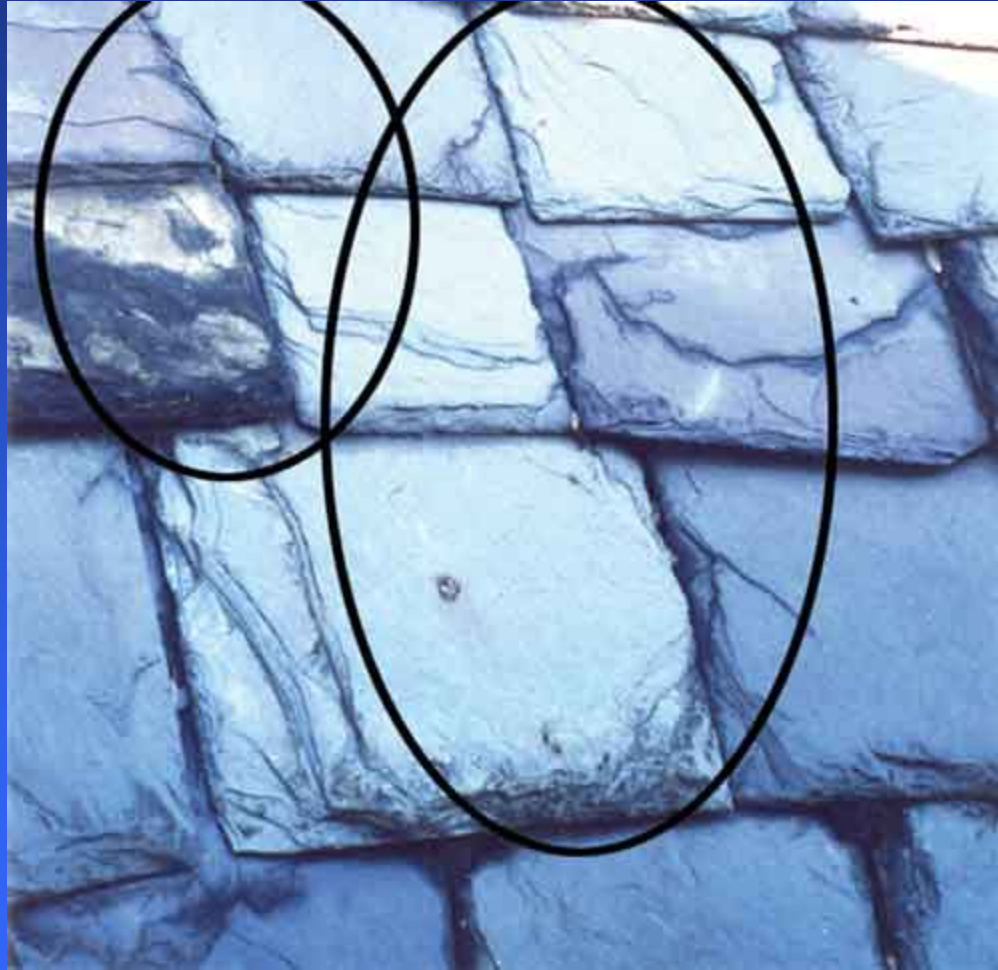
Measure 10 courses vertically, divide by 10 for an average exposure. If you know the slate length, this will also give you an average headlap for that portion of roof. Repeat on other roof surfaces.



# SIDELAPS: should be 3 inches minimum



# Incorrect slate installation:



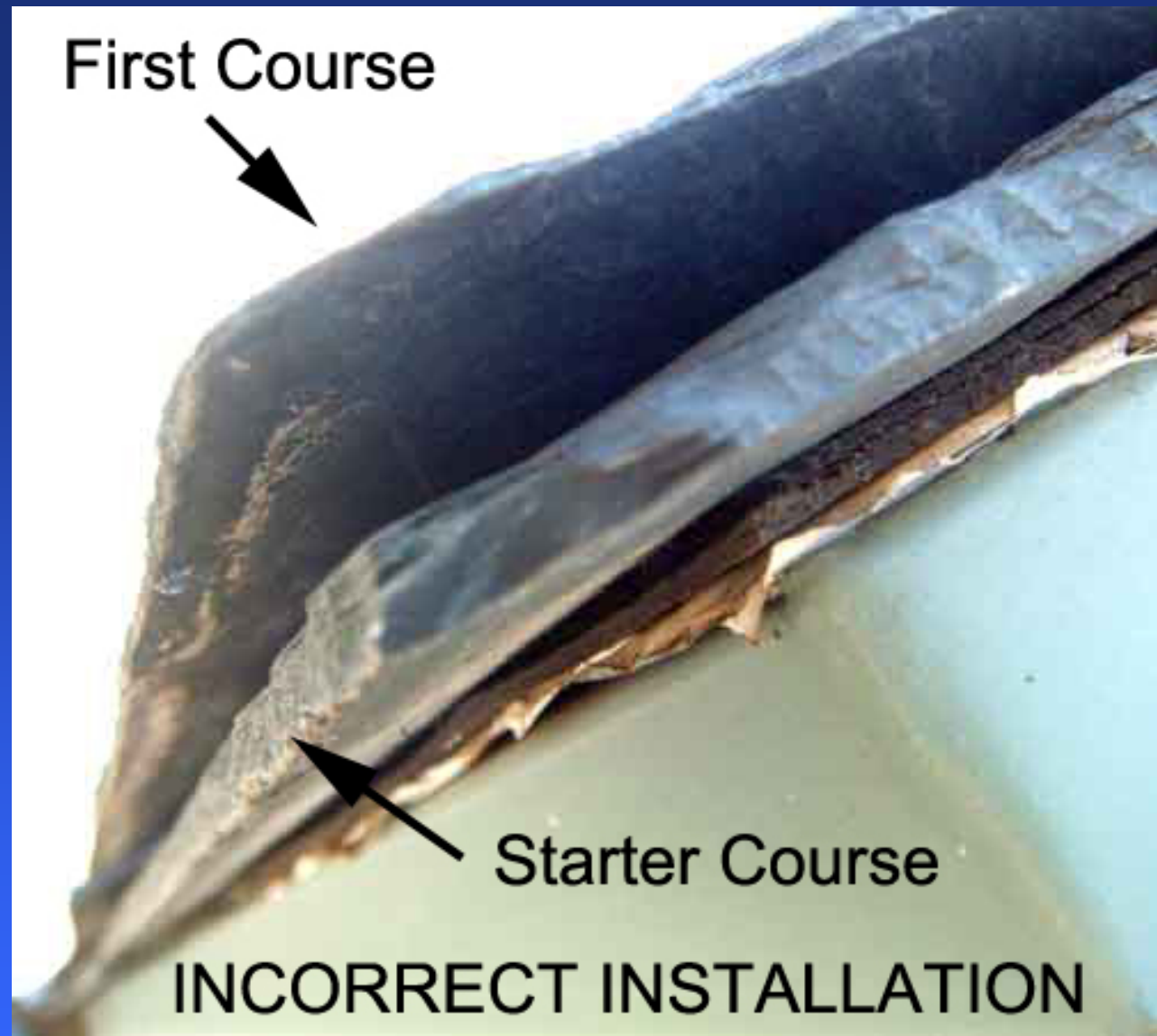


# Starter Courses Mistakes

1. Lack of headlap
2. Lack of sidelap
3. Starter laid face up
4. No cant



The starter slate and first course should be back to back. There should be a cant under the starter.



Correct: back to back slates



Incorrect starter:  
not enough sidelap



Cants for the starter course can be a wood strip or can be built into a metal drip edge. The cant tilts the starter course to match the field slates.

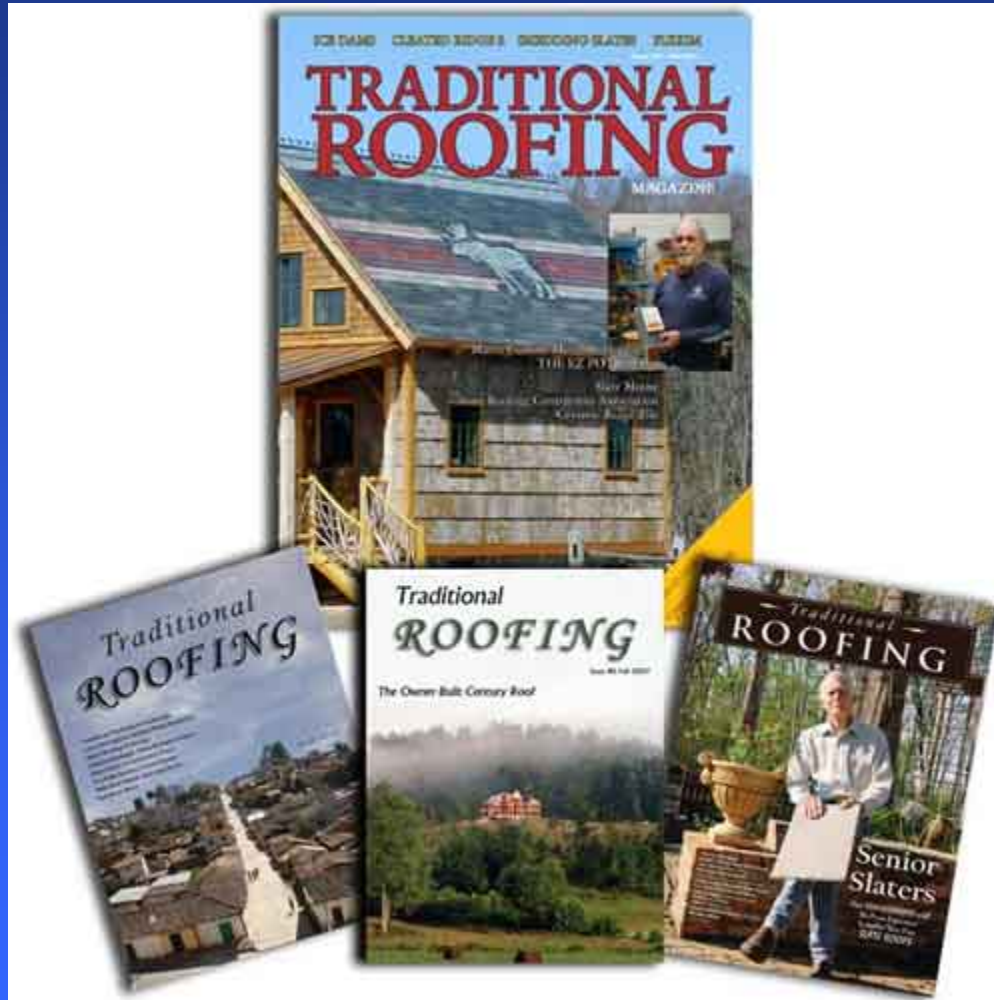


# Correctly installed starter with copper cant:



Articles about headlap, starters, installation, nailing, etc:

[TraditionalRoofing.com](http://TraditionalRoofing.com)



## Part 3: Accessing Slate Roofs

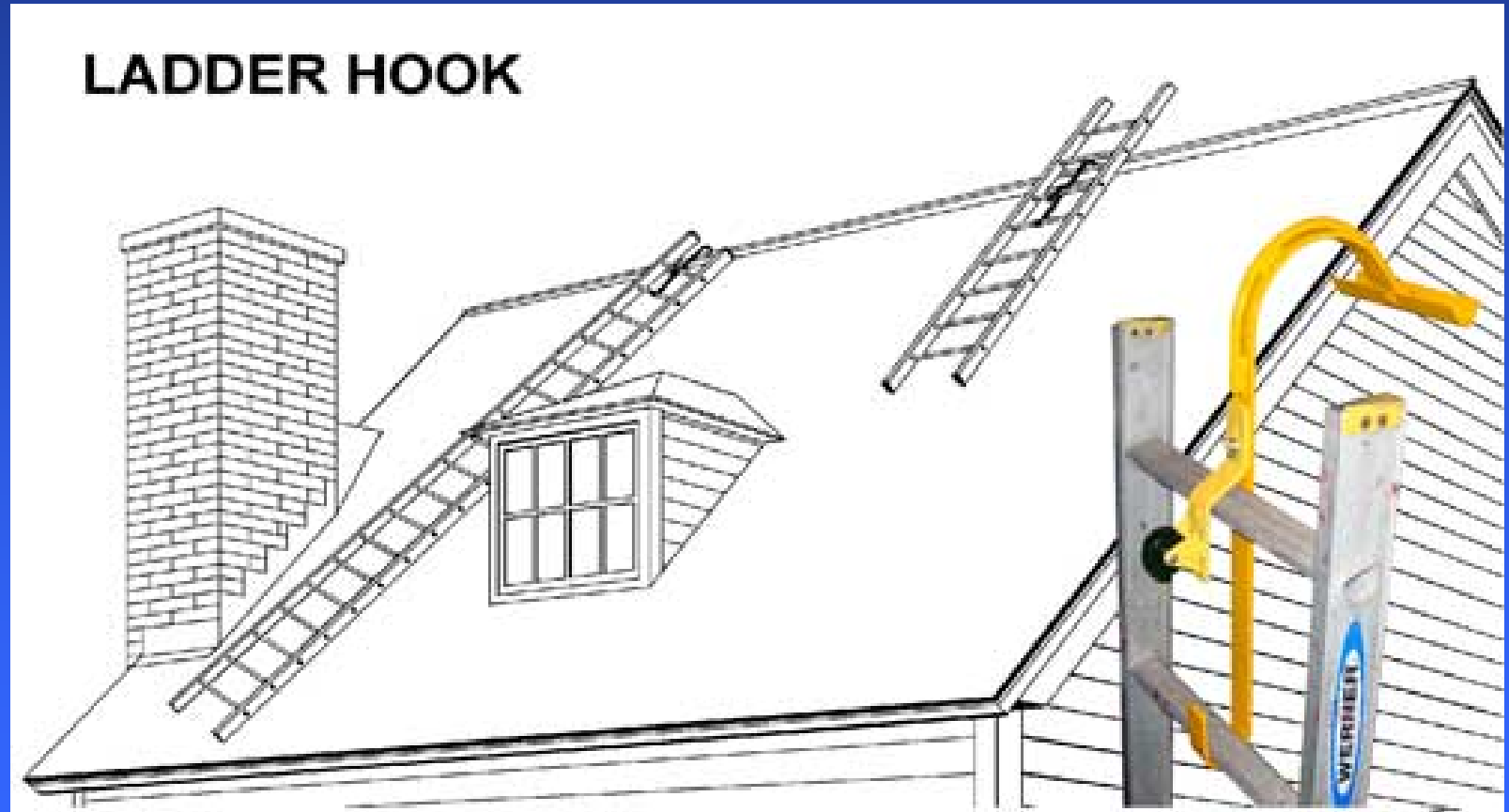
Slate roofs tend to be high and steep. Gaining access often requires creativity.





Ladder hooks can allow access.

## LADDER HOOK



A combination of ladder hooks, roof jacks and planks can get you almost anywhere on a slate roof, providing you can reach the roof with a ground ladder.



The view looking down from the 2<sup>nd</sup> set of roof jacks.



The hook ladder at the peak. This new roof was leaking at the peak in two places, so access to the peak was necessary.



Ridges, hips and valleys can usually be carefully walked or crawled on, but wear soft-soled shoes. Avoid walking on the field of the roof.



A metal ridge can be crept along if too steep to walk on.



Hip roofs are relatively easy to access because hips can be climbed up and down.



I was able to access this entire roof with only one short ladder.





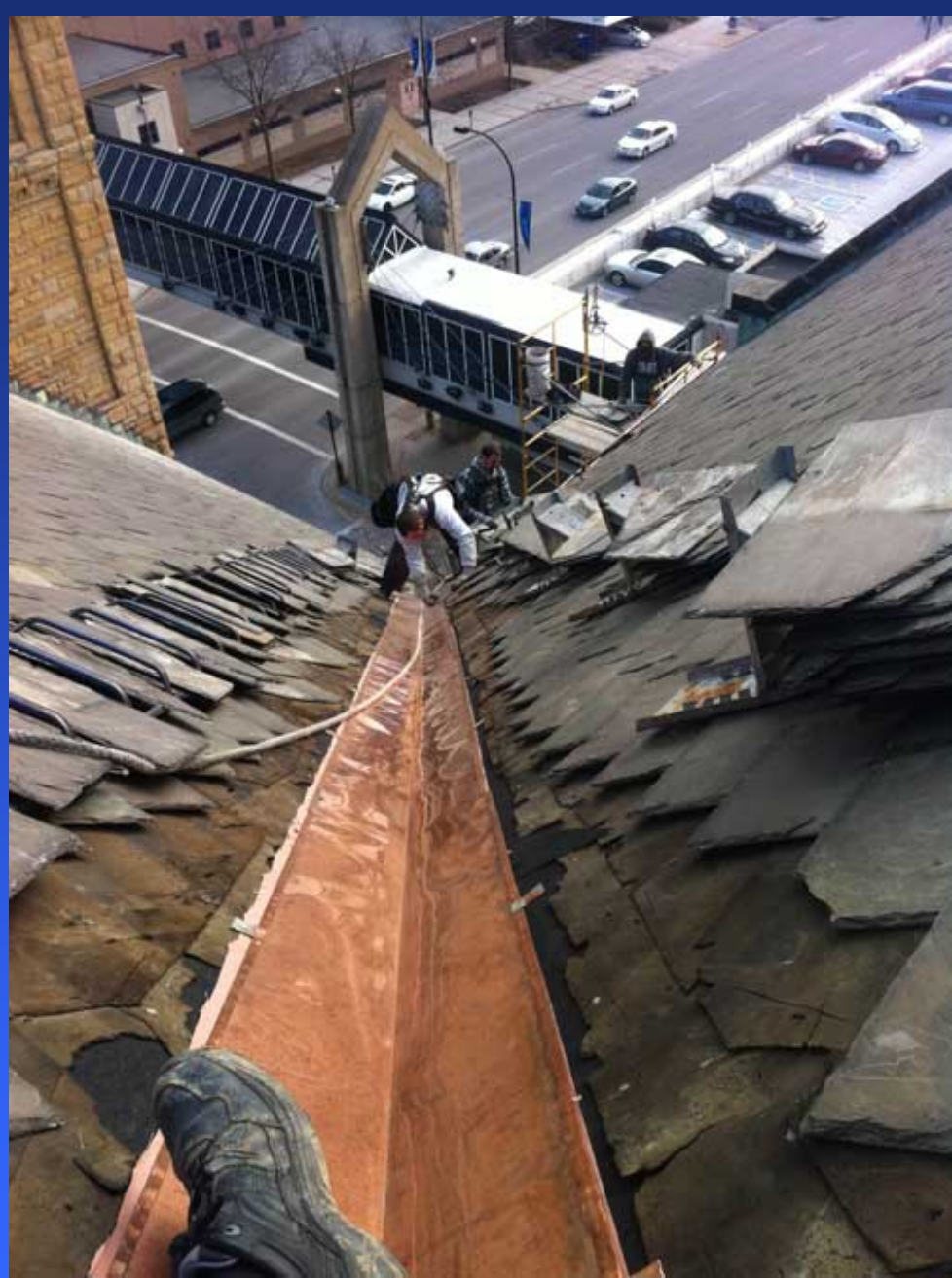
The back side was against a hill. A short ladder allowed access to a hip. Once on the hip, the rest of the roof was accessed via ridges, valleys and built-in gutters.



On this roof,  
workers already on  
the job site had  
scaffold set up and  
a rope to hold on to.



It can be risky using other contractor's roof access equipment, but sometimes it's necessary.



If you're really lucky, scaffolding will be set up around the building.



Of course, there's always the lift, but permits, operators and access can make them undesirable or impossible.



Try to get access to an adjacent building so you can get an overview.



This view is from a public parking garage next door.



Of course,  
don't forget  
Google Earth.





### Images

The following aerial images show different angles of this structure for your reference.

Top View



And make good use of EagleView and other online roof report services.



Report: 3275078

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Serike Forensic

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Page 1



# Part 4: INSPECTING THE ROOF



# What to look for:

1. Anything broken
2. Headlaps
3. Sidelaps
4. Holes in slates
5. Flashing issues
6. Leaking areas
7. Metal incompatibilities
8. Photograph all surfaces



Headlap can often be observed at the gable ends.



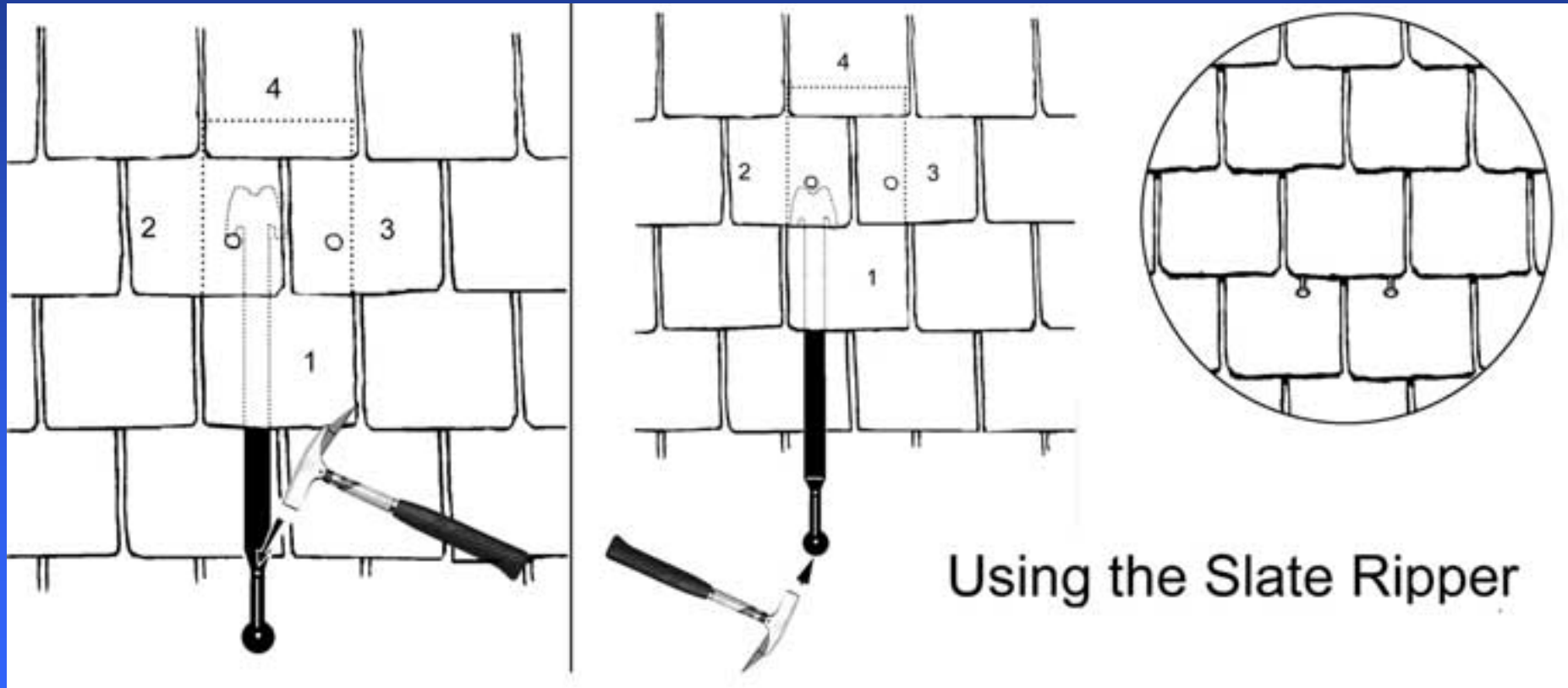
You may have to remove slates to inspect the roof deck or check the nails or headlap. You will need tools.



The basic tools are unique to the trade.



The slate ripper pulls out the nails so you can remove slates. It does not cut them.



A slate can be re-installed using a slate hook.





An angle locator is helpful for consultants.  
It's good to know what the slopes are.



A good digital camera is essential. It should clip on to your belt. You cannot take too many photos! Photograph everything!! These cameras also take video.



Figure 6



# Broken Slates

Most of the fractures shown here are defects in the Spanish slate rock. This is unusual.

# Classic foot traffic damage



Probable foot  
traffic damage



# The wrong way to install a slate roof.



# Scaffold planks allow for a better installation.



Likely foot  
traffic  
damage





# Foot traffic damage



Look for accuracy of layout.



A crooked layout will have headlap issues.



Any loose nail will leak.



# Incompatible Metals



# steel shank copper rivet



Rusting rivets coming through lead solder.



Built-in gutters often have problems.





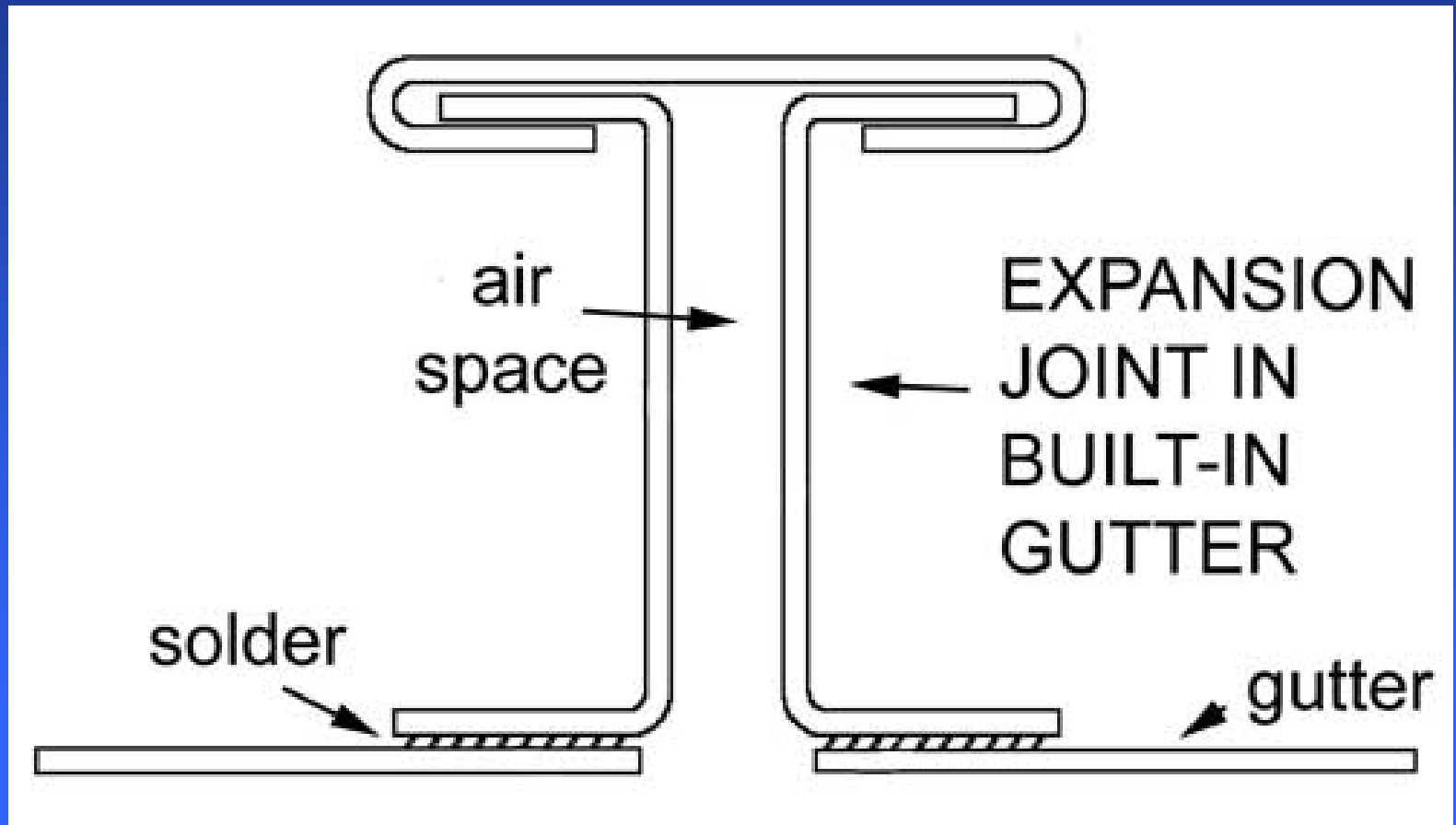
Solder joints will pop.



Expansion joints are needed in built-in gutter systems.



The expansion joints take the strain off the solder joints.



An expansion joint  
under construction.  
These can be  
added retroactively.



# Part 5: CASES



New roof, Indian slate, had to be completely removed and reslated.



New roof, Vermont slate, had to be completely removed and reslated.



New roof, Chinese slate, had to be completely removed and reslated.





New roof, Chinese slate, had to be completely removed and reslated.



New roof, Chinese slate, had to be completely removed and reslated.



QUESTIONS?

Thank you for attending!

