

# INSTALLING A GRADUATED SLATE ROOF

By Barry Smith

While visiting Edinburgh, Scotland, in November 2000, I was fascinated to see thousands and thousands of graduated slate roofs. Scottish slate, it was explained, can't be split into smooth and regular pieces, so orders were traditionally filled with different sizes of slate. These would be sorted at the job site and installed with the larger slates at the bottom and gradually smaller slates on up the roof. Fortunately for Scotland, this frugal practice produces a beautiful and distinctive roof that looks appropriate on both mansions and barns.

Graduated roofs are uncommon in North America because we have many types of very fine-grained slate that can be used to produce uniform thickness and sizes of roofing slate. A uniform slate roof requires less labor to install and is therefore less expensive, so this has always been the norm. As a result, the few graduated roofs to be found tend to be on higher-end buildings. These roofs were installed to give the building an elegant European look. I was therefore very interested when contacted by an upscale contractor in Erie, Pennsylvania, to bid on a graduated purple slate roof for a new garage, being built to match the bay-front mansion beside it.

After meeting the contractor and home owner at the building site and discussing their plans, a sampling of measurements was taken from the slate on the house to determine what sizes to order. The slates were about 70 years old and in great shape. They ranged in thickness from 3/8" to 3/4", giving the roof a very textured look.

Matching the roof exactly was going to cost a lot more than an approximate match. So I had several slate companies quote on 3 different options, all involving purple slate. First: 4 different lengths in descending ratios; 40% of 22", 30% of 18", 20% of 16", and 10% of 12". Each of these came in 3 to 5 different widths, and ranged in thickness from 3/8"-1/2". Second: The same as above except thinner; 1/4" to 3/8". Third: 20" long slates by random; 1/4"-3/8". The thicker slate was obviously more expensive than the thinner, but the installation labor was the variable that

was most affected by each of the options above. Finally, I was able to give them a proposal with the 3 options, with the closest match being the most expensive. They decided on the middle option, thinner slate, but still graduated.

## LAYOUT CALCULATIONS

The roof was just over 13 squares, but because of valleys and hips, starter slates, capslates (instead of ridge iron), the need to balance all the different sizes, and the need for extras to do some work on the house, I

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Putting the finishing touches on one side of garage, Erie, PA. Most of the faces had hips on both sides so we started in the middles and worked our way to the edges. Note how the steep roof pitch allowed us to lay ground ladders right on the roof, thereby avoiding the need for any roof planks.

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decided to order on the heavy side. In the spring of 2001, we took delivery of 19 squares of slate, consisting of 17 different sizes, from Evergreen Slate Co. For the remainder of this article, I will assume that the reader has read *The Slate Roof Bible*, especially Chapter 12, or already has a working knowledge of basic slate installation.

When we arrived at the job site, my employees, Mark and Mildred (don't ask), were ready to pound some nails. However, I knew that this was going to be a bit trickier to get started than the normal job. I scrambled to get the calculations done to keep ahead of them. I counted all of the different sizes and verified that the above ratios were delivered and then determined the ratios of the various widths within each length.

With the above numbers, the chalk-line layout could be determined. I calculated the area that the 22" long slates would cover (40%) and determined the number of courses of this size. The chalk-line interval for these courses would be 9 ½", assuming a 3" headlap. ((22"- 3" headlap) divided by 2 = exposure). There were 5 different widths of 22" long slates that broke down accordingly: 11" (9%), 12" (29%), 14" (59%), 16" (1%), and 18" (2%). We used these percentages to guide us when carrying up the slate so that we wouldn't run short on any of the widths before the roof was completed.

After determining the starter course chalk-line and the required number of courses of 22" long slates, it was time to graduate down to 18" slate chalk-lines (7 ½", which were to cover the next 30% of the roof. The key to doing this involves a transitional row of 20" long slates, the length being arrived at by averaging 18" and 22". **The top of the transitional slate is treated like an 18" slate**, because it uses the same chalk-line interval as the 18" long courses (18"- 3"headlap divided by 2 = 7 ½"exposure); **however the bottom of the transitional slate acts like a 22" slate**, because it has a 9 ½" exposure.

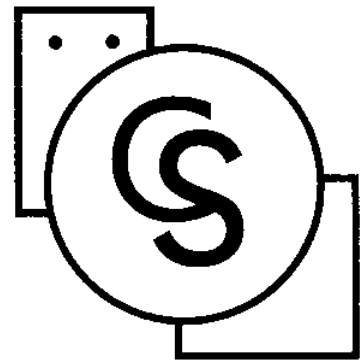
Between the 18" long slates and the 16" slates, the transitional row is 17" long with a chalk-line interval of 6 ½", which is the same for the rest of the 16" courses (20% of the roof).

The last transitional row is 14" long, with the chalk-line interval stepping down to 4 ½". This, as before, is the interval for the rest of the 12" long slates (10% of the roof). As you might imagine, this took several attempts before all of the numbers were worked out. We went through this process on the roof itself, and once we were satisfied that we had the right measurements, we each drew up a "key" on an index card that told us everything we needed to know about each of the 23 courses: chalk-line measurement, slate length, and the percentage of each width within each length (see below).

At last we could start nailing! As each slate was installed, care was taken to maintain at least a 3" lateral lap

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relative to the slates being covered below. This slows the process considerably, compared to installing uniform width slates. Referring to our keys frequently slowed the process further. As each side was completed, the remaining slates would be recounted to make any needed adjustments to the percentages of widths within each length. The final product was a very good match, both in color and style, and the difference in slate thickness on the house and the new garage was hardly noticeable, making that compromise seem like a reasonable one. With the addition of copper half-round gutter and spouting, the new garage was beautiful, and will remain so for many, many years. ■

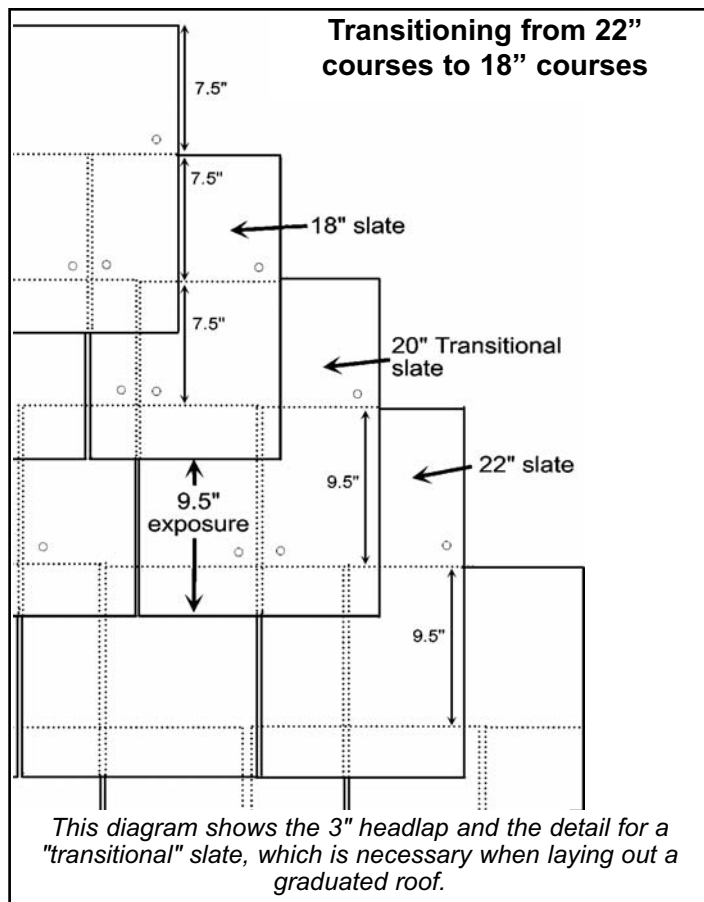
Layout Key Below (see also illustration at right)

23	<b>Caps</b>		11	94	
22	155.5	x 8" (28%)	10	86.5	x 9"(26%)
21	151	<b>12"x 9"</b> (37%)	9	79	<b>18"x10"</b> (45%)
20	146.5	x10" (35%)	8	71.5	x11"(29%)
19	142		7	64	
18	137.5	<b>14" Transition</b>	6	56.5	<b>20" Transition</b>
17	133		5	49	x11" (9%)
16	126.5	x 8" (13%)	4	39.5	x12" (29%)
15	120	<b>16"x 9"</b> (31%)	3	30	<b>22"x14"</b> (59%)
14	113.5	x10" (45%)	2	20.5	x16" & 18" (3%)
13	107	x11" (25%)	1	10.5*	<b>22"x12" Starters</b>
12	100.5	<b>17" Transition</b>			

\*Note that the headlap on the starter course is only 2 1/2" since a 12 1/2" wide slate would be a special order and is unnecessary.

## INTERNATIONAL PRESERVATION TRADES WORKSHOPS 2002

The Preservation Trades Network and the Vandalia Heritage Foundation will hold the 6th Annual International Preservation Trades Workshop in Fairmont, West Virginia, August 2-4, 2002. The IPTW features demonstrations, exhibits, and seminars in many areas of the historic preservation trades. PTN has been instrumental in building a worldwide community of preservationists who share a hands-on knowledge of the process of historic preservation. Cost is \$330 for members and \$370 for non-members (after June 14 it's \$355 for members and \$395 for non-members). Membership fee for PTN is \$45 individual, \$25 apprentice or student, \$300 business or institution. Membership payment can be sent to PTN, 731 Hebron Ave., Glastonbury, CT 06033. To register or for additional information visit [www.ptn.org](http://www.ptn.org) or call 860-633-2854.



  
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