Technical Bulletin #13

NATIONAL SLATE ASSOCIATION

Technical Bulletin No. 13: Matching Slate For Repair Or Replacement

All too often the replacement slates used in repair work,[1] or when replacing a slate roof that has reached the end of its service life, do not match the original slates (Figure 1). This is often not done with intention, but rather a lack of knowledge regarding what types of slate are available that might best match those that are being replaced.

New Slate Still Available

Many slate types from the primary commercial North American deposits are still being quarried and remain readily available for use in repair and replacement work. These include those from:

- Arvonia, Buckingham County, Virginia: Typically called "Buckingham" or "Grayson," an unfading black slate with a lustrous surface due to the presence of mica

- Slatington, Lehigh County, and Pen Argyl, Northampton County, Pennsylvania: Typically called Pennsylvania Black, but also known as Pennsylvania Soft-Vein, a

Figure 1: Mismatched Pennsylvania Black slate installed above the pole gutter on a New York/Vermont Semi-weathering Gray/Green slate roof.

weathering, relatively soft, gray-black slate that lightens a bit in color over time

▪ Washington County, New York/Rutland County, Vermont: The slate district straddles the border between the two states, where a wide variety of colors and weathering types can be found, including:

Semi-weathering Gray/Green, also known as Sea Green
Semi-weathering Gray, also known as Vermont Gray
Strata Gray, also known as Semi-weathering Mottled Gray/Black
Semi-weathering Variegated Purple
Semi-weathering Gray/Black, also known as Vermont Black
Unfading Mottled Green and Purple
Unfading Gray/Green
Unfading Green
Unfading Gray
Unfading Red

▪ Saint-Marc-du-Lac-Long, Quebec, Canada: Known as North Country Black, a clear, uniform, unfading black

New slate, even if the same type or from same quarry, will never match an existing slate that has been exposed to the weather due to the patina that the existing slate has acquired. Over time, the new and existing slate will become a closer and closer match, with an indistinguishable match taking, perhaps, decades in some instances.

If undertaking slate repair work and the desire is to match the weathered appearance of the existing slate, many, if not all, of the above slates may also be available from regional salvage companies, but keep in mind that sizes and quantities may vary based on demand and what is available to salvage.

Slate No Longer Quarried

Slates can become unavailable and quarries can cease production for a variety of reasons: the quarries can be too remote from populated areas, thereby increasing transportation costs; there could be excessive overburden or other geological constraints, making it difficult to wrestle stone out of the ground or expand the quarry; the slate might not split readily, thereby increasing the percentage of waste to unsustainable limits; severe weather which has been common in recent years, can cause the quarry to flood; or, a vein of a certain type of stone may just “pinch-out” (be depleted or be impractical to pursue in an open pit quarry). Replacement options for slates no longer being quarried are outlined below, but first some general guidelines are in order:

▪ For slate repair work, the best match is almost always salvaged/reclaimed slate from a salvage company or that harvested (removed) from a small, less visible area of the roof being repaired. Slate taken from the less visible roof area can then be replaced with new slate that is a reasonable match to the existing.

▪ When undertaking roof replacement work and a certain percentage of sound slate is to be salvaged for re-use, it is best not to intermix salvaged slate with new. While the mix of weathered and new might be aesthetically pleasing, it is good practice to keep the salvaged slate on its own, isolated slopes, apart from the new, as the salvaged slate will reach the end of its service life and need to be replaced sooner than the new slate.

▪ When undertaking partial roof replacement, try not to pick a line mid-slope as the dividing line between new and old. Rather, for a more pleasing transition, look for convenient transitions where new and existing will be isolated from each other, such as hips, party walls, or a large cross gable where only two or three courses may be present between the peak of the cross gable and ridge (Figure 2).

▪ Replacement slates used in repair work, whether new or salvaged, should possess a service life equal to or greater than the existing slate being repaired. For example, if a slate roof has an expected remaining service life of 100 years, and some broken or cracked slates need to be repaired, it is best to use replacement slates that have a similar expected remaining service life (see Figure 4).

▪ It is good practice to obtain samples of replacement slates to be used in repair and replacement work before committing to a match. Given subtle shading differences

and the way light can reflect off of slate, in some instances it may even be helpful to install sample replacement slates that are under consideration on the roof to discern the best match.

▪ Matching the size, thickness, and any patterns that may have been incorporated in the roof is just as important as matching the type of slate used in repair and replacement work.

▪ Slate roofs sometimes change color in unexpected ways. For example, older slate roofs in many urban areas may appear to be covered with black slate, but the black color actually derives from heavy deposits of soot over time (Figure 3). The best way to determine the actual color of a slate is to remove a piece and observe the upper portion of the back side. When replacing such a roof, it will have to be decided whether to match the current color or original color.

Figure 2: New North Country Black slate (right) is separated from existing Monson slate (left) by a party wall. When undertaking partial roof replacement, it is best not to place the replacement slate immediately adjacent to existing slate scheduled to remain. Rather, it is recommended that an entire roof area of the replacement slate be installed on a different slope, or otherwise visually separated from the existing slate sections.

Monson District

Slates from Monson, North Blanchard, and Brownville, Piscataquis County, Maine, collectively known as “Monson,” were a dark, unfading black color. Weathered Monson can generally be distinguished from other black slates by a black band along its exposed edges (more so in urban environments) and by the fact that its nail holes were usually drilled and countersunk rather than punched. Monson roofing slate production dropped off dramatically during World War II and largely ceased by 1965, or thereabouts, except for small quantities that remained available via special order until the mid-1970s. (Structural slate – sills, sinks, countertops, etc. – remain in production today, but in a very limited way.)

For slate repair work, the best match for Monson slate is salvaged Monson, which is usually available in small quantities in the secondary (salvage) market. Unfortunately, using

Figure 3: This brown looking slate roof located in Pittsburgh, Pennsylvania, is actually New York/ Vermont Unfading Green slate that has become soiled over the course of approximately 113 years.

Figure 4: The five Pennsylvania Black slates used to repair this c.1924 Monson slate roof with varying exposures are not a good match. Three of the five replacement slates are nearing the end of their services lives (as evidenced by their surface delamination) and will need to be replaced yet again. (Interestingly, the varying exposures mentioned produced a wave effect when viewed from certain angles at grade.)

other types of black slate, whether new or salvaged, to repair a Monson slate roof often results in a noticeable checkerboard or polka dot effect (Figure 4).

When replacing Monson slate, the best replacement slate, in terms of performance, composition, and color is North Country Black. That said, and although both North Country and Monson are unfading black slates, the two are not identical. The North Country black color is more homogenous and consistently darker black than Monson (see Figure 2), while Monson is generally somewhat lighter in color, weathers to a variety of shades (greener or grayer than North Country), and has more tone/hue variables in its black coloration in response to local conditions (e.g., exposure to an urban versus rural versus coastal environment). Buckingham/Grayson may also be considered as a replacement slate, but bear in mind that they will exhibit a more lustrous appearance than Monson.

Chapman

Chapman slate, from Northampton County, Pennsylvania, also known as Pennsylvania Hard-Vein, was a weathering blue/black slate characterized by closely spaced, dark colored ribbons that turned white, light gray, and orange over time to give the slate a streaked appearance (Figure 5). In certain environments, the slate took on a greenish hue as it weathered, especially when used as a wall cladding (Figure 6). While Chapman slate was very popular, especially in Pennsylvania's Delaware Valley, the quarries that produced it have been idle since the mid-1950s.

Chapman slate is unique; there just is no other slate that even comes close in appearance. As such, the best replacement slate for use in repair work is salvaged Chapman slate from a salvage company or slates harvested from a small, less visible area on the roof being repaired. Even then, as Figures 5 and 6 attest, the nearness of the match will depend on whether the salvaged slate was taken from a roof slope or vertical wall.

When replacing Chapman slate, there is no precise match, but a replacement slate that gives some impression of Chapman's streakiness is New York/Vermont Strata Gray, particularly after the Strata Gray weathers a bit (Figure 7). Besides their appearance, other differences to note between the two slates are that 1) whereas Chapman slate was typically split to a thickness of 3/16-inch to 1/4-inch, Strata Gray is typi-

Figure 5: View of 80-year old Chapman slate on a roof in Glenside, Pennsylvania.

Figure 6: View of 100-year old Chapman slate cladding on a vertical wall in Ardmore, Pennsylvania that has taken on a greenish hue.

cally offered at 1/4-3/8-inch, thus making the Strata Gray appear and, in reality, be a little heavier than Chapman, and 2) whereas Chapman presented a relatively smooth surface texture, that of Strata Gray tends toward more of a medium textured surface. These differences are generally not a problem if replacing an entire roof. If replacing only a portion of a Chapman-covered roof, it is best not to place Strata Gray slate immediately adjacent to Chapman slate. Rather, it is recommended that the Strata Gray be visually separated them from the Chapman slate.

Peach Bottom

Peach Bottom slate from Delta, Pennsylvania and Cardiff, Maryland was a dense, highly metamorphosed unfading black slate with a slight luster and medium surface texture. The slate was known for its strength, hardness, and durability (with an expected service life of over 200 years). The peach Bottom quarries ceased producing roofing slate in the mid-1940s.

The best match for the repair of a Peach Bottom slate roof is salvaged Peach Bottom, which, given the slate's longevity, is generally readily available in the salvage market.

For roof replacement, the closest match to Peach Bottom is Buckingham or Grayson slate, although these can

Figure 7: New York/Vermont Strata Gray can be used as a reasonable substitute for Chapman slate.

be somewhat more lustrous and more gray in color than Peach Bottom.

New York/Vermont Unfading Clear Purple

Although Unfading Purple slate with green markings and Unfading Mottled Purple and Green slate from the New York/Vermont District are still available, unfading clear purple has been difficult to come by since the latter part of the first decade of the 21st century (2005-2009). A very limited number of quarries may be able to sort out small quantities of Unfading Clear Purple slates from those which contain green "splashes" and their mottled production, but the material is currently so scarce that it is not marketed and is sold only after a sufficiently large quantity has been accumulated. It may only be a matter of time before this stone again becomes available in commercial quantities, as the quarries continue to work their beds or come back into production. In the meantime, salvaged Unfading Clear Purple and the two options offered below for roof replacement work remain the best source of material for repair work.

For roof replacement, options are limited to Unfading Mottled Green and Purple and Penrhyn Purple. Unfading Mottled Green and Purple will consist of a range of colors, from slates that are predominately purple with frequent inclusions of green in almost every piece (dark mottled) to slates that are predominantly green with inclusions of purple (light mottled). If green markings are not desirable, Penrhyn Purple is a clear, or fairly clear (sometimes with sporadic, small green markings), unfading purple imported from Wales in the United Kingdom. Being an import, Penrhyn Purple may be subject to longer lead times than Unfading Mottled Green and Purple, and likely be a bit more costly.

Newfoundland Purple

Purple slate from Newfoundland, Canada, was a clear, or fairly clear (with some green markings), unfading slate available in vivid shades, ranging from deep purple (aka "Heather") to plum (aka "Plumb Red"). Promoted as "Trinity Slate," the shades were typically not separated at the quarry and, as such, were referred to as "Hues of Heather" (Figure 8). The Newfoundland quarry closed intermittently starting in 1998 and last produced a small quantity of slate in 2010 or 2011.

Figure 8: New Newfoundland Purple (aka Trinity Hues of Heather) and Vermont Unfading Green slate on a tower roof in Poughkeepsie, New York.

Salvaged Newfoundland Purple slate for repair work may be difficult to come by. As such, slate harvested from less visible roof areas and Penrhyn Purple slate may be next best for use in slate repair work.

For roof replacement, the closest match to Newfoundland Purple is likely Penrhyn (Welsh) Purple. Although the shading variations in the Penrhyn slate will be less distinct than that of the Newfoundland slate, the Penrhyn slate is unfading and, typically, fairly clear, with only occasional green markings. The lead time on Penrhyn slate can be long and the material expensive due, at least in part, to current unfavorable exchange rates versus the U.S. dollar and transatlantic transportation costs. The alternative, a New York/Vermont Unfading Mottled Green and Purple, while unfading and more readily available, will consist of a range of colors, as previously described above (see New York/ Vermont Unfading Clear Purple) rather than a more homogenous range of purple shades. Should New York/Vermont Unfading Clear Purple become available again in the future, it, too, could be considered as a possible replacement slate for Newfoundland Purple.

Newfoundland Green

Green slate from Newfoundland, Canada, was a clear, unfading slate ranging from blue/green to olive/green. Promoted as "Trinity Green," the slate was typically provided as a mix of the full range of colors. As with the Newfoundland Purple slates, the Newfoundland quarry producing Trinity Green closed intermittently starting in 1998 and last produced a small quantity of slate in 2010 or 2011.

As with Newfoundland Purple, salvaged Newfoundland Green for repair work may be hard to come by. Harvested slate from less visible areas of the roof and that recommended below for roof replacement may be the best options for repair work.

For roof replacement, the closest match to Newfoundland Green is a New York/Vermont Unfading Green slate, or a mix thereof from several different quarries to better replicate the range of colors found in the Trinity Green slates.

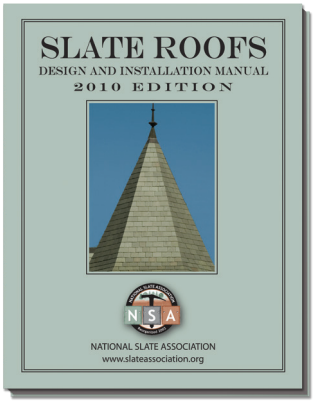
Closing

For a list of active quarries, distributors, and slate salvage companies, see the NSA website at slateassociation.org. Their sales professionals have a vast knowledge of previously worked slate deposits as well as those currently in production, and will be best able to provide guidance on the matching of slate for repair and replacement work. When making inquiries, keep in mind that, in addition to a verbal description, it is often best to provide color photographs of the slate in question, or, even better, physical samples, showing the full range of colors/hues that are to be matched.

Endnote

[1]Note that "slate repair" refers to the process of removing broken, cracked, or otherwise deteriorated slate shingles and replacing them with new or salvaged/ reclaimed slate shingles. It does not entail, as the phrase implies, that the broken slate, itself, is somehow repaired in-situ or repaired and reinstalled in its original location.

For more information on slate roofing, please see *Slate Roofs: Design and Installation Manual,* 2010 Edition, available at www.slateassociation.org



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