TECHNICAL GUIDE:

Collecting Masonry Mortar Samples for Color Matching & Analysis

Matching of mortar is essential for maintaining architectural integrity, aesthetics, and performance in restoration projects. Accurate sampling ensures that new mortar works and blends seamlessly with the original, preserving both aesthetics and historical value while providing durable and compatible performance. This guide outlines best practices for identifying, extracting, and selecting representative mortar samples. The “Checklist” below provides a quick overview, followed by more detailed information.

✅ Mortar Sampling Checklist for Color Matching

🔍 Identify Original Mortar

- ☐ Inspect joints for differences in color, texture, and tooling
- ☐ Look for signs of aging: erosion, staining, biological growth
- ☐ Avoid areas that appear cleaner, smoother, or recently worked
- ☐ Review building records for known repointing zones

🌎 Ensure Representative Sampling

- ☐ Sample from multiple elevations (north, south, east, west)
- ☐ Include varying heights (base, mid-wall, roofline)
- ☐ Capture both exposed and sheltered areas
- ☐ Sample near transitions in masonry type or construction phase
- ☐ Photograph and log each sample location

🛠️ Extract Samples Carefully

- ☐ Use hand tools only: cold chisel, hammer, safety gear
- ☐ Select discreet or deteriorated joints to minimize visual impact
- ☐ Chisel gently to avoid damaging adjacent bricks
- ☐ Collect about 100 grams per sample (about 4 ounces)
- ☐ Label each sample with location, orientation, and depth

🧪 Prepare for Matching and Analysis

- ☐ Compare samples to identify which will be sent for analysis and/or matching
- ☐ Mark the surface to be matched with a dot or “X”; Pre-clean if the target for matching is a cleaned, weathered surface
- ☐ Fill out the sample request form

DETAILED STEP BY STEP PROCEDURES

🔍 Step 1: Identifying Original Mortar vs. Repointing Mortar

Before sampling, it is critical to distinguish original mortar from newer repointing work, which often differs in composition, texture, and color. The most common error in mortar sampling is selection of more recent repointing mortar rather than original materials. Mortar fragments that have already become detached or have fallen to the ground tend not to be representative of original materials.

Tips to avoid sampling repointing mortar:

- **Visual Inspection:** Look for inconsistencies in color, texture, and tooling. Repointed areas often appear cleaner, smoother, or harder. Color differences are frequently evident, with modern mortar binders tending towards grey portland cement color, while historic binders are often buff or white. When mortar fragments are removed, look at the back of the sample to determine whether there is more than one layer of mortar, which may also tend to differ in color, texture, and hardness.
- **Weathering Clues:** Original mortar typically shows signs of age—erosion that exposes sand particles, staining, or biological growth. Repointed joints may look fresher or more uniform.
- **Tooling Differences:** Older mortar may tend to have less crisp, uniform profiles.
- **Documentation Review:** If available, consult building maintenance records or restoration logs to identify areas of recent intervention.

Pro Tip: Use a flashlight and magnifying glass to inspect joints closely. Subtle differences in aggregate or binder can reveal newer work.

🎨 Step 2: Ensuring Representative Sampling

Mortar color can vary across a building due to age, exposure, and original construction practices. Collecting a range of samples enables more accurate matching, and may reveal a need for more than one mortar match.

Sampling Strategy:

- **Compare:** As a bare minimum, take the collected samples that you believe may be representative, and walk them around to different areas to compare with existing mortars. This comparison is important to determining whether you will need more than one mortar analysis and/or match. If your goal is to choose a single mortar for the overall project, comparisons (if not sample collection) should be made according to the following guidelines.
- **Multiple Elevations:** Collect (or compare) samples from different sides of the building (north, south, east, west) to account for sun and weather exposure.
- **Varying Heights:** Include samples or comparisons from ground level, mid-height, and near the roofline.
- **Different Conditions:** Sample or compare both sheltered and exposed areas to capture weathering effects.
- **Material Transitions:** If the building includes different masonry types or construction phases, sample or compare adjacent mortar to capture variations.

Documentation Tips:

- Photograph each sampling location before and after extraction.
- Create a sampling log with notes on color, texture, and environmental exposure.
- If possible, sketch a simple elevation diagram marking sample locations.

🛠️Step 3: Removing Mortar Samples Safely

Once original mortar is identified, careful extraction is key to preserving the integrity of the structure and obtaining usable samples.

Tools Required:

- Cold chisel or small masonry chisel
- Hammer
- Safety goggles and gloves
- Zip-top bags or labeled containers
- Permanent marker

Extraction Method:

1. **Choose Discreet Locations:** Select joints that are less visible or already deteriorated to minimize aesthetic impact. Bear in mind that some buildings and structures were built in multiple phases and mortar may differ from section to section.
2. **Extraction:** Use a hammer and chisel to remove mortar as gently as possible, aiming for a sample size of about 2–3 tablespoons (20–30 grams/ 3-4 ounces). Intact fragments are required for petrographic analysis, rather than crushed or disaggregated powder. If more is too soft or deteriorated to make removal of solid fragments feasible, remove and entire masonry unit with mortar remaining bonded to the masonry.
3. **Avoid Brick Damage:** Ensure the chisel does not contact the brick units—only the mortar.
4. **Label Immediately:** Place each sample in a separate zip-top bag or container and label with location, orientation (e.g., north wall), and depth.

Note: Avoid using power tools, which can pulverize the sample, altering component proportions in the retained material.

🧪 Step 4: Preparing for Analysis

Once samples are collected:

- **Compare Samples:** Mortar analyses are costly, and discretion should be used in determining the number of samples to be analyzed and matched. If samples from different areas appear to be identical, it may be most practical to reduce the number of samples to be analyzed and/or matched accordingly.
- **Mark the Surface to be Color-Matched:** Determine whether the surface to be matched is the exposed, weathered surface, or the clean cross-section obtained when breaking the fragment in half. Mark all surfaces NOT to be matched with a readily visible dot or "X", leaving the surface to be matched unaltered.
    - **Clean the Samples** if the building is to be cleaned and the exposed surface is the color-matching target, using the same methods and cleaning agents as will be used on the rest of the building.
- **Fill Out the Sample Request Form** and enclose in the package with the mortar samples.