23 PRESERVATION BRIEFS

Preserving Historic Ornamental Plaster

David Flaharty

U.S. Department of the Interior
National Park Service
Cultural Resources

Heritage Preservation Services

From the time America struggled for a new identity as a constitutional republic—and well into the 20th century—its architecture and its decorative detailing remained firmly rooted in the European classicism of Palladio, Wren, and Mansart.

Together with skilled masons and carpenters, ornamental plasterers saw their inherited trade flourish from the mid-18th century until the Depression years of the 1930s. During this two hundred year period, as the Georgian and Federal styles yielded to the revivals—Greek, Rococo, Gothic, Renaissance, and Spanish—decorative plaster reflected each style, resulting in the wide variety of ornamentation that survives. The traditional methods of producing and installing interior decorative plaster were brought from Europe to this country intact and its practice remains virtually unchanged to this day.

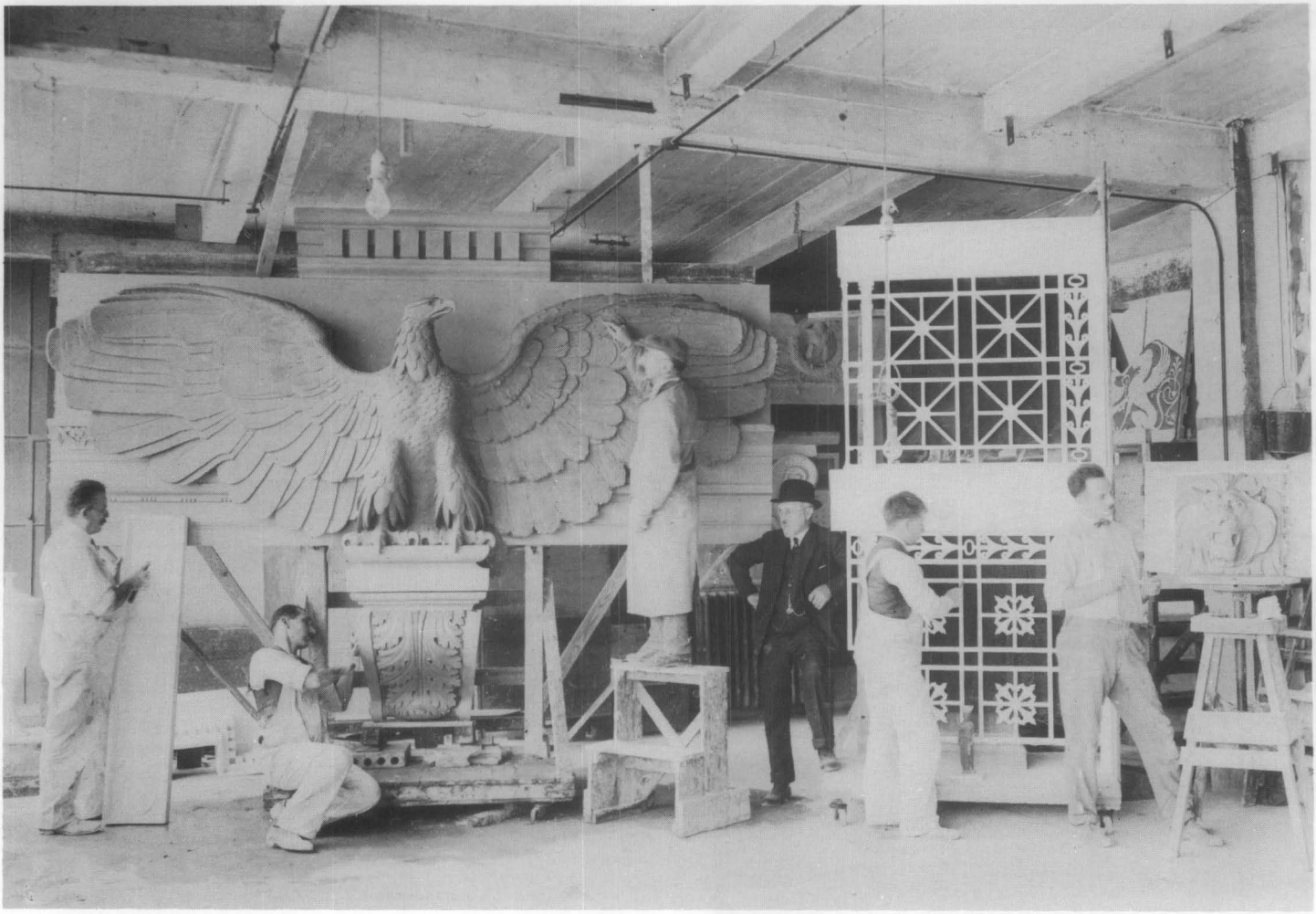

Fig. 1. Ornamental plaster studios employed the following personnel: Draftsmen to interpret architectural details in shop drawings; sculptors who modelled in clay; modelmakers who assembled sculpted, plain-run and pre-cast elements into an ornamental unit; moldmakers who made rigid or flexible negative tooling; casters who made production units; finishers (often the caster's wives) who cleaned the casts; and laborers who assisted skilled personnel in operating efficiently. This studio was in Philadelphia, c. 1915. Photo: Courtesy, M. Earle Felber.

Styles of Decorative Plaster in America, 18th–20th Centuries

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(a) Kenmore, Fredericksburg, Virginia. c. 1752. Georgian in style with ornamental ceilings based on Batty Langley's 1739 English style book, the plasterwork was executed by a Frenchman in the mid-1770s. This house was built by Col. Fielding Lewis and has the most elaborate ornamentation of any in the period. *Photo: Historic American Buildings Survey Collection.*

(b) Old West Church, Boston, Massachusetts. c. 1806. Designed by Asher Benjamin, this church in the Federal-Adamesque style became the prototype for many other New England churches through publication of plans in Benjamin's **American Builder's Companion**. *Photo: Courtesy, Stanley P. Mixon (copy).*

(c) Lyndhurst, Tarrytown, New York, c. 1838. This Gothic Revival villa on the Hudson River was built for financier Jay Gould by Alexander Jackson Davis. A versatile architect, Davis was simultaneously at work on Greek Revival buildings in New York City. Both styles called for elaborate ornamental plasterwork. *Photo: Jack E. Boucher, Historic American Buildings Survey.*

(d) Gaineswood, Demopolis, Alabama, c. 1842–60. These Greek Revival columns were drawn from Minard Lafever's **The Beauties of Modern Architecture** of 1835. This bold new style began in New York City and quickly spread south and west. *Photo: Historic American Buildings Survey Collection.*

(e) Ohio Theater, Columbus Ohio, c. 1928. An example of the "Golden Age" of movie palaces, Thomas Lamb's "Spanish" style interior is a typical example of the plasterwork executed just prior to the Depression years. Ornament was site cast, often on the stage, while the orchestra was scaffolded for installation. *Photo: National Park Service files.*

Like flat walls and ceilings, historic *ornamental* plaster is made of gypsum and lime which are stable and durable materials. An extremely versatile material, plaster can be modelled, cast, incised, colored, stamped, or stencilled. However, as an integral part of the building system it is subject to the typical problems of water intrusion, structural movement, vibration and insensitive alterations, both incrementally and from adaptive use projects. This Preservation Brief has been prepared to assist property owners, architects, contractors, and Federal agency managers in identifying the causes of ornamental plaster failure, specifying repair and replacement techniques and engaging qualified professionals to do the work. The scope of this Brief is limited to the repair and restoration of **existing ornamental plaster;** certain forms of decorative plaster such as scagliola, composition ornament, and artificial Caen Stone are not addressed, nor is the design and installation of ornamental plasterwork in new construction. Finally, guidance on using substitute materials to match the historic appearance of ornamental plasterwork—a legitimate option within the *Secretary of Interior's Standards for Historic Preservation Projects*—is not discussed here, but will be the subject of another Brief on interiors.

The Ornamental Plaster Trade

Shop Personnel. As builders and architects were hired by an increasingly affluent clientele, ornamental plaster shops developed from the single artisan operations of the 18th century into the complex establishments of the early 20th century. American plaster studios employed immigrant and, later, native craftsmen (see Fig. 1). Plasterers' guilds were in existence in Philadelphia in the 1790s. In 1864, a plasterers' union was organized in the United States with members from the British Isles whose work there had been limited to palaces and churches. English and European craftsmen came to America where the demand for their skills had increased by the decade, offering them the unparalleled opportunity to open their own shops. Over the years, plaster elements became so popular in decorating interior spaces that a major industry was established. By the 1880s, catalogs were available from which property owners could select ornamentation for their splendid new buildings (see Fig. 2).

Methods of Production. Historically, ornamental plasterwork has been produced in two ways: it would be *run in place* (or on a bench) at the site; or *cast in molds* in a workshop. Plain plaster molding without surface ornamentation was usually created directly on the wall, or run on a flat surface such as a plasterer's workbench and attached to the wall after it set. Ornament such as coffering for ceilings, centers for light fixtures (medallions), brackets, dentils, or columns were cast in hide glue (gelatin) or plaster molds in an offsite shop, often in more than one piece, then assembled and installed in the building.

Decorative Plaster Forms—Cornices, Medallions, Coffers. Three decorative plaster forms in particular—the cornice, the ceiling medallion, and the coffered ceiling—historically comprised much of the ornamental

Fig. 2. This parlor medallion and pendant drops shown in a mid-19th century row house in Annapolis, Maryland were originally ordered from a catalog. A local plasterer ran the plain cornice and band ribbon, the curved corners of which were bench run, set with a plaster adhesive and pointed at the joints. Photo: M. E. Warren.

plasterers' business. These forms appear individually or in combination from the 18th to 20th century, irrespective of stylistic changes.

For example, an elaborate parlor cornice consisted of plain moldings made of gypsum and lime run atop temporary lattice strips around the room. Tooling for plain-run moldings called for a sheet metal template of the molding profile mounted on a wooden "horse" (see Figs. 3 and 4). Mitering was accomplished using a plaster and lime putty gauge (mix) tooled with miter rods at the joints (see Fig. 5). Decorative "enrichments" such as leaves, egg and dart moldings, and bead and reel units were cast in the shop and applied to the plain runs using plaster as an adhesive (see Fig. 6). Painting, glazing, and even gilding followed. Large houses often had plain- run cornices on the upper floors which were not used for entertaining; modest houses also boasted cornice work without cast enrichment.

Among the most dramatic of ornamental plaster forms is the parlor **ceiling medallion.** Vernacular houses often used plain-run concentric circles from which lighting fixtures descended, usually hung from a wrought iron hook embedded in the central ceiling joist. More

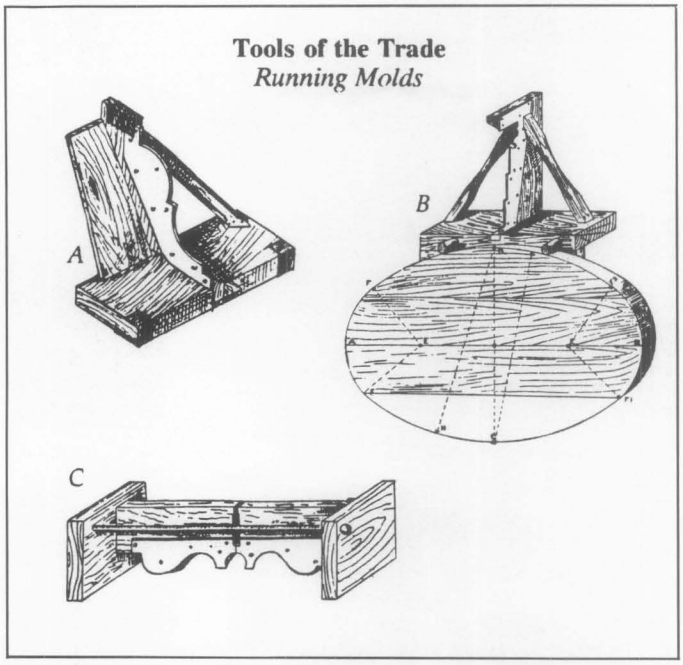

Fig. 3. A running mold consists of a sheet metal profile blade nailed to a stock and slipper. A triangular brace also acts as a handle. Such a mold produces a clean plain plaster molding if it travels in the same place each pass as a gypsum and lime putty gauge is troweled ahead of the moving blade. (A) is a typical mold for a cornice; (B) produces a diminished run as the hinges close together; and (C) is a pin mold that is used to surround elliptical forms such as arches. In addition, running molds may revolve around pivot points, trammels, and mandrels.

Fig. 4. Running a Cornice. The historic method of producing a cornice is unchanged today. A running mold or template is pushed along a lattice strip nailed to the wall. Base coat plaster is gypsum and sand; finishing plaster is added with small tools and stuffed wearing rubber gloves because lime burns the skin. As many as 20 passes are required to complete a smooth run; this particular cornice was formed in two stages, top and bottom, because it was so large. Cornices this size also have to be blocked and lathed to minimize the amount of applied material. Photo: Old-House Journal.

Fig. 5. Mitering a Plain-Run Cornice. Mitering requires great dexterity using the miter rod. In this case, a return at a chimney breast is tooled using an infill of gypsum and lime. Internal and external miters are required with the internal being the most difficult. Another method is to run a length of cornice (using the same blade) on a bench and set it in place, later to point the joints. Photo: Old-House Journal.

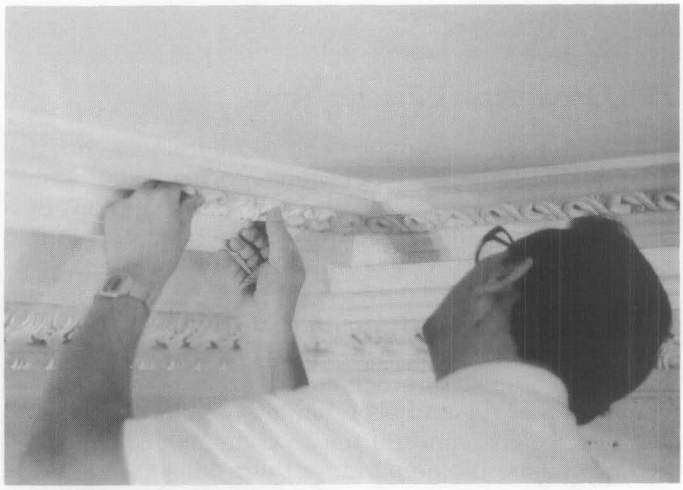

Fig. 6. Enriching a Plain-Run Cornice. After a cornice is run and mitered, cast enrichments are stuck in recessed sinkages planned to receive the casts. Ornamental models are made to engage with one another, resulting in unbroken lines or courses. A shop-cast ornament is soaked in water until saturated and pressed into its sinkage using wet plaster as an adhesive. Once the casts have been installed, they are carefully pointed at the joints and at the miters so that they appear as a continuous, repetitive design. Photo: Old-House Journal.

elaborate medallions were composed of shop-cast pieces, such as acanthus foliage often alternating with anthemia or other decorative designs. Medallions usually related stylistically to the cornice ornament found in the room and could be created with or without a plain-run surround (see Fig. 7). Of particular importance to the art of ornamental plaster was the mid-19th century double parlor plan. Architects often specified matching medallions of robust proportions and ornamentation. Later, in 20th century American Colonial Revival architecture, architects called for Federal style ceiling medallions. Some of the more successful were graceful one-piece units, utilizing classical motifs such as garlands and swags, and in their simplicity, reminiscent of Adamesque designs of the 1760s.

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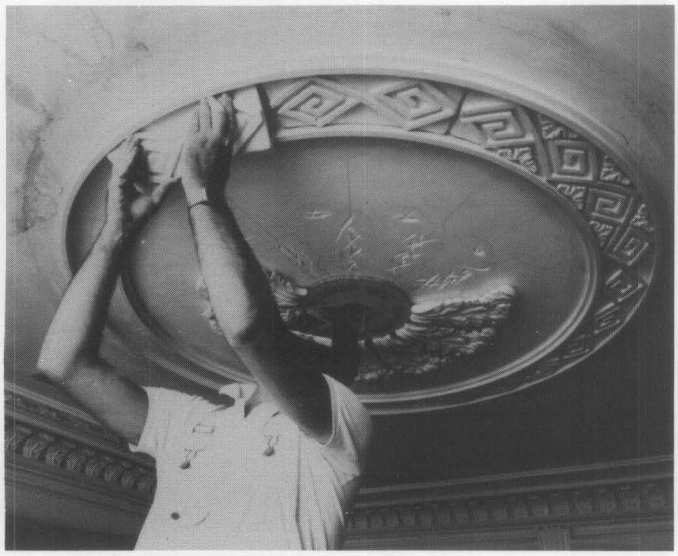

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Fig. 7. Running and Enriching a Ceiling Medallion. The method of running and enriching a ceiling medallion remains the same today. (a) First, a plain-run surround is spun from a pivot point centered in the ceiling field. (b) Ornament layout is determined using plane geometric principles; segmented locations are deeply scratched to provide a rough surface for adequate bonding using plaster as an adhesive. Historically, cast enrichments could be bought from local suppliers and set individually, allowing architects to compose medallions to suit room dimensions and period motifs. Photos: Peter Sanders.

Fig. 8. Casting a Coffering Unit. Ceiling coffers are made the same way today except, historically, a hide glue mold was poured over an ornamental model whereas today urethane molding rubber is used. Now, as then, the plaster casts are made with steel channel irons embedded on the back of each panel. The coffers are hung from carrying irons fixed to the ceiling above by means of twisting wires to level each coffer to its neighbor. Afterward, the panels are fastened together and the joints pointed with plaster. Photo: David Flaharty.

Fig. 9. The elaborate coffered ceiling was designed for the Willard Hotel in Washington, D.C. (1902–04) by Henry Janeway Hardenbergh. The coffered ceiling was restored as part of a rehabilitation project in the 1980s. Photo: Carol M. Highsmith.

Yet another significant decorative form is the **coffered ceiling.** Coffering units were cast in the shop or onsite, then installed with hanging wires to form the ceiling (see Fig 8). Ceiling design varied from period to period as to depth, panel shape, and ornamental complexity. Not always flat, coffering is seen inside domes, within barrel vaults and groin ceilings, along overhead ribs and soffits. Rosettes are usually centered in the panels and often enrich the intersections of elaborate stiles bordering the panels. Flat ceiling coffers are generally identical in reflected plan; on domed or barrel ceilings, coffers differ from course to course so as to appear identical from various sight lines. The finish treatment of a coffered ceiling frequently exhibits the height of the painter's craft. Foremost examples of ceiling coffering include the United States Capitol, and Washington D. C.'s Union Station. As a popular decorative form with inherent acoustical benefits, the coffered ceiling is seen across the United States in many large public spaces such as theaters, courthouses, railroad stations, and hotels (see Fig. 9).

Unfortunately, these supposedly enduring decorative forms created by ornamental plaster tradesmen are subjected to the ravages of both nature and man and, consequently, seldom remain as originally designed. Minor changes of taste are perhaps the least injurious to plasterwork. Considerably greater damage and deterioration are caused by radical changes in building use and poor maintenance practices. Fortunately, in most cases, the form, detailing, and finish of historic ornamental plaster can be recaptured through careful repair and restoration.

Causes of Ornamental Plaster Damage

Ornamental Plaster Substrate. For flat plaster walls and ceilings, as well as decorative forms, the system to attach interior plaster to walls and ceilings primarily consisted of 1/4" x 1-1/4" wooden lathing strips nailed 3/8" apart against studs and joists. First a *scratch coat* consisting of sand, lime, and cattle hair was troweled on the lath and pressed through the slots so as to slump over and form "keys." Next, a *brown coat* was applied to establish flat and plumb surfaces. The earliest plasterwork consisted of two coats of lime and sand plaster; later in the 19th century, a third or *finish coat* was applied that consisted of both lime *and gypsum.* Decorative units were generally attached to the substrate using plaster as an adhesive.

Signs of Failure. Failure of the substrate is more typical than failure of the plaster ornament itself. Among the reasons for deterioration, **structural movement** (see Fig. 10) and **water intrusion** (see Fig. 11) are the most deleterious. Buildings move and settle, causing deflection and delamination which result in stress cracking. These cracks often begin at the corners of windows and doors and extend upward at acute angles (see Fig. 12). Roof or plumbing leaks make finishes discolor and peel and cause efflorescence, especially on plain-run or enriched cornices. Unheated buildings with water intrusion are subject to **freeze-thaw cycles** which ultimately result in base coat and ornamental plaster failure (see Fig. 13).

Fig. 10. Structural settling has caused this ceiling to deflect. Prior to restoring the damaged plaster and final repainting, a structural engineer experienced in historic preservation will be engaged to shore-up the ceiling from below and reattach the sagging ceiling plaster with the joists above (see also Fig. 17 under Immediate Action.) Photo: National Park Service files.

Fig. 11. The cornice of an Iowa courthouse has been severely damaged from a roof leak. In order to repair the ornamental plaster, a thixotropic rubber impression will be taken (with the paint build-up undisturbed). The efflorescence will be removed and fresh plaster casts installed so that egg and dart, dentil and leaf molding are perfectly aligned. Photo: National Park Service files.

Fig. 12. Settlement caused stress cracking through both flat wall and ornamental plaster. Repairs to the cornice molding involve chamfering the stress cracks to a "V groove" and patching with a mixture of gypsum and lime. The cornice can be countersunk-screwed to its substrate to prevent further movement. Screw heads are then plastered over. The crack running through the painting will need to be filled carefully, and the painting restored by a trained conservator. Photo: Jack E. Boucher, Historic American Buildings Survey.

Fig. 13. Water intrusion and freeze/thaw cycles caused extensive efflorescence and ornamental plaster failure. The plaster needed almost total replacement within the rehabilitation project. Photo: Commercial Photographics.

Fig. 14. A mitered portion of this impost capital abacus has fallen, revealing the plaster adhesive material. Repairs are made by obtaining a section through the abacus, making a bench-run length, cutting, fitting, and readhering the missing piece. Finally, the joints are pointed. Photo: Lee H. Nelson, FAIA.

In addition, keying and adhesive properties may be further jeopardized by **weak original mixes** (see Fig. 14) that were improperly applied. Substrate failure typically results from **faulty lathing or rusty lath nails,** causing ceilings to fall. In the 20th century, **vibration** from heavy vehicular traffic, nearby blasting, and even repeated sonic booms may contribute to damaging ornamental plaster. **Inadequate support** in an original design may also be to blame when particularly heavy units have simply broken off over time (Fig. 15). Finally, new mechanical systems, suspended ceilings and partition walls insensitively installed in adaptive use projects, show little regard for the inspired decorations of earlier periods (see Fig. 16).

Repairing and Replacing. Plaster failure is a matter of degree. For example, top coat failure can be repaired by

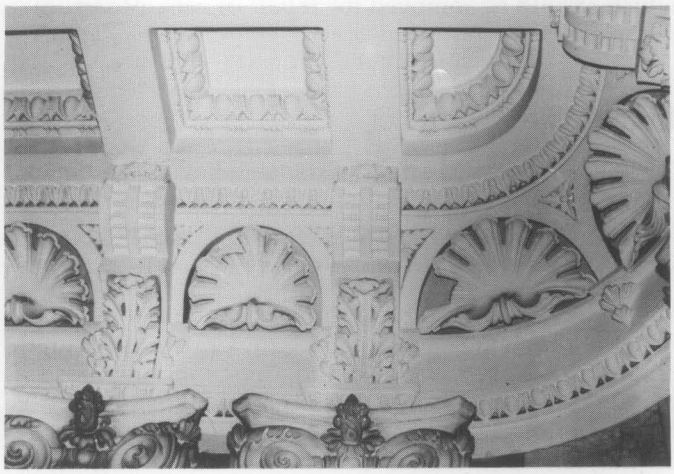

Fig. 15. U. S. Treasury Cash Room, Washington, D.C. c. 1830. Designed by Robert Mills in the Greek Revival style, the unreinforced shell flutes most likely broke as a result of their weight. As part of an overall restoration of the room, the broken parts were molded on site, recast, then re-attached using wooden strips to pin them in place. Photo: Laurie R. Hammel.

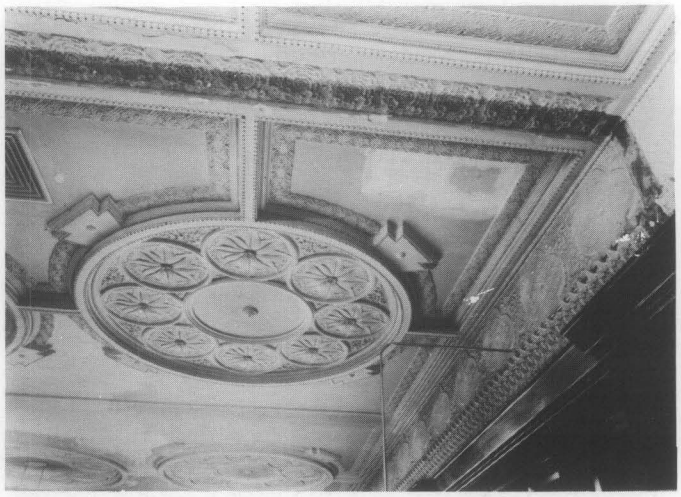

Fig. 16. The Auditorium Building, Chicago, Illinois, 1889, by Louis Sullivan. Earlier insensitive alterations were removed prior to restoration of the room. In the photo, a partition wall has already been removed; the electrical conduit and a ventilation grille followed. Plaster patching and painting were the final steps of restoration work. Photo: National Park Service files.

applying a new finish coat over a sound early substrate. Also, if cracking or loss of all three coats has occurred and is not combined with major structural failure, it can be repaired much like flat wall plaster. For ornamental plaster, however, repair beyond patching is often equivalent to targeted replacement of entire lengths or portions of run-in-place and cast ornamentation. Pieces that are deteriorated or damaged beyond plain patching must be **removed and replaced with new pieces** that exactly match the existing historic plaster. For this reason, partial restoration is often a more accurate term than repair. But whichever term is used, it is not recommended that repair of ornamental plaster be undertaken at any level by property owners; it is a craft requiring years of training and experience. A qualified professional should always be called in to make an inventory of ornamental plaster enrichments and to identify those details which are repairable onsite and which should be removed for repair or remanufacture in the shop.

Immediate Action

Once the cause and extent of damage have been determined, treatments such as shoring, stabilization, and limited demolition can begin, preparatory to repairing or restoring historic ornamental plaster.

First, roof or plumbing leaks must be repaired to eliminate the problem of water intrusion. General structural repairs should be undertaken to arrest building movement, which weakens the base coat plasters to which the ornamental enrichments are attached. Ornamental plaster deflection should be corrected by shoring from below followed by re-anchoring (see Fig. 17).

Testing for poor adhesion of base coat to lath or ornament to base coat, should be conducted to reduce further loss of enrichment. Adaptive use intrusions should be carefully removed to protect the existing decorative plasterwork.

Code-required fire suppression systems should be evaluated at this time. Modern building codes may require heat/smoke/flame detectors and automatic sprinkler systems of various types and applications. Fire suppression systems as well as all mechanical systems (HVAC, plumbing and electrical) systems should be designed so that they accomplish their purpose with minimal impact on the decorative plaster. Plumbing for an automatic sprinkler system, for example, can be run above new and existing coffering so that the sprinkler heads barely protrude from the rosette centers in the coffered design. Access should be provided for future system maintenance or repair.

A 20th Century Shop Tour—Personnel, Materials, and Processes

Before discussing how decorative forms such as cornices, medallions, and ceiling coffers are repaired onsite and in the shop by ornamental plasterers, the "shop tour" explains traditional casting processes used in conjunction with updated materials. A shop tour can be exciting, but confusing to the layman without some explanation of modeling, molding, and casting activities. For a prospective client, a visit to the plaster studio or site can be of value in choosing a qualified plastering contractor.

Shop and Personnel. Generally, a highly functional shop should look well organized—that is, not in disarray with remnants of past projects lying about to impede current production. Old molds may be in abundance, but hanging from the wall or otherwise "on file." Machinery (saws and drill presses) and hand tools should appear well maintained. In short, one might evaluate such a studio as one does an auto mechanic's shop: does it inspire confidence? This is the time to look around and ask questions. What is the shop's past project work experience? Is the firm mostly involved in new construction work or total reconstruction? More important than the way the shop looks, is the personnel sufficiently experienced in making **repairs** to historic decorative plaster? What about training and apprenticeships? How did the staff learn the trade? The more that is known about the total operation the better.

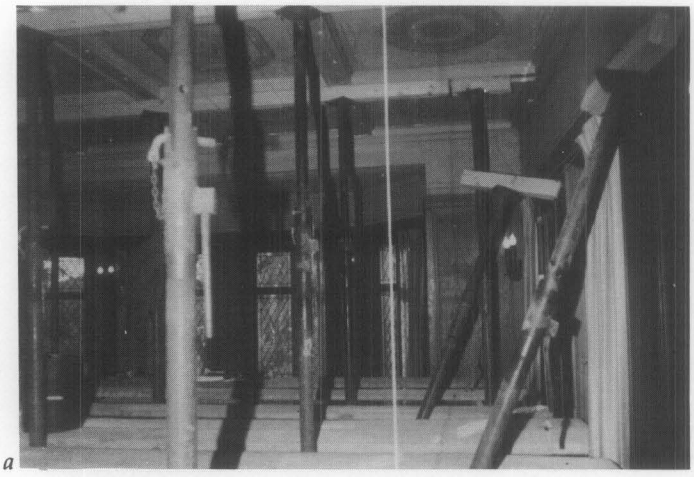

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Fig. 17 (a) Where this ceiling was suffering from structural failure, the first step was to shore it up from below. (b) Toggle bolts were used to reattach the plaster molding to the ceiling joists. The ceiling was then patched with gypsum and lime, prior to restoring the significant paint finishes. Photos: National Park Service files.

Molding Rubber. Familiarity with contemporary molding rubbers is desirable. There are several formulations currently on the market. In the past, flexible molds were made with hide glue melted in a double boiler and poured over plaster originals which had been prepared with an appropriate parting agent. Of the newer rubbers, latex (painted on the model coat by coat) is time consuming and has little dimensional accuracy; polysulfide distorts under pressure; and silicone is needlessly expensive. Urethane rubber, with a 30-durometer hardness, is the current choice. Urethanes are manufactured as pourable liquids and as thixotropic pastes so that they can be used on vertical or overhead surfaces. The paste is especially useful for onsite impressions of existing ornament; the liquid is best used in the shop much as hide glue or gelatin was historically. Urethane rubber has the ability to reproduce detail as fine as a fingerprint and does not degrade during most ornamental plaster projects. No flexible molding material lasts forever, so spare casts should be maintained for future remolding.

Molding Plaster. Molding plaster will also be in evidence; it is the product most similar to that used historically. This plaster is finely ground to accept the detail of the rubber molds, not so hard as to prohibit tooling, and combines readily with finish lime. High-strength plaster is available in varying densities, some with added components for specific purposes. Most shops maintain these varieties, but use molding plaster for typical work.

Sheet Metal Templates. The contractor's familiarity with sheet metal is critical. Accurate template blades are required to reproduce both straight and curved sections of moldings (see Fig. 3, above). The blades must be carefully cut, filed, and sanded in order to form exact reproductive units. A tour of a sizeable shop will include observation of running techniques and the results of this activity should be much in evidence. Regardless of size, these runs should be smooth and true when made by qualified craftsmen.

Models. Models, whether of capitals, cornices, medallions or cartouches, are made as whole units or in parts depending on project demands. Completeness, accurate dimensions, and attention to historic styles are essential ingredients of successful models. Each part of a model has a name, i.e., dentil, guilloche, rinceau or bolection molding, modillion, egg and dart, and the designers and restorers of these ornaments should know their names. Failure to identify these parts correctly should be of concern to a prospective client.

Molds. Molds are "negative forms" produced from completed models. Simple flood molds require a separator or barrier coat over the original and a surrounding fence to prevent the liquid rubber from leaking out. Larger or more complicated molds are made in pieces or with a layer of rubber supported by a plaster shell or mother mold attached to a wooden or metal frame. Following completion of a successful mold, the original model is discarded because it is now possible for it to be accurately reproduced.

Casting the Molds. Casting operations should appear clean and efficient. A skillful caster's output can be voluminous and often looks effortless as it is being produced. Raw materials are close at hand, molds are rarely without curing plaster in them, production is stored so as not to warp while it is still wet and each cycle, from mixing to pouring, setting, and demolding is accomplished so as not to waste time or break plaster casts. A good caster generally obviates the need for a finishing department.

Two other aspects should be noted. Shipping facilities are critical to move the product to the restoration site safely. Drawing and design space should be separate from the production floor. In summary, the modern ornamental plaster shop inevitably looks quite different from that pictured earlier in this Preservation Brief (see Fig. 1, above), but, with the exception of contemporary tools and materials, the operations are the same. The following sections discuss how repairs are made by today's plaster tradesmen.

Repairing Historic Ornamental Plaster

Cornice. A plain run or ornamented plaster cornice which has undergone damage or severe deterioration can often be repaired. Footage which is beyond repair should be identified and be carefully demolished to expose the underlying structure beneath to which the molding was secured. To replace the missing lengths, the first step is to obtain a cross-section, or profile, through the cornice from finish ceiling to finish wall lines. This is best accomplished using one of these methods:

1. A section through the cornice may be determined by sawing through the molding, inserting a sheet metal blank in the slot and tracing the profile directly on the template. This is considerably more accurate than the profile gauge, but will require repointing the saw kerf; alternatively, the cut may be made on one of the deteriorated pieces, provided it was removed as an intact unit.

2. The section may be obtained by making a thixotropic rubber impression of the molding, casting the result in fresh plaster and sawing through the cast to transfer the cross-section to a sheet metal template.

With the section determined, it is drawn onto 22-gauge galvanized sheet metal, cut with tin snips and carefully filed to the line. The template is checked periodically against the original profile to assure a perfect match. With the template blade finally complete, it is nailed to stock and slipper (see Fig. 3, above), ready for running the replacement footage.

Short lengths of new cornice are best run on a bench using gypsum and lime; the reproduction molding should be somewhat longer than the required length (see Fig 18). The new footage is cut and fit in place to match the existing cornice, then securely countersunk-screwed to studs, joists and/or blocking. The resulting joints are pointed with flat mitering rods, flush with adjacent members (see Fig. 5, above).

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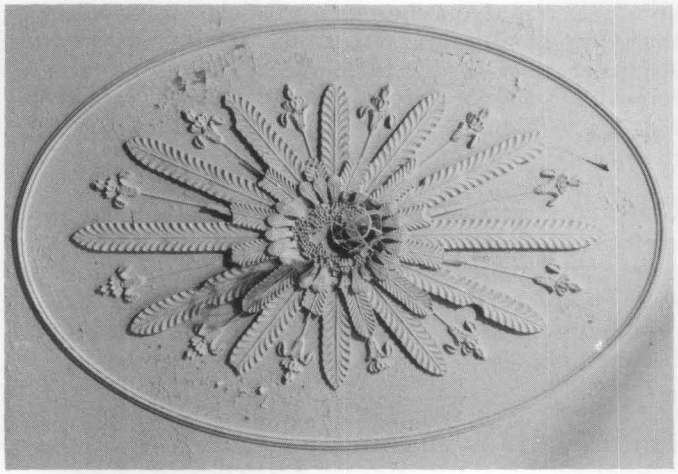
Fig. 18. Repairing a Cornice. (a) In the restoration of the Henry Hirshfeld House, a 19th century residence in Austin, Texas, removal of a tin ceiling revealed a damaged plain-run cornice. Photo: John Volz, AIA. (b) A section through the molding was taken, a template blade cut, horsed-up, and run on a bench using gypsum and lime. Photo: Charles E. Fisher. (c) The new cornice was then cut, fitted, and applied to new blocking between wall and ceiling. The external miter and returns were pointed using the miter rod. After the ceiling restoration was complete, other finishes, such as wallpaper, were applied. Photo: Candace Volz.

Longer lengths of cornice may be run in place, much as they were historically. Care should be taken that the position of the running mold engages with the existing work at either end of the run. Yet another method is to bench run the cornice to five or six feet, make a rubber mold of the model, and pre-cast the replacement parts either at the site or in the shop.

If the damaged cornice is ornamented, samples of the enrichment should be removed, making sure that whole original units are obtained. This is a difficult process, since these units were stuck into plain-run recesses called "sinkages" using plaster as an adhesive. In order to insert a flat chisel behind the ornament to break the bond, some units may have to be sacrificed. Sacrifice should be minimal. The excised enrichment should then be removed to the shop for rubber molding and casting either with or without the paint buildup, depending on the demands of the project. Whereas molding with several layers of paint make it hard to discern new casts from originals, paint-stripped molding reveals the remarkable talents of the period modelmakers. As noted, contemporary rubber materials have "fingerprint detail" capability. Modern casts are then applied to the new or original runs, again using plaster as an adhesive.

Ceiling Medallion. Ceiling medallions are often in greater jeopardy than cornices because the joist-lath-basecoat support system is susceptible to deflection and the force of gravity. The problems of ceiling failure are more frequent in the centers of parlors because circular-run and shop-cast ornament is often quite heavy and was not historically attached with any additional mechanical fasteners such as bolts and screws.

If the lath or keys have failed, plaster ceiling ornament may be saved, in whole or in part, by removing floor boards above, then drilling and injecting each lath with an elastic acrylic or epoxy material to reattach plaster to lath, and lath to the joists. This is a recently developed procedure which should only be undertaken by experienced professionals. The consolidation and reattachment process has been used successfully in period structures with dramatic results when important plaster and painted surfaces would otherwise have been lost.



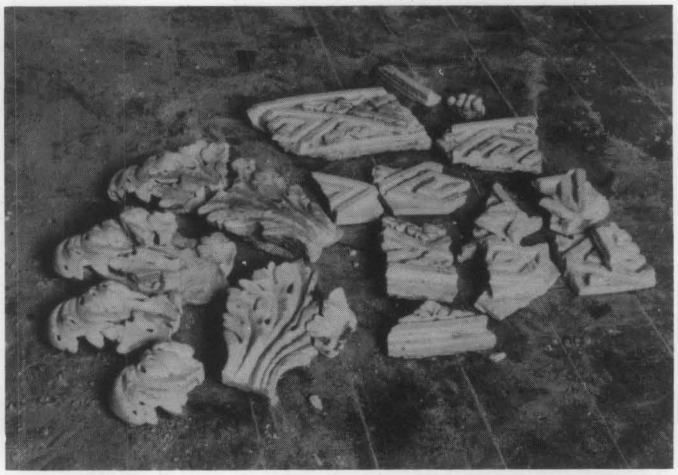
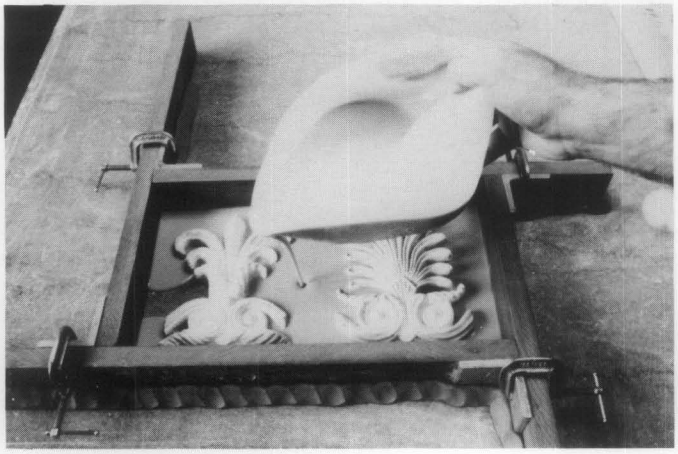


Fig. 19. Ceiling medallions may need repair or replacement. The ornamental plasterer takes impressions of the existing plaster, then casts new plaster elements. Adhesive plaster is used to reattach the new pieces. Left: Damaged elliptical medallion from Rockland, Fairmount Park, Philadelphia, Pennsylvania. Photo: David Flaharty. Right: Fragments of a medallion from the Bennett House, Charleston, South Carolina. The fragments serve as documentation for the replacement medallion. Photo: Peter Sanders.



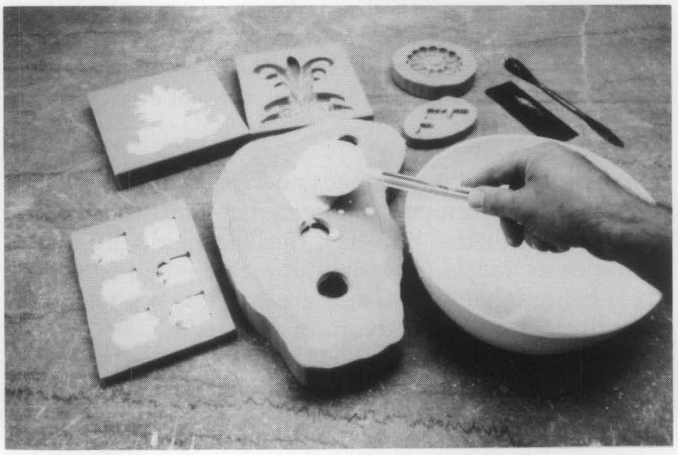


Fig. 20. Repairing a Medallion. Left: The plaster models shown are first lathered with a parting agent (liquid soap). To make a flood mold, urethane rubber is poured between wood fences clamped together and dammed with clay. Right: Casting plaster is then spooned into the two-part urethane mold. The mold showing six ornaments in the process of being cast is called a "gang mold." The others are simply single molds. Photos: David Flaharty.

Historic lighting fixtures often hung from elaborate ceiling medallions. When these fixtures were later converted to gas and electrical service, the central ornamental plaster canopies were sometimes damaged by insensitive tradesmen. More recent adaptive use projects may have caused additional damage.

Damaged ceiling medallions (see Fig. 19a) can be repaired by carefully removing representative plaster ornamentation, molding and recasting in the shop (see Fig. 20) and replacing the new enrichments so that they align perfectly with the original pattern. Polyvinyl acetate bonding agents are applied to the background and ornament so that the adhesive plaster grips tightly. Alternatively, a severely damaged medallion (see 19b) can be replaced using the fragments as physical documentation to cast a visually accurate replacement.

Sections of plain-run circular molding may also be repaired by determining a section through the run and the radius from molding to pivot point. As with cornices, the run should be made on a bench to a length greater than required, then cut and fit in place. Circular run sections are installed using plaster adhesives on bonded surfaces or modern construction adhesives after referring to manufacturers' instructions as to whether the adhesive is recommended for use on wet or dry materials. Coarse-threaded, galvanized screws are often countersunk to aid the bond; if possible, the screws should be inserted at points that will ultimately be covered with cast enrichments.

Ceiling medallions frequently appear in matching double parlors. It is not unusual for one ceiling to fail while its mate remains undamaged. The flat plastered ceiling over the location of the missing medallion often has a "ghost," confirming that a ceiling medallion once ornamented the parlor. The missing medallion may be remanufactured by securing a section, dimensions, and samples of cast enrichments from the surviving ornament and accurately following the original procedure (see Fig. 7, above). The ceiling on which the new work is to be set should be examined for its soundness and, if necessary, relathed (with self-furring metal lath) and

plastered. The pivot point for a circular run is screwed into a wooden block, force-fit into the center electrical box, and removed after the run is completed.

After 1850, particularly in the South, ceiling medallions were often designed with cast ornament only; no plain-run surround was used. Repair of such medallions proceeds as described above but without bordering molding.

An important point needs to be made about **adding** ceiling medallions (or any other kind of ornamental plaster element) when there is a lack of historical evidence. If there is no ghost mark or other documentation, indicating a medallion once existed, then the room should remain *unornamented* as it was historically. Adding conjectural ornamentation of any type or material (i.e., shop-cast or glass fiber reinforced plaster or polystyrene foam substitutes) can create a false sense of historical development contrary to the preservation principles stated in *The Secretary of the Interior's Standards for Historic Preservation Projects.* However, if there is clear indication that a ceiling medallion once existed, but there is inadequate documentation for its replacement, a medallion compatible with the room's historic character may be considered. Professional advice should be sought.

Coffered Ceiling. Like cornices and medallions, coffered ceilings suffer from poor maintenance practices and structural problems; however, these individually cast ceiling units are particularly vulnerable when a building is being rehabilitated and great care is not taken in executing the work. In the most serious of cases, portions of a roof can collapse, dropping heavy debris through the hanging coffering panels, and demolishing large portions of the ornamentation (see Fig. 21).

But even this level of damage can usually be remedied by restoration professionals. Immediate action calls for shoring the areas adjacent to the damage, and inspecting the hanging apparatus for unforeseen detachment and deflection. New channel iron is used to stabilize the existing coffers and ties reinforced, as necessary. An intact coffering unit is then identified and carefully removed to a casting shop for molding and casting (see Fig. 22). When re-hung, the units are painted to match the historic coffering (see Fig. 23).

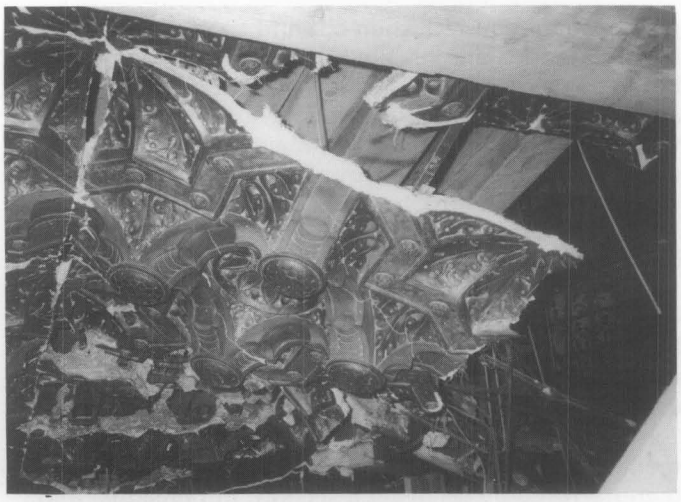


Fig. 21. The Yiddish Arts Theater, New York City, c. 1920s. The concrete roof of this building collapsed, damaging portions of the existing Moorish style coffered ceiling. The square coffer unit was easily identifiable and was removed to a casting shop for reproduction. Photo: David Flaharty.

Coffered ceilings appear with plain run or enriched cornices. In most cases it is recommended that the cornice be repaired first in order to achieve straight and level moldings. Then the damaged coffers should be replaced with the matching new coffers and the joints between pointed. Access from above is critical.

Finding and Evaluating a Contractor

When ornamental plaster damage or deterioration has been identified, the historic property owner, architect,

Fig. 22. Repairing a Coffered Ceiling. As part of the theater rehabilitation, the coffered ceiling panels are being reproduced in urethane rubber molds and reinforced with open weave burlap and wood fiber. Steel channel irons can be seen, attached to the backs of the casts. Later, these irons are used to hang the panels from a superstructure at the site. Photo: David Flaharty.

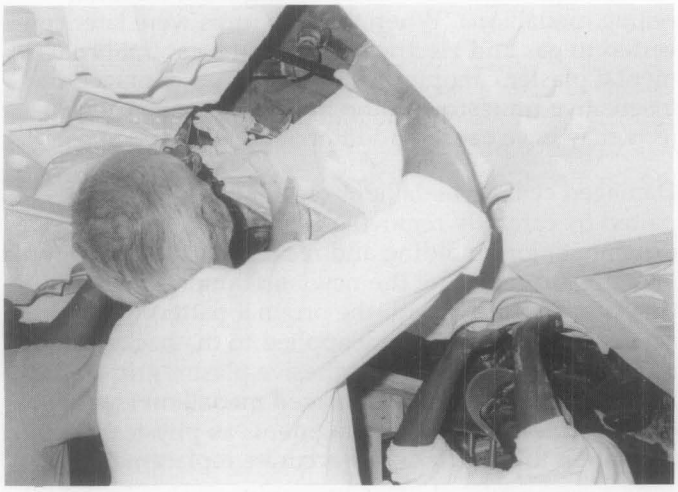


Fig. 23. A pre-cast coffer is lifted into place to abut adjacent panels. Tie wire will be fastened to the channel irons and the superstructure above, twisted to level, and finally wadded with wood fiber soaked in plaster to prevent the wire from stretching. Photo: David Flaharty.

or developer should secure the services of a reputable restoration contractor before proceeding further. It is clear as more and more projects are undertaken, that there is a wide disparity of skills within the trade today. This is partly due to the introduction of gypsum board as a substitute for traditional plastering. As gypsum board became popular after World War II, plasterers saw the demand for their skills decline. Plastering techniques were forgotten because they were often not passed down within shops and families. However, ornamental plaster studios have seen a resurgence in demand for their services in the last decade, particularly as more historic buildings are rehabilitated (see Fig. 24).

Locating an experienced contractor who is suitable for your **particular project** is the goal. First, many professional preservation organizations can provide references for suitable restoration contractors. Local plasterers' unions should also be able to identify contractors with experience in ornamental plaster restoration projects. Architects with preservation and restoration project experience may recommend contractors they feel have done a good job for them in the past. Museums with period rooms have engaged craftsmen to assemble the backgrounds for display of antique furniture and decorative arts. Finally, historical societies, either national, state, or municipally organized, may have funded projects which repaired and restored ornamental plaster.

Once several contractors have been identified, their specific abilities need to be evaluated. Prospective contractors should be invited to visit the job site to see and define the scope of work; written proposals, including prices, from all bidders, are essential for comparison. References should be provided and investigated. An outside consultant may be engaged or an informal adviser designated to aid in evaluating the experience and proposals of the bidders. To get a total picture, a completed project should ideally be visited by the prospective client with the contractor present to answer questions which often arise.

Finally, although this may not always be achievable, the bidder's studio may be visited, preferably on a normal working day (see **A 20th Century Shop Tour,** above.) Alternatively, the bidder may be visited while working onsite. Some ornamental plasterers simply do not have shops. They prefer to cast onsite, adhering the casts while the plaster is wet, and coordinating the job closely with the architect, who inspects each unit as it is cast and before it is installed.

Conclusion

Decorative plasterwork is usually a component of the historic character of interiors and, consequently, *The Secretary of the Interior's Standards for Historic Preservation Projects* call for its protection, maintenance, and repair. Where decorative plasterwork has deteriorated beyond repair, it should be replaced to match the old. Based on physical documentation, both repair and replacement can be accomplished using traditional molding plaster and casting procedures, together with the best of the modern molding materials available. Once a "lost art" after the Depression years, the skills of today's ornamental plasterers are increasingly in demand as part of historic preservation project teams. The ingenious and inspired decorative work created by our earlier architects and artisans can now be assured an extended life.

Fig. 24. This plaster studio is well organized, with ample work space. Note the plaster casts hanging neatly on the wall. Photo: Berry and Homer, Philadelphia.

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