

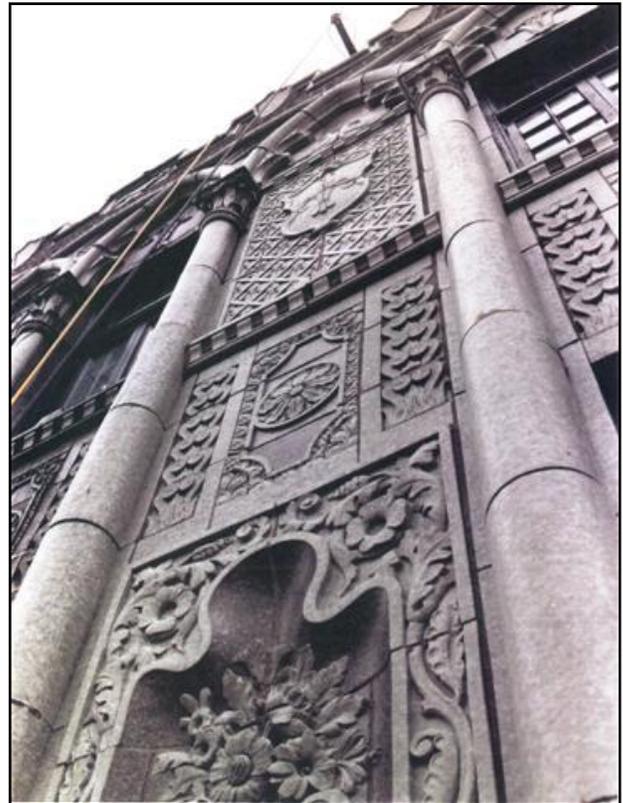
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## **415 Aldine: The Repair of Terra Cotta Facades**

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Unlike buildings with brick facades, ones with stone or terra cotta are more likely to experience dramatic defects. The reason for this is that stone and terra cotta masonry are built with less joints that can accommodate movement caused by water penetration and associated structural changes. Typically, these forces build up unobserved, until a serious failure occurs.

That's what happened in 1989 when the 415 Aldine Condominium Building had several chunks of terra cotta become dislodged and fall to the sidewalk. The Condominium Association retained Klein and Hoffman, Inc. (K&H), a Chicago-based structural and architectural engineering firm, to determine the causes of defects in the exterior walls and develop repair recommendations. Because the anchorage and support systems for terra cotta are complex, a thorough hands-on investigation by an architectural engineering firm was required to determine the type, location and extent of the deficiencies.



Built in the 1920s, the neoclassical structure uses the image of a column to visually organize the architectural elements. The lower floors that form the base are clad with ashlar limestone. A decorative band of terra cotta above the third floor marks the transition to the "body" of the column. The middle floors employ a matrix of brick and windows that form a simple but strong vertical line that leads the eye upwards. The top three floors abound in an intricate display of Gothic decoration comprised of ornate terra cotta window surrounds, continuous cornices, finials, intricate spandrel panels, medallions in the crenelated (i.e. sawtoothed) parapet and half round columns between the windows.

The terra cotta and limestone detailing of the 16-story tower's façade illustrates the character and craftsmanship that went into Chicago architecture. Since the terra cotta plays such an integral part in the building's presence, Klein and Hoffman's particular challenge was to develop a repair program that balanced cost and aesthetics.

Three methods are available to repair terra cotta. Duplication uses a model of an original piece as the basis for a new cast piece of terra cotta. Replication entails casting a copy made from glass fiber reinforced concrete (GFRC). Approximation uses a piece of planed

limestone to provide a profile similar to the original. The choice of repair method is governed by several considerations:

- **Level of Deterioration** – How serious is the defect?
- **Location** – How visible from the ground or residences is the area to be repaired? In general, the less visible the repair the less exact a method can be used.
- **Appearance** – How close should the repair match the original? Duplicated pieces will have the same texture, color and profile as the original. GFRC replicated pieces will have similar dimensionality; but because paint is applied to the surface, their color and texture will differ. Limestone approximations merely suggest the appearance of the original piece.
- **Cost** – What level (or mix) of repairs will the budget allow? The cost of each repair method varies according to the labor and materials involved.
- **Time** – What is the schedule for the restoration program? When is the desired completion? The time required to obtain a replacement piece varies from over four months for duplication to three weeks for an approximation. It should be noted that all three methods require removing the defective piece to fabricate replacements. A temporary plywood, in-fill panel is then installed and the area is rendered weathertight with plastic sheeting. This results in a rather unsightly façade until the replacement is installed.

Because terra cotta is prone to more latent defects than other masonry, the key to a successful repair program is good communication between owner and engineer. Given the above variables, the engineer must make sure the owner fully understands what to expect before the work begins. Frequently, once construction is underway, the scope and extent of repairs can change. Therefore, more progress reports to keep the owner informed are required to keep the work within budgetary constraints while achieving a pleasing appearance.

At 415 Aldine, Klein and Hoffman prepared bid documents, including drawings and specifications for a one-year construction program that used all three terra cotta repair methods. The restoration program also included limestone repairs, tuck-pointing, replacement of underlying steel lintels and support angles, replacement of caulking and glazing putty around windows, and corrective work on wood window frames and terra cotta sills. Chicago contractor Banner Restorations was selected to perform the repairs because of their knowledge and hands-on experience dealing with terra cotta.