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Vintage Masonry Buildings A Case Study in Repair

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Opening up an old masonry wall can be like opening up the proverbial can of worms. A whole host of unforeseen issues can rise to the surface.

Repairs on the exterior terra cotta walls of the Thompson Commissary Building, originally designed in 1912 by Alfred Alschuler, were proceeding as planned. Central Building and Preservations was working with the building's construction consultant, Bob Bergazyn, to caulk, tuckpoint and re-set shifted units in the cornice at the upper roof.

By all appearances, a straightforward job. The only telltale sign of apparent distress was the shifted and cracked cornice and parapet wall units. Their movement apparently indicated some corrosion of the support steel and anchorage. One of the characteristics of terra cotta is that it can accommodate a great deal of internal stress before deficiencies manifest themselves externally.

However, when several pieces of the shifted terra cotta were removed, the significance of the problem became clear. The underlying structural steel roof support beams and columns were discovered to be severely corroded. As well as supporting the roof structure, all of the lateral anchorage for the projecting terra cotta cornice was attached to these members. The stability of the entire cornice and roof was in danger—a situation that Central recognized as clearly requiring a structural engineer.

Klein and Hoffman, at the request of the contractor, was hired by the owner to provide the necessary design and engineering services. The firm conducted a conditions survey of the masonry cornice, related anchorage and the building's structural steel frame. Our engineering analysis clearly indicated the deteriorated structural steel members supporting the upper roof had to be removed and replaced.

Not a simple procedure —doing so required opening large portions of the upper wall and roof. Special care had to be taken by the contractor to make sure that business operations were not affected. To prevent water or air infiltration into occupied office space below, temporary enclosures had to be erected to render the wall weathertight. Further steps had to be taken to accommodate tenants. Some work was performed at night or weekends so as not to endanger building occupants.

When the project was originated routine maintenance repairs and swing-stage scaffolds were sufficient. Once the scope expanded, pipe staging had to be erected across the entire front of the building, extending above roof level. Again the comfort of the tenants, including the occupants of ground floor retail space as well as pedestrians, required special attention.

Because such a large amount of structural steel needed to be replaced, saving the terra cotta cornice became impossible. Reconstructing it with new terra cotta would have been cost prohibitive. It also would have meant delaying completion of the project 6-8 months for lengthy fabrication.

In its heyday, terra cotta was a popular building material. It was lightweight, came in a variety of decorative shapes and finishes, and was cost effective. Terra cotta was originally chosen to clad the Thompson Building because it conveyed cleanliness. What better statement for the headquarters of a firm whose business was food production and preparation.

And so, another solution had to be devised. One reason limestone was chosen was because of the location of the repair, high above street level. The stone would blend well visually with the terra cotta. In addition, limestone was readily available and could also be planed to approximate the profile of the vintage terra cotta. Matching the original design intent was an important consideration in restoring the Thompson Building's graceful appearance.

Structurally, though, the new cornice weighed more than the original. Using the basic original drawings, obtained through the Chicago Historical Society, Klein and Hoffman designed various modifications to accommodate the additional loads and changes in profile entailed by the new cornice. All existing and new steel members were cleaned, primed and coated with rust inhibitive paint to prolong the life of the repair. State of the art flashing systems were installed prior to setting the new stone work.

Another consideration when repairing vintage masonry is melding new technologies and current construction techniques with as-built conditions. Design and detailing practices obviously have changed over time.

An awareness of how old and new fit together is crucial. This is especially important when dealing with repairs to small sections of walls. Existing stresses in the façade need to be addressed when inserting new materials. Improperly detailed repairs can actually cause new problems.

The goal of any successful masonry restoration program is to preserve and prolong the structure's useful life.

Technical expertise, however, is not enough to get the job done. Restoration engineering is about "restoring" value to a clients properties. The most appropriate repair/rehabilitation program takes into account both financial and aesthetic factors.

An owner should be prepared to experience some changes in scope, extent and, of course, cost when working to repair or restore the facades of older buildings. The three most frequently asked questions are:

- HOW MUCH IS IT GOING TO COST?
- WHAT'S IT GOING TO LOOK LIKE? and
- HOW LONG WILL IT TAKE?

The answers are all inter-related. It may be helpful to look at these issues in relation to three basic levels of repair.

- **Essential Repairs Option:** Seriously defective and irreparable brick, stone and terra cotta are rebuilt using simple brick. As a result, this method of repair will change the architectural character of the building.

- **Approximation Option:** Irreparable stone or terra cotta ornamentation will be replaced with limestone. Limestone lends itself well to approximation, and for simple profiles, duplication of the original configurations. This option will have a slight impact on appearance.

- **Restoration Option:** Irreparable and/or ornate masonry is replaced with in-kind reproductions, approximations or glass fiber reinforced concrete (GFRC) as a replication. In some instances, bricks can be stained to match the original. Masonry cleaning is often included as it not only improves appearance but can aid in matching repair with existing materials. This option comes closest to renewing the walls to their original appearance.

In the case of the cornice at the Thompson Building, the cost to exactly reproduce the original terra cotta would have been 4 to 5 times that of the limestone rebuild. While several repair/replacement materials were available, planed limestone offered the best approximation of the cornice's appearance. Although some of the ornate profile detail was lost, the engineer's design was sensitive to the building's look and character. (The project has been submitted for consideration by the Landmarks Preservation Council of Illinois for a restoration award.) Because it was readily available, limestone also offered quick turnaround. Even the many pieces involving several cuts for detailing were delivered in a timely manner. On the other hand, lead time for the production of new terra cotta would not have allowed for project completion until the following year.

And so over a year after the original work began, the project was completed. What had begun as routine maintenance had become a major restoration. No one knew when the work started that a problem of such magnitude lay hidden behind the building's creamy terra cotta façade.

Latent conditions are a common factor of many masonry repair projects. When approaching a façade rehabilitation, it's often wise to "expect the unexpected".