ARCHITECTURE

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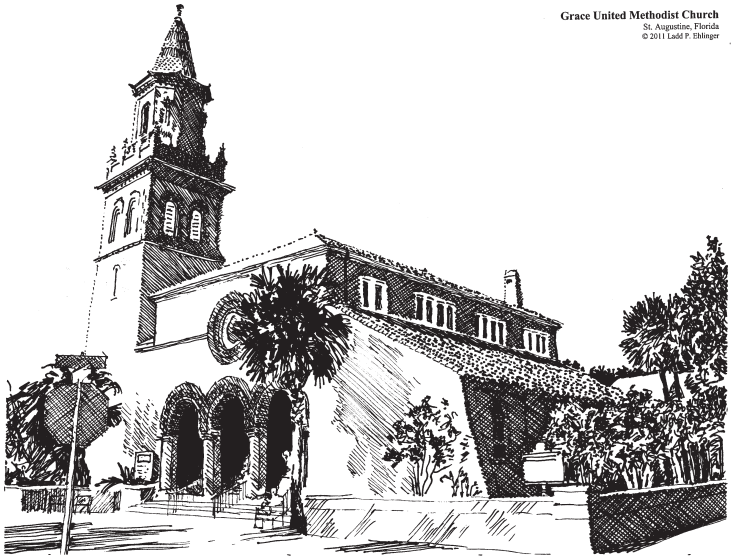

Grace United Methodist Church

Grace United Methodist Church in St. Augustine, Florida, this issue's limited edition print of a sketch by Ladd P. Ehlinger has a very interesting history, besides being an archetype of what I would call "Robber Baron Architecture". This building is actually the second building the congregation had designed and built. The first was built in 1884 and was closer to the Ponce de Leon Hotel being built by Henry Flagler. Shortly after completion, Flagler decided that he needed the property to further complete the hotel, so he offered in 1886 to buy the first building and furnish property and build a new church further north on Cordova St. at Carrera in St. Augustine. The congregation accepted Flagler's offer, and work began on the new facility in 1886.

Flagler was John D. Rockefeller's partner in Standard Oil. He came to St. Augustine originally in hopes of curing his wife's illness upon Doctor's recommendations. His wife died shortly after their arrival, but Flagler was so impressed with the potential of St. Augustine that he decided to leave his employment at Standard Oil, buy the railroads serving the area, combine them and expand them, and go into the resort hotels business. Hence the Ponce de Leon Hotel. Flagler hired the same architects, Carrere and Hastings, that had designed the hotels to design Grace as well as several other churches. He also hired the same contractor, McGuire and McDonald to build it.

Grace United Methodist is of the aesthetic that evolved in America out of the classical training of the University of Paris Ecole des Beaux Arts. At that time there were few American schools of Architecture, so most aspiring architects went to Europe, and most to the Ecole des Beaux Arts. One architect from the New Orleans area, Henry Hobson Richardson, became famous for his design of the Trinity Church in downtown Boston, and Marshall Fields Warehouse department store in downtown Chicago that were done in this same time frame. Richardson even had a distillation of the style of the day that he developed named after him: "Richardsonian Romanesque", characterized by bold Romanesque arches and rough hewn brownstone walls. Other architects that worked in this milieu were Louis Sullivan, McKim Mead & White, and Burnham & Root to mention a few. This was the gilded age, the age of the "Robber Barons", Industrial Age patrons of architecture that spent lavishly on commercial and private buildings. Many buildings of the day had strong organization and symmetry, well developed architectonic components, and arches that mimicked the Richardsonian Romanesque arches, and were usually flamboyant and assertive.

Carrere and Hastings were fairly inventive and bold architects. They made use of concrete as the major wall material of the Grace Church project. This was very daring at the time because concrete had only recently been rediscovered as a building material since the fall of the Roman empire. Architects and engineers were not accustomed to the material at this time, yet the finish on the walls is one of exposed aggregate, and there was tight control of the type of aggregate used in the concrete so as to control the color. There was however a lack of knowledge about reinforcing the concrete, so many of the St. Augustine buildings have cracks that would have been prevented with that knowledge.

The interior of Grace is of heavy timber construction, with stained and varnished structural members and decking, along with intricate millwork. This was all beautifully designed and constructed in Grace as in their other buildings.

Ladd P. Ehlinger, AIA

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More About Brick

There is one other proprietary product called CavClear™ that purports to keep the cavity / air space clear of mortar droppings. CavClear is similar in composition to MortarNet™ in that it is a plastic non-woven fabric 2" thick resembling Spanish moss in composition, that is intended to fill the entire cavity / air space, and placed there prior to laying the masonry, thereby preventing any mortar droppings that can block the weep holes from behind. It is placed in sections equaling in height the spacing of the wall ties. My only reservation about this product is that there is a possibility that the "curly-cue" strands of the fabric may well translate water across the cavity / air space, functioning like a mortar bridge. I know of one local project where it is presently being used and the "jury is still out" on this product until it's performance can be judged over time.

In an earlier article, I said that the building code prohibits the use of brick veneer for the support of anything. The code says "The traditional definition of veneer as an element without resistance to imposed load is adopted." This is implicit also in other prescriptive sections of ACI 530. The code also says however, that "Loads shall be distributed through the veneer to the anchors and the backing using principles of mechanics." What this means is that the veneer itself should not be used to resist loads, but to transfer the loads to the back-up wall. This does allow for loads to be imparted to the brick veneer, however.

Criteria for anchor strength and mortar strength has been developed by testing. Anchor strength has been tested by manufacturers of anchors and independently as well. Testing has been performed that gives tensile, compressive and shear strength of anchors in published papers. Similar testing has been performed for various types of mortars, and some of the anchor testing is also testing of the mortar as well as it considers the bond strength of the mortar and the pull-out strength of the anchor embedded in the mortar.

Using principles of mechanics to translate loads from the veneer through the anchors to the back-up wall rather than the prescriptive dictums of the code can be a rather risky endeavor. The testing indicates a very wide range of values for the ties in their attachment to the stud back-up wall or to a masonry back-up wall, and a wide range of values for bond strength of the mortar itself and pull-out of the ties, indicating that it's strength is dependent upon the skill and care of the mason in mixing and applying the mortar. There is only the designer's judgement to rely upon, as there are no stated guidelines. This would tend to guide the designer to utilize the lowest test results to be safe.

Testing of the shear and tearing of anchors in the plane of the veneer has also been performed which seems to indicate that the veneer will translate almost half of the lateral load from the wind to the foundation, and that the veneer acts in concert with the stud walls. A question would be: "Is the foundation to be considered a backing?" I think more work needs to be done in this area, as utilizing the veneer as an element to resist an imposed load would seemingly violate the code. We all know from observations of effects of storms that there is contribution from the brick veneer to resistance of in plane shear forces, but a rational design method has yet to be developed.

Other structural considerations have to do with normal forces to the brick veneer, like the wind, and the total height of the brick veneer.

Deflection of the back-up wall can affect the brick veneer. If the back-up wall deflects more than l/600, the veneer may well crack and become unstable. I observed several brick veneer residences that were damaged during the winds of Katrina with cracks at the mortar joints continuous such that one could move the veneer inward by hand. The vertical height of the brick veneer is limited by prescriptive measures in the code to a height where crushing of the mortar and / or the brick will not occur. One has to design additional vertical support, usually by a steel angle supported by the building frame, if the brick veneer is to go higher. One could go higher under principles of mechanics if one were using a stronger mortar and brick than the code assumes, such that no crushing takes place.

There are methods to fix the impacted mortar that blocks the weepholes from within the cavity / air space. We have successfully had the contractor cut pyramidal shaped holes a diamond tipped blade on a grinder about 2' wide at the first course, and then a half brick inward as the hole goes up, and space the holes about 2' apart edge to edge. The impacted mortar immediately in the hole is easily removed, and the mortar still behind the brick remaining is removed using long wood bits on a drill. After removal of all impacted mortar, new brick is re-laid to fill the holes.

When there are wall above roofs that terminate at the roof, sometimes what you think is a roof leak is actually a wall leak due to impacted mortar. The repair is similar to the above described repair, except that after the brick and impacted mortar is removed, a new base membrane flashing and metal receiver flashing is applied, the new brick re-laid, and the brick between the repaired holes has to be removed as well to apply the flashings as well, and then be re-bricked also. This is an iterative process.

When there are mortar bridges up high in the field of a wall that are translating water across the cavity / air space to the back-up wall and the problem is ubiquitous, the entire brick veneer has to be demolished and then relaid to solve the problem.

Ladd P. Ehlinger, AIA