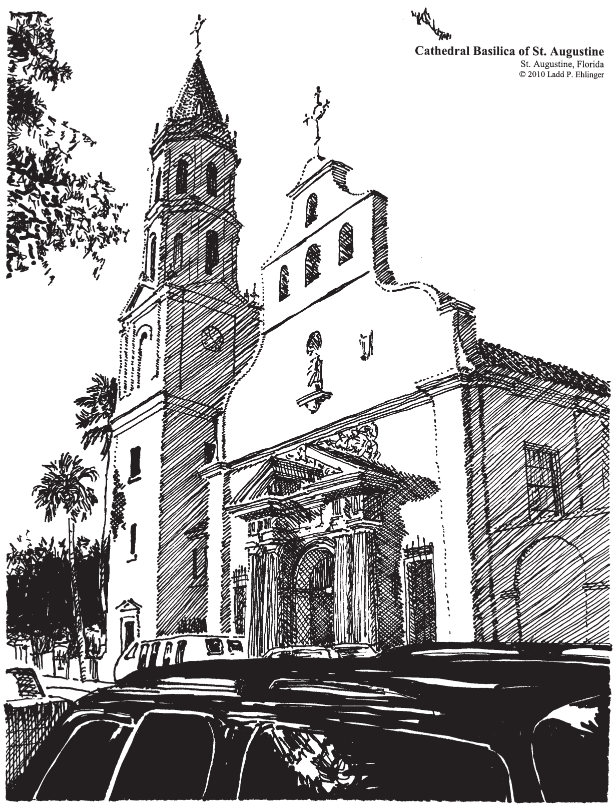
ARCHITECTURE

EHLINGER & ASSOCIATES **FOURTH QUARTER 2010**

Ehlinger & Associates extends Seasons Greetings to all of our friends who receive the newsletter. Merry Christmas, Happy Hanukkah, and Happy New Year.



Cathedral Basilica of St. Augustine

In 1565, the Spaniard Don Pedro Menéndez de Avilés sailed from the port of Cádíz, Spain with prospective Spanish settlers and sighted land on the east coast of Florida on August 28 in what is now known as Cape Canaveral. He went further north and landed on Sept. 8 in a natural harbor of the native Timuacan tribe and named it St. Augustine, because the 28th of August was the feast day of St. Augustine of Hippo. Menéndez was presented with a cross to kiss by Father López Mendoza Grajales as the hymn *Te Deus Laudamus* was sung upon coming ashore, after which a mass was celebrated. This was the beginning of the establishment of the oldest European settlement in North America, and the founding of the City of St. Augustine and the parish of the Cathedral Basilica of St. Augustine.

There were four Spanish Franciscan priests that came with Menéndez to evangelize and convert the natives, as well as minister to the settlers. The first church they established was in the southeast corner of the main plaza of St. Augustine, whereas the present day Cathedral is on the north side of the plaza in the center. The Franciscans also established missions to the north as far as St. Catherine's Island, GA and to the west near Tallahassee.

Sir Francis Drake, the English privateer (pirate) pillaged and burned St. Augustine including this first church in 1586. Everything was rebuilt, but the need for more security prompted the construction of Castillo de San Marcos. This was a stone fortress authorized by the Spanish Crown to protect its northernmost flank, and was begun in 1672 and completed in 1695. In the war of Spanish succession, the English occupied the city but failed to take the fort after a 50 day siege. They then burned the town and left.

The English took over in 1763, when Florida was ceded to the them in the conclusion of the French and Indian War as part of the First Treaty of Paris. In the second Treaty of Paris in 1783, the independence of the U.S. was recognized and Florida was returned to Spain. Finally, in 1821 Spain ceded Florida to the U.S.

When the English governed between 1763 and 1783, a colony / plantation was started in New Smyrna, 60 miles south of St. Augustine, the English capital of East Florida. Dr. Andrew Turnbull recruited settlers from around the Mediterranean, mostly from Greece, Minorca, Corsica, and some from Turkey. In return for passage to Florida, settlers agreed to work for 5 years on the plantation. Dr. Turnbull reneged on most of these contracts and refused to release these people when their contracts had been fulfilled, also treating these indentured workers cruelly and abusively, sometimes to the degree of manslaughter. There were two revolts, the second of which was successful due to the need of the English for able bodied men for military service during the American Revolution. The colony collapsed, the indentured workers moved to St. Augustine, and being Catholic, created the need for a larger Parish worship center. The Parish was elevated to a Diocese and the Cathedral was built in 1786 per a directive of the Spanish crown.

In 1887 a fire occurred in the adjacent St. Augustine Hotel which spread to the Cathedral, severely damaging it. The suibsequent reconstruction added the bell tower and transept wings. The basic plan of the Cathedral is Basilican, that is with a long simple Nave straight from the Narthex (Entry) to the Apse where the altar is located. The walls were built of coquina stone, a locally available very soft stone formed by deposition of marine animals, similar to limestone though not subjected to any overburden pressures. Coquina hardens considerably when exposed to air after quarrying, but still has to be clad with stucco to protect it from the weather. The superstructure consists of wooden timber trusses and decking, covered with tile shingles. The main facade is exemplary of Spanish Colonial architecture with large, plain wall surfaces embellished with decorative porches and openings. This a very mild expression of Churrigueresque architecture.

MORE ABOUT BRICK VENEER

One comment here about 1" wide air spaces or cavities: Home builders have pressured the writers of the codes to keep this criteria because they like to form the watershelf with a 2 x 6 (actual 1-1/2" x 5-1/2") on the flat at the edge of the slab form. A modular brick is 3-5/8" wide and the sheathing that laps or shingles into the vertical edge of the watershelf is 1/2" thick. Added together, they are 4-1/8" thick, leaving a 1-3/8" wide cavity / air space. To properly form the width of the cavity, one needs 3-5/8" plus 1/2" plus 2" or 6-1/8". This means the builder will have to rip down a 2 x 8 (1-1/2" x 7-1/4") to achieve this. Another aspect to consider is the vertical height of the watershelf. To course out properly with CMU after the first course, the watershelf should be a nominal 2-5/8" high so that it equals the height of the first course of brick. Both of these cost more, but if the builder is going to re-use the forms, this additional cost is spread over four to six jobs.

For the cavity or air space to function properly and drain the water to the watershelf, the back-up wall has to be sealed air tight from the cavity, and there can be no “mortar bridges” or “impacted mortar” blocking the weepholes from within the cavity. Mortar bridges and impacted mortar are created from droppings of mortar within the cavity in the act of laying the brick, that accumulate on top of the wall ties and at the bottom of the cavity respectively. Mortar bridges are more prevalent when the corrugated ties are used, but can occur on wire ties as well if the mason is egregiously sloppy. Impacted mortar is when there are so many mortar droppings on the bottom of the cavity that the back side of the weepholes in the cavity itself are so thoroughly blocked that the cavity can’t drain. The result is that the water will exit the cavity by seeping through the brick veneer outward and seeping through the back-up wall inward, resulting in a leaky wall. I have seen impacted mortar as high as 4' within the cavity, more than likely produced by a lazy mason who dumped his mortar board at the end of each day. I have seen mortar bridges in patches as large as 2' x 3' at the top 1/4 of the wall, wetting the back-up wall at the top.

The ACI-530 Masonry Code is published by the American Concrete Institute and incorporated by reference into the building code. ACI-530 permits a cavity or air space only 1" wide. However, in the Commentary of ACI-530, it tells you that a 1" wide cavity does not work, because frequently there are mortar bridges and impacted mortar, as a 1" wide cavity / air space is very difficult to keep clean, and then recommends that one use a two inch wide cavity because it is easier to keep clean.

BIA Technical Notes are published by the Brick Institute of America (which also calls itself the Brick Industry Association). Tech Note 20 tells the designer to make the cavity / air space a minimum of 2" wide in a cavity wall with a masonry back-up wall. Tech Note 28B tells the designer to make the cavity / air space a minimum of 2" wide in a veneer wall with a metal stud back-up wall. Tech Note 21C tells the mason the use a 2x dimensional lumber board (actual 1-1/2" wide) with lanyards (ropes) on each end of the board in the cavity to keep it clear of mortar droppings. The mason is to place the board in the brick shelf to start and lay up the first courses of brick, usually six courses to the first row of wall ties, pull the board out of the cavity and shake off the mortar droppings, lay out that course’s wall ties, set the board back in the cavity on top of the all ties, and keep repeating this until the wall is complete.

We require that the mason omit two bricks in the first course and one above them in the second course, assuming use of modular bricks, to function as inspection ports every ten feet, until such time as the remainder of the wall is complete. We then inspect with a light and a mirror after the wall is laid up, and if free of mortar droppings and bridges, allow the closing of the inspection ports. If not free of droppings and bridges, then corrective work is directed, even to the point of demolition and rebuilding.

There is a patented product called MortarNet™ that advertises that it solves the impacted mortar from droppings problem which blocks the weepholes within the cavity without having to use the pull up the board method to keep the cavity clean. This product is composed of semi-rigid plastic strings in a non-woven pattern similar to Spanish moss that is as wide as the cavity, and in elevation has a castellated dovetail pattern so that the mortar droppings are caught on two levels, both of which are above the cavity bottom. The near vertical faces in the castellated pattern thus remain open, allowing water to drain to the bottom of the cavity and then out the weepholes.

I observed one use of MortarNet several years after its construction in a building with mold on the interior gypsum board of the exterior wall. The source of the water for the mold was the mortar droppings on the MortarNet that formed mortar bridges across the cavity, translating the water to the back-up wall gypsum sheathing. The water penetrated at joints in the gypsum sheathing and by saturation of the sheathing, producing mold on the surface of the sheathing and internally within the sheathing. There was fiberglass batt insulation, which further translated the water across the void of the stud wall to the interior gypsum board. My judgement is that MortarNet does keep weepholes open provided the droppings are not high enough to close up the near vertical faces of the castellation, but it creates mortar bridges that defeat the purpose of the cavity. MortarNet encourages the mason to be sloppy, and therefore should not used.

The back-up wall may be wood studs or metal studs with a sheathing, or it may be CMU (Concrete Masonry Unit) or even brick, a minimum two wythes wide. If the wall assembly is a stud wall with sheathing, the sheathing should be taped air-tight and shingle over the inner vertical edge of the (brick) watershelf. If the back-up wall is a CMU wall, there can be no holes, cracks or crevices in the wall, and it should be treated with a waterproofing compound on the face of the CMU in the cavity in case some water does translate across the cavity.

To Be Continued

Ladd P. Ehlinger