ARCHITECTURE

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THE TREASURY OF ATHENS
DELPHI, GREECE

This month's limited edition signed print by Ladd P. Ehlinger is of the Treasury of Athens at Delphi, Greece. The view in the sketch is of the east facade with the sun shining from the west, looking slightly up the mountain. This type of temple style is architectonically known as a 'di-style in antis' with Doric style columns. This particular style has a pair of columns framed or bracketed between walls. This framing of the columns by the walls gives a strong aesthetic focus to the columns as a picture frame does to a picture, and was a common device used for treasuries.

Delphi was a Greek city founded in pre-historic times upon a legend from Greek mythology. On the precise spot where two eagles, freed by the god Zeus, flew down to earth for the first time, the first shrine at Delphi was founded and consecrated to 'Mother Earth', Gaia. Themis, identified by many as synonymous with Gaia herself, was the sole heiress to the shrine and she, in turn, ceded her place to Apollo, the god who came from the sea and slew the Python near the Phaidriade rocks.

Delphi was thus a shrine or sanctuary, and served as a focus for the pious pilgrims of the Greek city states. These city states made the various shrines about Greece into 'festival cities', where competitions in athletics, drama, oratory and the like were held between the various city states at the time of the feasts of the gods being worshipped at the particular shrine. These feasts varied with the calendar and from city to city. Olympus is probably the most famous city of these competitions, from which our present day Olympics are derived.

Delphi was also known as the 'navel of the earth', and a strange massive crock of pottery was created to represent the concept. It was about 5.5' tall and 4.5' in diameter, oval in shape, with various icons embellishing its surface. This object was venerated during the festivals.

Delphi is in the very mountainous region of Corinth near the sea. The only flat land in the city was used for the athletic fields. There were numerous structures built to service the events, the largest of which is an amphitheatre built into the mountainside. The largest temple was the Temple of Apollo, just up the mountain from the Treasury of Athens.

The Temple of Apollo was where the famous 'Oracle of Delphi' was resident. The oracle was always a female who was kept in a cage in the basement of the temple and fed laurel leaves and other hallucinogenic drugs. She was kept in a stupor at all times. When the faithful would pose questions to her through a screen in the main floor of the temple, the answers were governed by her drug induced stupor. Most oracles did not live very long.

Another one of the ways the various city states competed at the shrines was to build 'thesauroi' or treasuries. The treasuries functioned somewhat as banks, but they were offered to the gods as tokens of gratitude by the city states. They played an important part in the embellishment of Hellenic sanctuaries. They conveyed outward indications of power and ostentatiousness, but they are nevertheless of very high significance in architectural history. Very often they are in a better state of preservation than larger buildings. At Delphi, the Treasury is one of the few remaining buildings.

The treasuries also reveal the ancient Greek philosophy of architecture: buildings were also works of sculpture so that the two arts were often associated in a search for plasticity. These buildings were of restricted proportions, the treasury of the Athenians measures 22.1' by 31.7' in plan. The concept was that of a 'jewel box'.

QUIET! On the Site

When sound waves reach the human ear, the eardrum receives the wave with a sympathetic vibration and we "hear it." Noise has been traditionally controlled by passive methods, such as insulation, designed to prevent the noise from reaching the ear - these methods are mainly effective with high frequency tones (comprised of short, close waves) rather than low frequency tones (whose distantly spaced waves are not easily blocked).

Born in 1976 at the University of Essex from an analysis of noise and vibration produced by engines, "anti-noise" technology cancels the sound waves before they reach our ears by producing the mirror image of the undesirable wave and thereby canceling it out, eliminating the noise. To cancel sound, anti-noise is generated simultaneously with the noise source (the firing cycle of an engine, for example). A microprocessor-based controller constantly compares the anti-noise with the source noise and makes adjustments for error in the next cycle. The noise from the last firing cycle is interpreted, the controller predicts the characteristics of the next cycle, and anti-noise is electronically produced. The speed of current-day microprocessors gives anti-noise controllers the speed to be able to correct errors within one firing cycle - faster than the human ear can hear the change.

Four basic components make up an anti-noise system: a microphone to capture and measure the noise, a synchronizing sensor to determine the exact frequency of the noise, a microprocessor controller to interpret the information, and a speaker to project the anti-noise signal.

The easiest noises to cancel are ones from repetitive sources such as gas and diesel engines, generators, propeller-driven aircraft and many types of factory equipment. The very types of low frequency noise found to cause fatigue, discomfort, hearing loss and reduced efficiency in workers. For example, special seats have been constructed to create quiet zones of noise control around the head and upper body of a seated passenger. Since it only eliminates selected frequencies, voices or warning sirens would be heard clearly. It is also applicable in the anti-vibration field, vehicle suspension systems could be computerized to compile feedback and program the "ideal" ride for any road conditions.

The anti-noise industry's focus is first business and commercial applications such as construction, aviation, trucking – but major automakers are already preparing applications in luxury cars. Within two to three years, anti-noise products will be available for lawn mowers, water pumps, HVAC systems, and most other sources of household noise.

Imagine spending all week on the job-site speaking to co-workers in normal tones, driving in a quiet car, and waking on Saturday without the sounds of the neighbors' lawn mowers. It's positively unheard of.

excerpted from The Construction Specifier 08/90 by Amy Hoffman New

STUCCO

Stucco has been used as an exterior finish almost from the time that man first began to build. The Mesopotamian, Egyptian, Greek and Roman builders all used stucco as a facing on monumental, institutional buildings over poorly dressed and/or blemished stone and over non and poorly fired and/or blemished brick masonry, and combinations of stone and brick masonry, to improve the aesthetic appearance of the walls, to improve the waterproofing ability of the walls and to protect the underlying masonry from weathering. Stucco was also used in vernacular construction for everyday and residential usage, and was applied over such substrates as wattle and daub (a weaved construction of wooden sticks or thatch held together with mud between a structural wood frame), and over wooden planking.

Early stucco formulations were composed of mud, then later of lime and gypsum (what we would label plaster today and restrict to interior usage), both of which weathered badly and had to be frequently renewed. The Romans introduced pozzalana cement (a naturally occurring portland cement) into the stucco, which improved the waterproofing and weathering characteristics of their stucco facings, and reduced the frequency of renewal. The use of pozzalana ceased in the west when the Roman empire fell, but continued in the Byzantine and Ottoman Empires. Stucco continued to be used in the west, however, in much the same way as the Romans did up until the 19th century. The renaissance period in all countries saw the use of stucco on monumental buildings, and on wood frame buildings as in-fill over wattle and daub in Germany, France, England and the other northern European countries. During colonial times in the 16th through the 18th centuries, the Spaniards used a cement made from pulverized fired brick or clinkers that had characteristics of portland cement also. They used this material for wall facings and also for roof coatings on flat roofs on their colonial buildings in the new world.

The native American Indian cultures in middle and central America also used stucco facings on their structures, without a type of portland cement in the formulation of the mix. These wall surfaces had to be frequently renewed.

Stucco in these traditional usages improved the waterproofing qualities of the walls over the underlying masonry structure, but did not entirely prevent the absorption of water, or the entry of water into the building. Stucco is a cementitious type material, and as such is porous and will absorb water. When saturated during periods of intense rainfall, the underlying masonry will absorb this water by capillary action. The stucco was frequently painted to further improve the waterproofing qualities and the aesthetic appearance of the walls. The paint protected the stucco, but it had to be renewed periodically.

In the late 19th century, everything changed with industrialization, and the development of the scientific method. The resultant engineering principles began to be applied to traditional structures and materials. Portland cement was re-discovered, and re-introduced into the formulation of stuccos. Experimentation began with new combinations of old materials, and of old materials with new materials.

Balloon framing was invented, where the wood used in structures was reduced in size (studs and joists) so that two men could handle members in building a structure without extensive lifting equipment, and the composition of the members was such that they interlocked and achieved their stability by virtue of the exterior surface (sheathing), which was usually at that time planking. Typically, lapped wood siding was used as the weather surface, but also wood shingles were used. Most of this experimentation took place in the United States, and this type of framing system and subsequent improvements to it (platform framing) suited the needs of the country at the time. It utilized the abundant forests, it was cheap and it was fast enough to handle a rapidly growing population.

Stucco began to be applied to the stud wall construction in experimentation, as plaster was applied on the interior walls of the then new type of construction. On the interior, strips of wood approximately 1/2" thick by 2" wide were used for lath, where they were separated by about 3/4", for the impressed plaster to bond to the wood. The stucco on the other hand was applied to a manufactured type lath of corrugated paper with light gage wires attached on the exterior peaks of the corrugation for stucco bond. No edges of the plaster or stucco were reinforced.

Both the plaster and stucco began to be applied in a three coat method, a scratch coat (the initial coat to bond to the lath), a brown coat (to build up the thickness and create a reasonably flat surface), and a finish coat (to produce an aesthetically pleasing, very flat, dense, uniform wearing and visible surface). The formulations of each of the three coats was tailored for its specific purpose and for economy of materials in the mix.

Cracking problems soon appeared in both systems. The differential rate of thermal expansion and contraction of the plaster and stucco from the underlying wood frame and the lathing systems, along with a lack of ductility of the plaster and stucco compared with the wood systems when subjected to temperature change and vibratory, flexural, and settlement movements caused the plaster and stucco to crack. Cracks also arose when the three coats comprising the stucco were not mixed properly or applied properly. The coats (lamina) would fail to bond with each other. The cracks in the plaster were mostly an aesthetic problem, but the cracks in the stucco were a waterproofing problem as well. Water intrusion in wood frame walls fostered termites and rotting.

This methodology was used until after World War II in light commercial and residential structures, with the traditional application of stucco and plaster over masonry still being used on monumental and institutional buildings. Then the technology began to change again.

More about stucco in our next issue!