

Technically Speaking

architectural design

Classic Principles Remain a Vital Design Tool

A S P E C I A L R E P O R T F R O M C A R T E R & B U R G E S S

THE ARCHITECT of a big box store, a strip mall or a 300-unit apartment complex, considers the demands of the owner, the cost of materials and the requirements of the user when designing for today's world. The architect of a Greek temple or Medieval cathedral designed for eternity, considering the connection between the worshipper and the divine.

Classical and early modern architects operated within a paradigm in which form imparted meaning. Classic architects worked with a well-defined framework of established forms and principles. Later, Gothic architects created structures rich in symbolism in which the placement of every element could be interpreted by the faithful.

Architects have continued to reinterpret the architectural vocabularies of these periods. In today's built environment, these principles produce substantive, appreciable, and tangible results. Reinvented for a modern world, these elements continue to impart value to us. The proportions still make "sense" to us,



When architects understand the principles that shaped the ideals surrounding classical and early modern architecture, they can design an authentic restoration or renovation for buildings needing these services today.

they feel "right" in a visceral way we can only define in terms such as "an environment we enjoy", "feel attuned to" or that "enhances our work experience."

Our understanding of aesthetics and the need for a level of beauty in our environment is still with us. We must now build for modern tastes, modern requirements, and modern budgets, but an understanding and judicious use of the design concepts of the past can instill within a building a greater depth of experience for the present user. Application of these design concepts also can create a greater value for the design dollar whether the building is new, or in need of an authentic renovation or expansion design.

the evolution of architectural design

“Architecture aims at Eternity; and therefore is the only Thing incapable of Modes and Fashions.” — Christopher Wren (1632-1723), Tracts on Architecture I.

Creating the classical. The architecture developed by the Greeks in the fifth century BC remained in use for more than a thousand years. Over that millennium a rich vocabulary of architectural forms was codified. The Doric, Ionic

and Corinthian Orders consisted of well-defined approaches to the elements of the post-and-lintel Classical buildings: bases, columns, capitals, entablatures, pediments. As later Roman architects developed the arch, the barrel vault and cross vaulting, the vocabulary was extended.

The principles governing use of the Orders provide a grammar for Classical architecture. Emphasizing proportion, unity, variety, stability and balance, Classical structures such as the Parthenon in Athens convey a sense of monumental permanence and restrained beauty.

Developing the Gothic. After the decline of the Roman empire, Romanesque churches, building on the Roman tradition, were constructed from Italy to England. Then a completely new style of architecture arose: the Gothic.

Gothic architecture possesses vocabulary of pointed arches, ribbed vaults, flying buttresses and rose windows. Its principles embrace tension and energy over stability. While the Parthenon rests in magnificent repose, Gothic cathedrals strive for the sky. The eye is drawn upward by spires, towers, buttresses and windows. Proportion was imbued with spiritual meaning; the number three, pointing to the Christian Trinity, pervades Chartres, with three doorways on each porch and three chapels off the apse.

Return to the Classical. Just as Gothic architecture reached its height, Italy rediscovered Classical texts and regained interest in Classical monuments. Brunelleschi based his design for the dome for the Florence Cathedral on his studies of the Pantheon. As Renaissance thought developed, artists and architects paid great attention to mathematical and harmonic proportions, with Leonardo da Vinci demonstrating the geometrical proportions of the human body based on the writings of the Roman architect Vitruvius in his famous drawing “Vitruvian Man.”

Classical architecture remained in use for centuries, developing as the Palladian style in Venice, evolving into the Baroque style across Europe and becoming the Neoclassical style in Republican France and the United States. Much

Preserving the Sense of Proportion through Optical Refinements

Greek architects were so committed to conveying a sense of balance and proportion that they actually distorted true proportions to retain the visual impression of harmony.

The Parthenon of Athens is the most famous building to employ these subtle manipulations. The columns stand slightly closer together at the corners, and those on the end are fatter than the rest to compensate for being seen against the light-filled sky. All of the seemingly level surfaces such as the stylobate (base) and frieze curve outward so that they appear horizontal. The columns, which seem to rise perpendicularly, actually swell slightly and taper toward the top in an effect called entasis; this creates the impression of elasticity, as if the “muscles” of the columns bulged with effort. The columns also lean inward so that they are about 3 inches off plumb.

The overall effect of these and many other deviations from mathematical regularity is to create a structure that is organic and coherent—stable yet elastic, firm yet tense. Neoclassical architects including Thomas Jefferson employed these and similar techniques to achieve the same effects.

As Modern and Postmodern architects embarked on different challenges and embraced different methods, optical refinements such as entasis diminished in importance. However, the Parthenon is a powerful example of how master architects adapt the principles of design for aesthetic effect.

great architecture of the U.S. from the 18th and early 19th centuries such as the Capitol in Washington and the Rotunda of the University of Virginia is Neoclassical.

Breaking into the Modern. In 19th century, architects felt free to attempt a number of different styles; commemorative buildings were often Classical, public buildings Renaissance, and churches Medieval. However, at the turn of the last century, architects broke entirely from the past.

The International Style of Gropius, Mies van der Rohe and Le Corbusier rejected all that came before. These designers eschewed decoration and valued industrialism over naturalism. The vocabulary of this language includes glass curtain walls, cantilevered structures and massive forms. Architects interpreted the principles of unity, stability and balance in new ways, striving for sparse structures in which the pure form of the building is revealed.

applying architectural principles to historic buildings

“These [Classical] architects were familiar with the alphabet and grammar of Architecture. Ours of today, ignorant of the first principles . . . collect and collate the choicest bits . . . , glue them together and imagine they have made a whole. In fact, our buildings are but mere odds and ends brought together.” — Edward Welby Pugin (1843-1875), Letter in The Times, December 19, 1871.

Many of today’s architects, having rejected the demands of Modernism, freely adapt earlier architectural elements, sometimes evoking them reverentially (e.g., I.M. Pei’s transparent pyramid addition to the Louvre), sometimes “quoting” from them ironically (e.g., Philip Johnson’s Chippendale highboy design for AT&T in New York). However, some architects must confront historic forms daily: those involved in restoration, renovation or expansion of historic buildings.

The historic preservation movement in the United States dates to the destruction of New York’s Penn Station from 1963-67. Since then, numerous buildings of historic, cultural or architectural significance have been preserved and restored. The National Park Service reports that more than 1,200 restoration projects valued at \$3.27 billion were proposed for fiscal year 2002. These projects are encouraged by historic tax credits that allow owners to deduct 20 percent of rehabilitation costs from federal taxes. The Ritz-Carlton renovation in Philadelphia, for example, received a \$20 million tax credit.



Preservation projects strive for historic authenticity, down to the material of the window sashing and the dye of the carpet. However, not all buildings can or should be strictly restored but rather reshaped to the needs of today. This is where the attention to design principals becomes essential.

Preservation projects strive for historic authenticity, down to the material of the window sashing and the dye of the carpet. However, not all buildings can or should be strictly restored. Expansions and adaptive reuse projects seek not to preserve a building as a time capsule but rather to reshape it to the needs of today. It is here that attention to the design principles of an earlier era becomes essential.

Understanding original principles. Knowing the grammar of the relevant architectural language helps structures retain unity. Understanding proportion, for example, helps interior and exterior additions and renovations feel part of the whole. Many historic buildings suffered when additions ruined the

proportions of their exteriors. Recognizing the original proportions enables the architect to echo and support them in an addition. At the Texas Capitol building, constructed in 1888, the original proportions were deemed critical. When lawmakers decided to expand, designers recognized the Italian Renaissance Revival exterior would be ruined by an addition. Instead, the extension was located underground, emerging below and out from the original building. A similar decision was made during the expansion of the University of Michigan Law School. Modernist architect Gunnar Birkerts placed his three-story law library addition underground rather than have it clash with the surrounding Gothic Revival structures.

Proportion is also important in interior spaces. The high ceilings of many older buildings have been lowered with acoustical tiles to provide room for HVAC, electrical and communications systems. Large rooms have been subdivided to create smaller offices. Any sense of the architect's conception of the void enclosed within the room is lost. Architects in the Texas Capitol renovation restored ceilings to their original heights. To accommodate the need for contemporary-size offices, temporary wooden walls separate rooms with glass extending from about 9 feet to the ceiling, dividing the space yet allowing the true proportions to be seen.

Knowing the original vocabulary. Renovation projects sometimes uncover long-observed architectural elements; murals reappear from behind walls and Corinthian capitals from above acoustical tiles. Preservation projects strive to retain existing architectural elements and even recreate them if they are missing or damaged. This holds true no matter what the original. When Lever House in Manhattan, the first truly Modern structure in the U.S. was renovated in 2002 its glass curtain wall required reconstruction. The original structure was considered unsafe, so the entire façade was strengthened and the original glass replaced with a better, heat-strengthened product.

New elements added to historic buildings must strive for particular authenticity. During the conversion of a former Philadelphia bank



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and office building into a Ritz-Carlton Hotel, architects designed a new monumental staircase for the marble rotunda, now the hotel lobby. The final design, in stone, metal and glass, curves behind Ionic columns, as elegant as its surroundings.

Additions to historic buildings can pose a challenge; some question the appropriateness of Neoclassical Doric columns or Gothic pointed arches in a 21st century building. The architects of the Texas Capitol Extension chose to evoke the Renaissance style of the original building



classic design principles defined

Proportion — Greeks and Romans combined their passions for architecture, geometry and music in their search for harmonic proportions. The Pantheon in Rome, for example, is based on the conjunction of circle, cylinder and square. The cylindrical base measures the same as the height of the structure; the dome is an exact hemisphere that, if completed, would fit precisely into the interior space.

Unity — Unity was prized in all Classic arts. Classical architects strove for all elements of a building to feel part of the whole.

Variety — Unity is not rigid uniformity. Variety adds interest to a unified structure. In the Coliseum in Rome, variety is found in the different Orders of columns on the three external tiers of the structure.

Stability — Classical structures were prized for the sense of strength and repose they imparted. Buildings such as the Parthenon feel monumental and permanent.

Balance — Tension was achieved in Classical architecture by creating asymmetrical yet balanced designs. For example, the Acropolis of Athens originally contained an entrance building, three temples and an monumental statue (now lost). The buildings are not symmetrically arranged; on a map they seem scattered across the landscape. However, as a unit their sizes and shapes balance one another.

without strictly copying it. Streamlined, simplified columns in the Extension, for example, take the place of the elaborate, fluted Corinthian columns of the Capitol and convey a contemporary feeling.

reshaping the buildings of yesterday for the life of today

“Architecture depends on fitness and arrangement . . . ; it also depends on proportion, uniformity, consistency, and economy.” — Marcus Vitruvius (c. 70-25 BC), de Architectura.

Most historic buildings are not in museums; they are part of the fabric of everyday life. Those who work and study in busy K-12 schools, universities, municipal buildings and office towers appreciate the architectural detail of a curving Ionic capital or a well-placed Gothic arched window. However, they are more concerned about crowded offices, out-dated electrical wiring, overwhelmed HVAC systems and uncomfortable meeting spaces.

Critic Walter Benjamin, writing in the 1930s, bemoaned insensitive architectural imitators as ruining a building’s “aura,” that sense of character and authenticity each work of art possesses unique to itself. With a thorough knowledge of the vocabulary and grammar of architectural styles, today’s architect can design building additions that truly speak their native language.

authentic renovation, restoration and expansion of historic buildings

Carter & Burgess offers a variety of services to assist building owners and facility managers in maintaining the integrity of historical structures needing renovation, restoration and expansion. Using the background of complete condition assessment surveys, we design ways to modernize existing systems while preserving the historical identity of the facility.

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the application of architectural design principles in renovation, restoration and expansion.

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