ARCHITECTURAL HISTORY

OF

WESTERN CIVILIZATION

CURRICULUM DEVELOPMENT

SECTION 1.0

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ABSTRACT:

The study of architectural history provides an understanding of the cultural forces that shaped architectural development. The history of architecture chronicles the formation of the architectural profession through the experience of guilds and formal education. The philosophies and design thrusts of relative periods and practitioners are reviewed as the profession changes through time.

PREAMBLE:

This section provides an overview of the history of architecture in Western Civilization. It includes an outline of architecture covering the major periods of development. The section provides opportunities for discussion relative to the influence of society and context on architectural design.

Figure 1: Chateaux de Chenonceaux, France

Historical study is a process of selection and interpretation. Choices were made in development of this section regarding what buildings and styles to include from the vast selection of notable architectural works.

It should be noted that many of the works featured in this section took hundreds of years to construct. The physical labour for construction required generations of families to carry on the work. Construction was delayed at times as society passed through years of war and conflict, disease, changes in governments and design philosophy revisions. The actual erection of any building using only manual labour is a feat in itself. Construction of these buildings achieved this feat and surpassed it in raising structures of incredible complexity and detail.

Figure 2: The Spanish Steps, Rome

Vernacular building is defined as native construction, typically residential, within a specific region. The construction of lodging is the immediate cultural response to the conditions of the local lifestyle: agrarian, primitive or developed societies. The language of vernacular building styles was not reviewed through this section. Housing settlements and urban development are discussed in the Geography section of this thesis submission.

COMPONENT INITIATIVE:

The goal of this section is to provide instruction on how architecture reflects the society and cultural period of development. The secondary goal illustrates how building styles and theories evolved through the centuries. This section will also review how the influence of culture and society changed the development of architectural forms.

COMPONENT COURSE MATERIALS:

Architectural design involves the shaping of space so that it is functionally appropriate for its purpose, structurally adequate and expressive of beauty and artistic achievement.

The history of architecture is a study of expression through the use of created spaces. Architectural history illustrates our attempts to achieve beautiful, functional and meaningful solutions in spatial organization in order to satisfy the needs of the time and local culture.

Figure 3: Uffizi Gallery, Florence

The study of architectural history relates to the study of people. It is a study of the needs, the knowledge base and the goals of each period in civilization. Architecture reflects the conditions of the age from which it springs. Architecture is the product of all sorts of factors, social, political, economic, scientific, technical and religious beliefs.

The language of architecture is permeated with a culture's sense of what they should do, where to do it, when it should be done, how important it is, and how these actions relate to the rest of the community, the material world and the supernatural world. Architecture communicates to the community the meaning of their actions as well as how their actions relate to the human, material, and spiritual worlds.

Figure 4: Old City Hall, Regina

The definition of an architectural language means that architecture can be "read". A person may discover how a culture organizes itself socially, materially and metaphysically. Architecture is like a book that a culture "writes" for its members. Architecture is also about understanding a world view. Whenever a member of a culture looks at a work of architecture in his/her realm, its meaning can be understood through the “reading” of the building. This meaning governs their actions and understanding of the world around them.

The study of history plays a role in education. The way we act and the things we do depend to a great extent on our past experience. Our social make-up is a combination of experience and background. One of the functions of history is to help us to live in a larger sense. History provides a wider dimension of knowledge in conjunction with our past.

Early human settlements were essentially rural. Rural societies transformed into urban ones as surplus of production began to occur. The complexity of buildings and their types increased. General civil construction such as roads and bridges began. Many new building types such as schools, hospitals and recreational facilities emerged. Religious architecture retained its primacy in most societies.

In Europe during the early times through medieval periods, buildings were not attributed to specific individual architects. The designer was almost anonymous in these cases. Guilds were eventually formed by craftsmen to organize their trade. Architectural styles developed and texts on architecture began to be written. These texts became canons to be followed during the design of important works, especially religious architecture. Some examples of early history canons are the works of Vitruvius (Rome) and Vaastu Shastra (India).

Figure 5: Grecian Column Detail

The Roman writer Vitruvius created the first architectural treatise for Western Architecture known as the "Ten Books on Architecture". He defined three essential components for a building to be deemed as Architecture: firmness, commodity and delight. Architecture was to be:

- Structural (Firmness): Realistically, a building is dangerous without adequate structure.

- Practical (Commodity): A building would be regarded as nothing more than large scale sculpture without practicality.

- Visual Art (Delight): A building would be perceived as basic utilitarian construction without beauty.

It is through possession and balance of these three items that a building would be perceived as an architectural statement according to Vitruvius.

Figure 6: Luxembourg Gardens, Paris

The study of the history of architecture within Western Civilizations can be broken down into seven basic general periods. Each period represents a style or combination of styles that have been developed from the previous period. An outline of the period breakdown and associated styles is:

FIRST GENERAL PERIOD

- Ancient World
- Egyptian
- Grecian
- Roman

SECOND GENERAL PERIOD

- Early Christian Architecture
- Byzantine

THIRD GENERAL PERIOD

- Romanesque
- Gothic

FOURTH GENERAL PERIOD

- Renaissance

FIFTH GENERAL PERIOD

- Baroque
  Rococo
  Mannerism
  Georgian

SIXTH GENERAL PERIOD

- The Eighteenth Century
  Neo-Classicism
  Romanticism
  Eclecticism
- The Nineteenth Century
  International Neo-Classicism
  Ecole Des Beaux Arts
  Victorian Gothic

SEVENTH GENERAL PERIOD

- The Twentieth Century
  Organic
  Mechanical
  Sculptural
  Art Deco (Art Nouveau)

An analysis of each period follows this section. Each period analysis begins with a summary noting the major events, shaping forces and architectural styles. The summary is followed by a written evaluation of the period with reference to precedents involved in the architectural design.

INSTRUCTIONAL STRATEGY:

Direct Instruction:

- Lecture series complete with written material handouts.
- Slide presentation of building types illustrated from handout materials.

Indirect Instruction:

- Audio visual presentations related to construction history ("A History of Architecture", Spiro Kostof, PBS Television).
- Audio visual presentations/films related to culture and civilizations.

Independent Study:

- Student research into historic styles, civilizations and cultural periods.

Interactive Instruction:

- Guided tours of local architecture.
- Art work relative to detail production.
- Scale model construction of historic structures.

Figure 7: Student Presentation (AGTS 1998)

STUDENT ACTIVITIES:

Oral:

- Class presentations on research papers.
- Open discussion on stylistic changes, influences and subjective impressions.

Visual:

- Graphic depictions of architectural details.
- Plan and site drawing reproductions of historic structures.
- Model building of historic structures including the surrounding area.

Kinesthetic:

- Student participation in local site tours.

Written:

- Research papers on historic structures including the context of the design: time period, major events, affect of influences on the building.

ASSESSMENT METHOD:

Pencil & paper method:

- Written Testing: test categories may include historic periods, major works completed, relationships of time frame to structures (join the building to its year or style), and contextual influences on design.
- Research papers based on learnings.

Performance assessments:

- Participation in class discussions.
- Participation in group assignments relative to visual student activities.
- Participation in tour assignments and information gathering.

Personal assessments:

- Awareness of the physical environment.
- Understanding of how cultural forces shape the built environment.

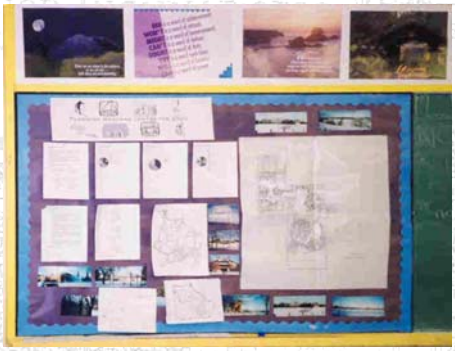


Figure 8: Architecture goes to School, 1998

COMMON ESSENTIAL LEARNINGS:

Communication:

- Verbal communication related to studies.
- Written communication relative to submissions and research.

Creative and Critical Thinking:

- Understanding of cultural and social forces through history and how these forces shaped the built environment.

Independent Learning:

- Research and written submissions relative to the course content.

Numeracy:

- Understanding of time frames, historic time periods and their duration.

Technological Literacy:

- Basic understanding of structural concepts related to building construction.
- Knowledge on technological advances and affects on the built environment.

Personal & Social Values & Skills:

- Basic understanding of societal structure and how the knowledge base of each time period affected the type of buildings constructed.
- Introduction into the growth, changes and demise of power bases throughout history, along with their impact on society.
- Relative to understanding current governments and power agencies and their potential impact on future development and construction.

ENVIRONMENT:

Classroom Climate:

- Open classroom layout
- Visual access for lecturer or audio/visual presentations.

Physical Setting:

- Lecture theatre/classroom seating for audio/visual.
- Display area for illustrations and artifacts.
- Flexible layout to allow modification depending on activity.

Flexible student groupings:

- Required for group projects related to construction of models and details.
- Adjustable settings required for differentiation of work project areas.

Extensions beyond classroom setting:

- Resource research.
- Individual building study within the community.

Community experiences:

- Tours of local community focusing on architectural styles.
- Potential workshop involving historic structures and rehabilitation efforts.
- Exposure to local community groups working towards historic preservation and restoration.

MATERIALS / RESOURCES REQUIRED:

In-room supplies:

- Audio/visual resources.
- Visual supplies for production of graphics and models.
- Research stations for independent and group work.

External supplies:

- Access to community services (tours and relevant groups)

SUMMARY OF ARCHITECTURAL PERIODS:

Period Name	Time Frame	Summary Comments
Ancient World	Prehistory	• Megalithic Builders • Religious monuments • Circular orientation related to natural elements
Egyptian	3000 – 672 BC	• Megalithic Builders • Religious monuments for the dead and gods • Context of desert and cliffs • Built for external viewing and impressions. • Mathematical proportions
Greek	1100 – 146 BC	• Last of the Megalithic Builders • Religious monuments the gods • Built for external viewing, access on all sides • Clear order of arrangement and proportions • Development of column orders (capitals, proportions and cornice lines) • Mathematical precision and structured design
Roman	509BC – 70 AD	• Development of concrete and structural arch • Religious monuments the emperors and heroes • Built for interior spaces, external viewing and access controlled for structured perception • Theatrical use of natural lighting • Mathematical precision in design.
Early Christian	4th– 6th cent AD	• Carried forward with Roman forms • Simple, unadorned buildings • Interior spaces well developed • Structure exposed on interior, keeping exterior plain
Byzantine	4th–10th cent AD	• Radial, symmetrical plan/section development • Highly decorative buildings • Interior spaces heavily developed and articulated • Structural advancement in development of dome system
Romanesque	1000 to 1200 AD	• Roman styles reinvented with new vertical expansion • Structure partially exposed on exterior • Development of rib vaulting for added ceiling heights • False frontages used to provide alternative shapes to the building, other than what the section would show • Use of Roman design philosophy with exaggerations used for stylistic changes to suit the new buildings • Like Roman but mainly a poor copy since skills had been lost during the time in between style development

Gothic	1150 – 1500 AD	• Romanesque style taken to extremes • Interior spaces dramatically lit with natural light to affect the participants • Wall surfaces thinned with extensive glazing added • Additional structural effects added to support thinner wall systems (buttresses) • Tracery developed to provide articulation to wall and ceiling systems
Renaissance	1420 – 1600 AD	• A return to Greek/Roman design philosophy • Design based on proportions of man • Mathematical precision brought back for entire building • Breakthroughs in structural engineering for domes • Formality in design and art carried forth in buildings • Classical detailing
Baroque	1600-1750 AD	• The Renaissance exaggerated • Design leading to a world view, planetary path inclusion • Time re-enters the design philosophy as an element of travel and layout, previously seen in Egypt • Detailing more dramatic with extensions in Renaissance proportions. • Sculptural elements included in building design • Less mathematical rigidity than Renaissance
Rococo Mannerism Georgian	1650-1750 AD	• The Baroque period exaggerated in a sub-style • Rococo presents the extreme in detailing, over the top sculptural elements • Mannerism creates a mix and mingle of styles according to "whim" of designer, using Renaissance principles extracted to suit the new "look" • Georgian more restrained with sculptural elements buts not to the extreme of other sub-styles • Mathematical rigidity almost lost
The Eighteenth Century • Neoclassicism • Romanticism • Eclecticism	1760-1860 AD	• Neoclassicism provides a return to Roman styling and proportions • Romanticism was revival of architectural historical styles, allowing for development through integration of alternative details • Eclecticism derived from Romanticism borrowing ideas from different architectural styles to suit the current need. This style copied “beauty” to reinvent the forms • Industrial Revolution provides new materials to construct the old forms

The Nineteenth Century: • International Neoclassicism • Ecole des Beaux Arts • Victorian Gothic	1800-1900 AD	• International Neoclassicism carries on Roman styling and proportions with Greek influences in the appearance (entrances, columns, gable roof lines) • Ecole education based on rigidity of grid planning relative to Renaissance styles with Roman influences • Victorian Gothic was a return to the applied details and exaggerated styles of Gothic (Queen Anne) period, primarily used in housing • Industrial Revolution provides new materials for development of new forms • Modern Architecture began under new movement of design philosophy
The Twentieth Century: • Organic • Mechanical • Sculptural • Art Deco (Art Nouveau)	1890-2004 AD	• Modern Architecture develops new forms, new philosophy • Previous styles remain active but new styles emerge as noted • Architecture adds in four definable types of design style • Organic sides with natural forms and context • Mechanical favours modern architecture styles, machine-like • Sculptural treats buildings as sculptural monuments • Art Deco adds decoration and flair to organic styles • Variations exist everywhere and the development of new styles continues….

THE ANCIENT WORLD

The Ancient World section dates from Prehistory recording prior to formal community settlements. Early structures of West and Southern Europe were multi-chamber caves, rock shelters or fragile tent-like assemblies of poles covered in hides and reeds. Permanent structures were impractical due to the need to move in search of food.

Land forms and temporary settlements were created by physical labor required to clear and establishing a setting for construction. The basic building blocks were very crude. Even during this time, human imagination and efforts were used to create monumental architecture. This was a time when day to day survival was arduous and uncertain.

Figure 9: Dolmen Tomb, Brittany (1500b.c.)

Prehistoric buildings for monumental purposes surpassed the basic utilitarian level of symbolism and use. Celebratory functions were held in structures constructed with monumental appearance. The use of artifacts and tool systems remained crude, even though achievements were made in the structural assembly of major components.

Early monumental structures were developed for purposes of worship and religious belief functions such as shrines. Many early structures were constructed in a circular pattern, congruent with nature and natural land formations. The materials used were basic stone blocks in an elementary configuration. The overall site layout and use of the structures remains somewhat of a mystery to date though great effort appears to have been taken in order to respond to superstitious beliefs of orientation and access.

As early as 7000 B.C., Neolithic man learned to farm, domesticate animals, make pottery for storage and make cloth for clothing. These developments allowed for the organization of permanent settlements and structures. Mankind developed a complex social structure within the communities. Craft systems along with trading economies, self-contained within each settlement, were created.

Early vernacular domestic buildings focused on protection from enemies and the elements. Living environments were one storey mud-shaped brick dwellings containing two rooms; one for living space and the other for storage. Entrance locations and the exhaust chimney used the same hole through the roof system. These dwellings contained no windows at the ground level. The lack of easy access made the dwellings quite defensible and secure.

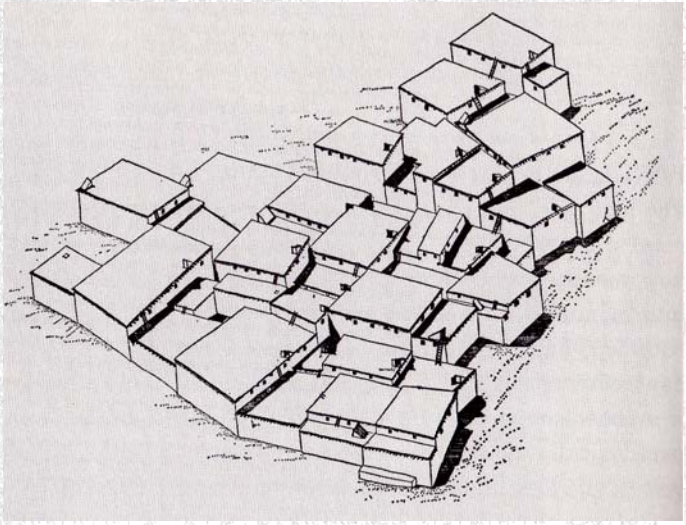


Figure 10: Catal Huyuk Settlement (6,000b.c.)

Neolithic man turned to addressing the spiritual side of their existence once security and basic defenses had been achieved. The outside world was poorly understood by man at this time. It presented a highly complex, mysterious and unknown existence outside of their immediate perceptions. The most impressive Neolithic architecture was constructed to serve emotional and spiritual needs, focusing on symbolism, ritual and magic.

Figure 11: Cyclopean Wall, Greece (7,000b.c.)

The principle mode of construction for the monumental structures was MEGALITHIC. This definition is derived from Latin: “mega” meaning “great”, “lithos” to indicate “stone”. The structures were made with huge stone blocks stacked and assembled in precise structural arrangements without the use of mortar. These structures were possible through the abundant availability of three key components: labor, material and time. It was through the abundance of labor that construction kept moving, enough material to quarry and a limitless time frame to construct that the structures were eventually erected. These items were necessary in order to quarry, transport, shape and erect the massive stones used.

Figure 12: Detail of Stonehenge

The best known example of this period is Stonehenge located in Salisbury Plain, England. This structure is constructed in co-centric circles. The assembly was likely host to elaborate ritual functions for the seasons or gods of belief at the time. Additional sites and assemblies similar to this type are located throughout Europe dating from the same period. These monuments include land forms, burial chambers and tombs as well as religious structures.

Figure 13: Aerial view - Stonehenge

EGYPTIAN ARCHITECTURE

A. Influencing conditions of time and place

1. Place:

a) location: Egypt along the Nile River

b) geography: Nile River (transportation), isolation

c) materials: stone, clay

d) climate: warm(hot), dry, brilliant sunshine

2. Time:

a) dates: 3000 – 672 BC

b) concurrent events: 672 BC – Assyrians conquer Egypt

c) social conditions:

- pyramidal society (pharaoh – priests – landowners – commoners)
- bureaucratic state, no individualism
- agricultural, craftsmen, commerce

d) religious conditions:

- polytheism (beliefs in many gods)
- animal worship
- After-life: planning and building for the dead.

B. Needs: Temples and tombs for the immortal dead (pharaohs and priests)

C. Forms:

1. Pyramidal tombs, mastaba (bottom side tombs), rock-hewn tombs
2. Temples – designed on processional axis
   Construction completed on a gigantic, monumental scale
   Formal symmetry

D. Expression:

- Ceremonial processional planning: large forecourt to small anteroom
- Monumentality, permanence, immortality
- Massive, solid forms

Egypt, along with Mesopotamia, produced the first recorded great civilization of the western world. Egypt was perfectly situated to provide for the creation of a distinct civilization. The Nile River along with the valley and delta locations are the guiding forces for Egyptian culture and development. The Nile River provided transportation and sustenance for the entire region. The valley location provided protection and security.

The ruling system in Egypt contributed to establishing a strong cultural environment. The community was ruled by a monarchy of pharaohs and subsequently by a powerful priesthood. The duration of rule was quite long, thus providing a stable political entity concerned with culture and community.

Egypt as a society was very concerned with the fourth dimension: that dimension being time. Their belief system incorporated the concept of timelessness, believing that spirits endure throughout eternity. This belief was reflected in the monuments constructed to serve hierarchy. The majority of monuments were ancient temples, burial tombs, mounds and the pyramids. These monuments reflected a strong belief system focused on death and the afterlife. Their religious beliefs, which governed the politics and lifestyles involved life, death and afterlife. In this manner, the tomb (rock hewn or pyramidal) was maintained as the principle house of the dead.

Figure 14: Temple of Khafre, Giza (2530b.c.)

The Egyptians built big. The pyramids, temples, burial tombs and sculptural assemblies were all larger than life, making the symbol of the temple (current pharaoh or head priest) also appear in that manner after death.

A key feature of Egyptian design is the axial approach applied to their monuments. The locations of their monuments had to compete with the vastness of the desert, the overall scale of the Nile and the strong impact of their belief system. The Egyptians took into consideration the view and approach to each monument, allowing it to appear larger than life while respecting the scale of the adjacent monuments. Great consideration was applied in building subsequent structures adjacent to existing tombs so as to reflect the proper standing of the future occupants.

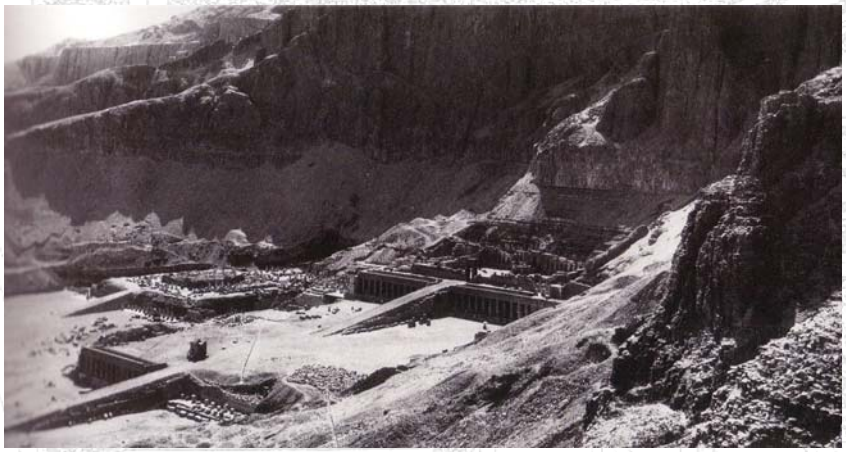


Figure 15: Mortuary of Mentuhotep and Hatshepsut (2030b.c.)

Egyptian monuments are meant to be seen as anchors in a vast sea of sand when viewed against the larger background of the desert. The design of individual monuments as well as relationship to adjacent structures presents a geometric clarity of form, measure, solidity and simplicity. Their cultural approach developed clear linear axial settings which contributed to the overall architectural composition.

The Egyptians built in the megalithic style, as previously discussed for the Ancient World civilizations. Egyptians took construction to a new level for fitting and placing the massive stone work without the use of mortar. The majority of construction materials used was masonry (clay and stone) due to a lack of available wood. The local cliffs provided sandstone, granite and clay for use in their monuments.

A central theme which appears in Egyptian architecture was the imitation of natural forms within the building structure. Wall piers of stone were carved to imitate papyrus leaves or bundles of reeds. These forms reflected the vernacular architecture of the city where reeds were a primary building material. Rock sculptures were carved to mimic natural forms at the entrances to tombs and monuments. The use of decoration on columns appears in the manner of carved shafts to mimic plant forms with the capitals shaped as papyrus flowers.

Art and structure were being integrated which presented a bold decorative stroke in the structure's appearance. The use of symbolism was present in the art work applied or carved within the structures themselves. A most famous example of structural art is found in the Sphinx, which represents the God Re-Harakhte, standing ever-present on guard in front of the King's Tomb of Khafre.

Figure 16: The Sphinx, Giza (2530b.c.)

The pyramids were first built in steps up the sides in order to access the top. The stepped sides then had limestone blocks added to the surface corners to provide a smooth slope as construction was completed. The finished limestone glistened in the clear sunlight, giving off a luminescence of the afterlife. The top of the pyramids were originally capped in gold, pointing to heavens. The problems presented with these details include the fact that limestone wears away in exposed weather conditions, eventually disappearing entirely. The gold of crown cap was stolen by thieves over the centuries.

Figure 17: Pyramid of Cheops (2528b.c.)

A second form of preservation in death was the cliff tombs. Elaborate structures were carved from the stone cliffs of the valleys to serve as the final resting place of the ruler. Work on these burial tombs would begin immediately at the start of the ruler's term. Work would continue right up until their death after which the tomb would be permanently sealed with the deceased entombed.

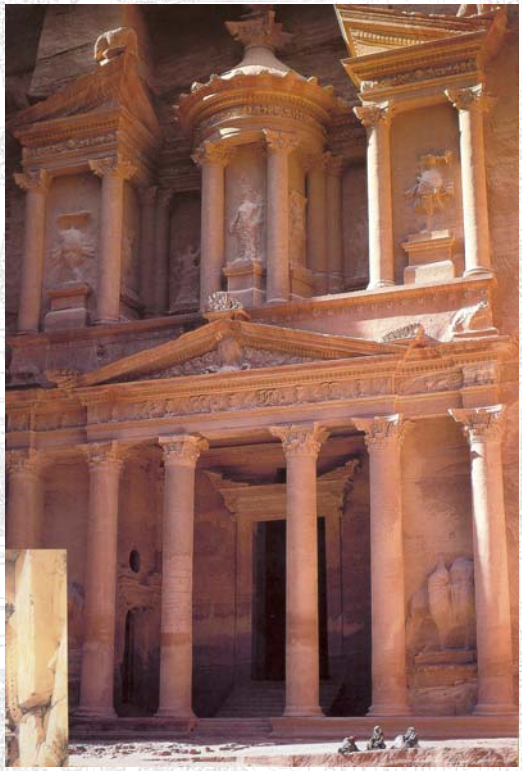


Figure 18: Cliff City of Petra (50b.c.)

Mathematical ideals were present in Egyptian architecture. Further development on this concept is explored in the Mathematics curriculum to follow. A clear example of the application of mathematics is found in the determination of the pyramid side slopes. The slope incline is determined by the height of the triangle to the radius of a circle. The circumference of the calculated circle equals the square plan of the pyramid. Mathematics could calculate the footprint, elevation, slope and overall height of a pyramid. Each of these elements is connected, allowing for a clear proportional development to occur based on fixed elements. Nothing in this method is left unplanned.

GRECIAN ARCHITECTURE

A. Influencing conditions of time and place:

1. Place:

a) location: Greece

b) geography: mountainous, surrounded by sea

c) materials: marble, timber

d) climate: moderate, clear, bright light (complementary to shadowing)

2. Time:

a) dates: 1100 – 146 BC, Periclean Age: 480 – 338 BC

b) concurrent events: 480 BC – end of Persian Wars
336 – 323 BC – rule of Alexander the Great
146 BC – Destruction of the city of Corinth

c) Social conditions: hardy, undominated sea-faring society, resourceful, adventurous people. Individual thinking and logic
Separate city states (fragmented)
Desire for knowledge, self-discipline, refinement

d) religious conditions: polytheism (belief in many gods),
Superhuman gods, God was personification of human being,
Mankind was centre of attention, not God

B. Needs: Temples were used to house of the statue of the gods
Simple outdoor life

C. Forms:

Temple was a monument to be seen from outside: simple, sculptural form
Rectangular room with surrounding colonnade resting on podium
Post and beam structural system supporting a sloped gable roof
Stone beams necessitated closely spaced stone columns due to heavy loads

D. Expression:

- Concern for proportion, beauty, aesthetics
- Unity, harmony, symmetry, balance, simplicity
- use of proportions and scale
- Monumental, used for social hierarchy functions

The Greek state is regarded as the initial stage of Western Civilization architecture. Greece was a highly developed civilization made up of independent city states. No single ruler controlled the country.

Greek civilization was a highly religious culture. Worship believed in polytheism; superhuman gods based on the personification of the human being. Greek culture was a highly developed and intelligent although incredibly self-centered using mankind as the focus of their world, not an independent separate god. They believed in gods as superhuman beings. Many of their gods and tales remain with us today including Zeus, Narcissus, Hercules, Neptune, Aphrodite, and so on. It was for the individual gods that specific temples were constructed.

Figure 19: The Acropolis, Athens (400b.c.)

Greek philosophy allowed for a great deal of individual thinking. Logic and its development were fostered throughout society. Logic and proportional study lead to a highly developed method of building design.

The Greek sense of mankind and his independence focused on the idea that man should strive to create his own destiny. Mankind was to exercise his personal intellect and follow his own will even when in opposition to his gods. Mankind for the Greeks was the measure of all things, including things considered divine.

Greece was a semi-isolated community. The basic geography allowed for the primary use of stone in their buildings, with only a minimal allowance for wood. The presence of stone as primary building materials brought the reputation to Greece as the last of the megalithic builders. Monumental architecture was commonplace in the society including theatres, council halls and public porticos. The most important form relative to the culture was the temple.

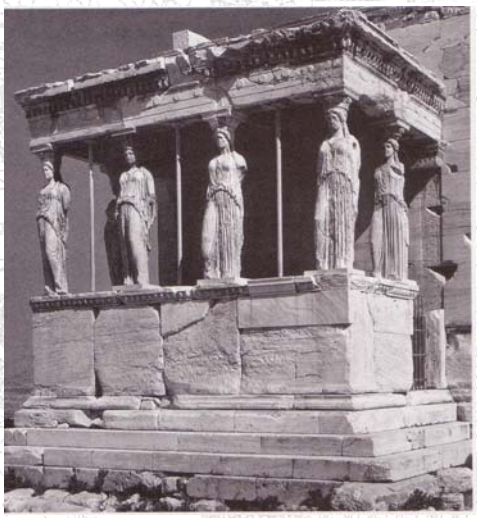


Figure 20: Porch of the Maidens (420b.c.)

A Greek temple was symbolic dwelling of the god (Deity) to whom it was dedicated. The temples we know of today are the white sun-baked structures. A little known fact of Greek temples is that they were painted in a multitude of colours including black, dark blue, red, white, gold, purple and green. It may be hard to envision these finishes on what we consider to be a classic Greek structure.

A key component of Greek architecture is that each structure was meant to be viewed as an entity unto itself. The context and site of the building was reasoned out prior to construction. Greek buildings were meant to be viewed on all four sides.

Figure 21: The Parthenon, Athens (447b.c.)

Greek architecture is based on the “needs” of the citizen. The temples, markets and porticos were constructed for use by all. The design of all their civic structures maintained the underlying principles of architecture celebrating the proportions of mankind as the correct design methodology.

It is through the application of this philosophy that Greek architecture achieved a timeless quality. Their architecture was designed on the proportions of mankind. These proportions remain with us today.

Greek architecture relied on mathematics; a science which their civilization had developed and mastered. Design used a calculated planning grid when laying out new monuments. The grid was calculated based on the available land area and intended size and use of the monument. Guesswork and intuition were removed from the process as mathematics took care of the placement of columns and height of the monument.

The use of mathematics in Greek Architecture extended though the planning stages into the elevations and details. All items within a building were mathematically derived. Greek columns, cornices, friezes and even overhangs were calculated according to the overall design concept.

The design of Greek monuments was so precise through mathematics that they calculated the distance at which a person must be in order to suffer what is known as parallax. Parallax is the tendency of perception that a building is bulging at the sides, or perhaps falling away due to the eye's tendency to perceive it in perspective.

Mathematical proportional design was used to compensate for this tendency. The Greeks were able to calculate and allow for this tendency. They compensated by twisting or sloping columns to make them appear perfectly parallel as the eye views it vertically. This technique presents a solid façade with no deviation in proportion or line when it is viewed from a distance.

Mathematical proportions and rules governing the design and construction of temples included everything from the approach to the size of the sculptures adorning the building.

A building consisted of a podium, columns, frieze and gable roof system. These elements were complimentary to each other but each one was also governed by strict rules as to its importance and placement within the monument.

Greek structures provided clear definition of design, proportion and aesthetics. Their buildings were designed in proportion to the actual structure, not in proportion to mankind (a philosophy later challenged during the Renaissance period).

Greek columns were defined by three orders: Doric, Ionic and Corinthian. Dorian Greek civilization was principally located in the northern states of Greece; Ionian states were located within the Asia Minor district and the Greek islands.

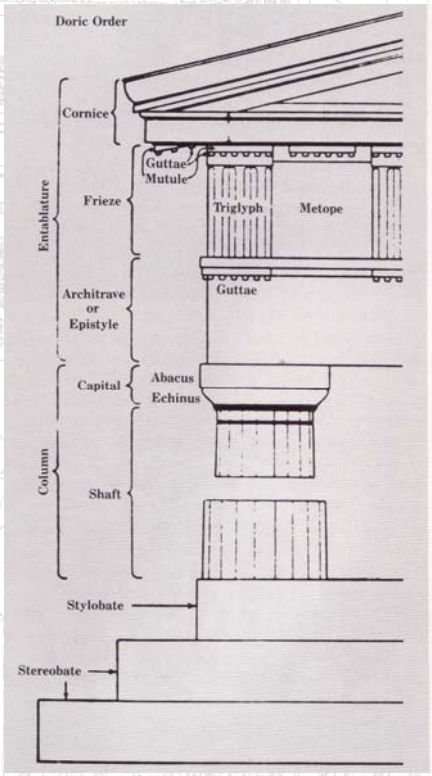


Figure 22: The Doric Order of Columns

The method of mathematics in Greek design was applied in throughout their structures:

- The base pediment contained three steps rising to the podium level. The base was known as the Stylobate.
- The total height of a step was equal to the lower diameter of the column. Therefore steps were scaled to the column, not to the ease of walking on them.
- Columns were fluted (slightly indented) on the sides to soften the overall visual weight, giving the appearance of a higher structure. There were 20 flutes applied to each column, the width of the flutes varied depending on the width of the column. The overall dimensions of the columns were fixed relative to the building height.
- The frieze is the most distinctive of the orders. A frieze in this case contained vertical panels (triglyphs) in between square panels (metopes).

One of the most famous Greek buildings is the Parthenon, located on the Acropolis in Athens. Acropolis itself means “city-on-the-height”.

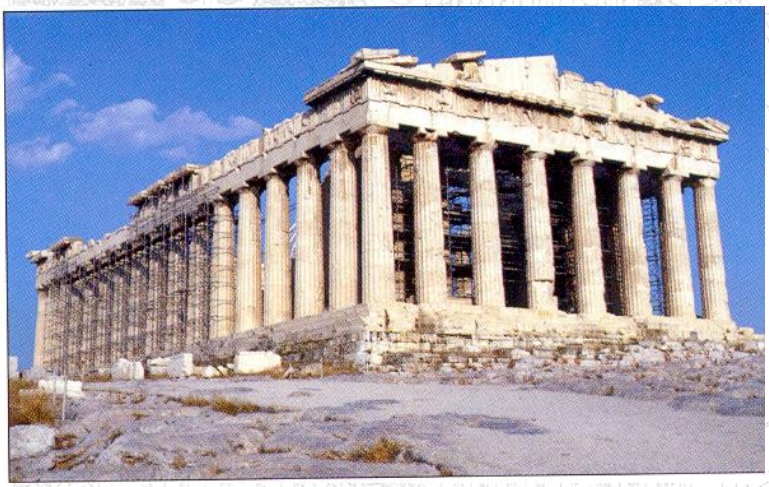


Figure 23: The Parthenon (447 b.c.)

The Parthenon was constructed during the period from 447 – 438 BC. The assumed building principals are listed to be ICTINUS and CALLICRATES as the architects with PHIDIAS as the principal sculptor. This building dominates the view of the city.

Figure 24: Parthenon Corner Entablature

This building represents the essence of Grecian planning and design as it relates to mathematics.

- The Stylobate dimensions are 101 feet by 228 feet. This area is equal to five residential house lots within our city today.
- The sides of the temple contain one more than twice the number of columns on the ends.
- The plan proportion is 4 to 9. This ratio is repeated in the lower column diameter to the distance between them, repeated in its width ratio to its height (45’-1”)

As Greek civilization matured through the years, the social structure developed an early form of specialization. Each member of society was no longer required to be a jack-of-all-trades.

Greek Column Orders:

A simple breakdown of column types is:

- Doric: undecorated column, no base pediment.
- Ionic: scrolled capital. Ionic columns are thought to be “softer” than the austere form of the Doric orders. Ionic design incorporates a sized base to the column. The principal feature of this order is the capital: the Ionic Shell. The shell is a tribute to the nautilus form as identified by the seafaring people of Asia Minor and the Greek Isles. The entablature of the Ionic order is also felt to present a lighter assembly than the Doric order. There is no frieze in the Ionic system. The architrave presents three faces, extending wider over the Stylobate as the faces are stacked. It was using this order that the Parthenon at Acropolis was constructed.
- Corinthian: a combination of the Ionic and Doric orders with the added flourish of plantlike flumes over the Doric plate at the capital.

The use of the Corinthian column as a visual support became commonplace in Greek architecture as the time period progressed. Decorative columns were no longer solely used for the structural purpose of support.

Figure 25: Corinthian Capital

Corinthian columns retain the basic features and proportions of the Ionic order except for the decorative variations on the capital. The capital evolved artistically to include plant-like or leaf flumes extending outward, mimicking the plant growth structure. This style was seen in Egyptian columns and capitals sculpted according to papyrus leaf and plants.

The trend of stylistic decoration in monument construction created a divergence between functional realism (columns required for a specific purpose) to visual realism (the structure is apparent for the purpose of aesthetics but is not specifically required).

Imaginative individualism emerged as a philosophy during the latter time period of the Greek culture. This imaginative trend leads away from the strict mathematical design regimen of the early period to allow for interpretive ornamentation. Individualism in design brought forth flexibility in the appearance of the structures.

Ornamentation was limited to sculpture located in the triglyphs of the frieze with symbolism applied within the metope sections. This ornamentation was reduced when applied to the Ionic orders, though greater ornamentation was enhanced in the columns capitals of the Ionic and Corinthian systems.

ROMAN ARCHITECTURE

A. Influencing conditions of time and place:

1. Place:

a) location: Italy, Lands bordering Mediterranean Sea

b) geography: Few natural harbours, lands extended through conquest

c) materials: marble, terra-cotta, stone, brick, timbers, pozzolana soil (used to make concrete)

d) climate: varies from warm to moderate

2. Time:

a) dates: 509BC – 204 BC, Empire in Augustan age 27 BC – 70 AD

b) concurrent events: 27 BC – Augustus begins Empire
365 AD – Empire divides into East and West

c) social conditions: Romans were empire builders preoccupied with the grandeur of Rome
Conquest brought new ideas to Rome
No time to develop their own aesthetics
Large number of unskilled foreigners

d) Religious conditions: worship of Emperors and heroes
Greek gods given Roman names
Not philosophical, more concerned for their own grandeur

B. Needs: Practical architecture to accommodate large foreign population

a. Interior space important as well as city planning
b. Need for engineering, town planning, public buildings, organization
c. Grandeur of Rome required monumental public expression

C. Forms:

Town planning on rectangular grid pattern, use of squares and plazas
Extensive use of the arch and round vault, later the dome and half-dome
Axial and bi-axial planning (major and minor axis)

D. Expression:

- Borrowed and copied from others
- Formal symmetry, monumental scale

The Roman culture defined the typology of construction for hundreds of years to follow. The influence of their achievements, design philosophy and construction techniques remain with us today; primarily in our monumental buildings.

Roman architecture was a development of Etruscan forms established during the early years of settlement. Etruscan culture and forces conquered over the primitive Roman agrarian (farm-like) lifestyles during the time of 6b.c. The Etruscan culture was soon assimilated into the Roman ideology, forming the basis of Roman design principles. The Etruscans had brought the culture and knowledge skills from the Asia Minor region to the Romans. These cultural influences and skills were laden with Grecian ideals of design and construction.

Figure 26: Etruscan Structure (6b.c.)

Two major concepts from the Etruscan culture remained prominent in Roman architecture. These concepts were:

1. The use of the Arch as a spanning element. (Found in early Etruscan fortress walls.)
2. The introduction of the Greek orders (mathematical means of design).

This combination of these two concepts became the basic component of Roman architecture. The main influences of the Greek orders is thought to be Ionic, however examples abound using the Doric and Corinthian orders.

One major design alteration provided by the Roman style is found in the way the Romans used a ridge roof structure with wide overhanging eaves. This type of building provided a simple street façade and subsequent lesser sides. This type is a change from the Grecian method of all four sides of a building having equitable presence.

Romans created a monumental architecture of controlled perceptions and calculated pictorial views. The building's site and context were major factors relative to a building's design. The manner by which the observer would view the building, approach it and subsequently enter it was considered during design stages.

Rome, like its predecessors, was a culture defined through monumental architecture. Romans created large interior spaces with an almost theatrical placement of the light sources. Lighting the large spaces was paramount to the design due to the vast size and scale of the structures.

Figure 27: Parthenon Interior (118a.d.)

Architectural design was also used to demonstrate public glory and triumph through the construction of triumphal arches. These arches were to demonstrate the grander of Rome, not any functional usage at all. This practice was later repeated by Napoleon Bonaparte at the Arc de Triumphe in Paris.

Figure 28: Arch of TItus (90a.d.)

Architectural design created both interior and exterior spaces through the site location of structures, facade development and the incorporation of public spaces (places, piazzas, courtyards) into the overall building scheme. Roman design presents the first use of what is now termed “mixed-use” buildings. In mixed-use buildings, the ground floor is used for markets and trading spaces, living quarters are incorporated into the upper floors. This combination provides an integrated live/work situation; the concept of which is still prominent today throughout major urban centers.

The primary building materials were masonry. Wood remained a semi-precious and scarce material. Romans had access to a wider variety of materials than was available to the Grecians due to land connections. Local materials typically included limestone and travertine with the availability of white and colored marbles by importation.

Rome was a conquering nation, ruling most of Central Europe for many years. The ability to access artisans from other countries and cultures turned out to be a great benefit for Roman architecture. They had the ability to find and secure the services of the best tradespersons and artists within Europe. The influence of Rome was felt throughout all of Western Europe.

The primary differences between Roman and Greek architectural styles are:

- Greek (and Egyptian) architecture created building masses that produce interior spaces as a result of the structure. The massing of the building was the dominant feature.
- Roman architecture used the space to be enclosed as their primary design objective. The interior aesthetic was an active consideration of the design.
- Greeks built for the exterior view; Romans built for the interior experience.

- Greek architecture was available for viewing on all sides with little consideration to the adjacent context.
- Roman architecture was designed to be seen and experienced in a controlled manner. Roman architecture controlled the access, the approach and the view in much the same way the military lifestyle controlled the citizens. As a conquering nation, Roman Emperors and their military forces remained in power by control.

Roman architecture made several major contributions to the development of construction and design techniques. The technical advancements included:

- Development of the arch into a formal structural system.
- Development of concrete mix materials that could be cast into a specific shape and maintain that shape.

The evolvement of the arch through Roman development was a massive leap forward in terms of building capabilities. Prior to the development of the arch, building spans had to be completed horizontally. This requirement meant that either large beams were used (a problem in getting, placing and securing) or many columns were needed to minimize the span (such as in Greek Designs).

The arch was explored in many forms and variations of building types. Sequential arches allowed for the development of an arcade system as is found in the aqueduct systems. Arcade systems allowed for long spans over straight distances.

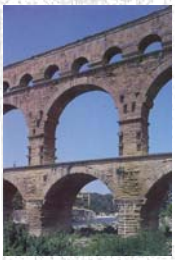


Figure 29: Aqueduct, Nimes, France (50 a.d.)

An archway could be constructed with great economy yet possess incredible bearing strength. The arch was further developed by lapping together rotated arches to form barrel vaults. This method allowed for the linear construction of long aisles, primarily used in town hall or forum designs. Romans were able to form semi-circle domes which can span large distances by creating and rotating arches as found in churches and basilicas. The actual distances were limited to the skill of the mason and the weakness or weight of the stone. The domes were constantly being reinvented with a triumphant breakthrough made during the Renaissance.

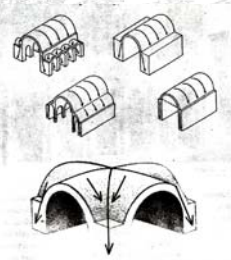


Figure 30: Vault Schemes

The second major achievement of Roman architectural technology was the perfection of the concrete mix. This material could be used instead of stone where stone was limited or not desired. The mix type of concrete based on the Roman model continued unchanged until the Industrial Revolution in the eighteenth century.

Concrete did not require mining, transportation, carving, special tools or skills of a mason to be able to take on the desired shape. These factors made the material very popular. Its use was widespread ass it was economical to use, easy to form and highly durable.

Basilicas used as public forums were an important contribution of Roman architecture. These buildings were originally civic centres to service the local market patrons and travelers. The forums were typically constructed using a high central roofed hall with adjoining side aisles. These buildings provided space for a variety of functions including business trading, judicial courts and at times public worship. The forum or basilica was most often located at the center of town in the square which made it accessible to the greater majority.

The basilica form became the basic planning form for early Christian architecture to provide a house of worship. The buildings were often structurally simple, providing sheltered space, lighting and surface area for the activities.

Temples, bathhouses and gaming theatres including the Colusseum were typically based on the earlier Greek models, however variations were continually being made to the design style.

Figure 31: The Colusseum, Rome (72a.d.)

Figure 32: The Pantheon (118a.d.)

The Roman Pantheon is seen as one of the greatest Roman achievements. This building combines scale, boldness and demonstrates the mastery of every architectural art available at the time. The Pantheon is based in design on the Greek philosophy of mathematics, proportions and scale. The Pantheon combines the best of Roman architecture both structurally and aesthetically.

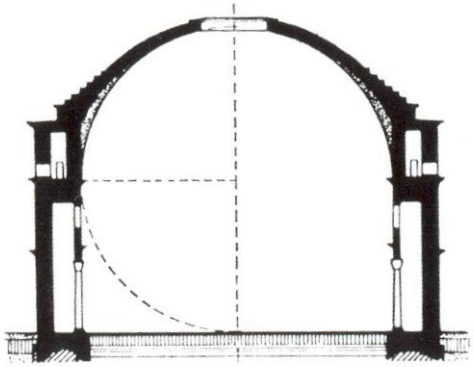


Figure 33: Section of the Pantheon

EARLY CHRISTIAN ARCHITECTURE

A. Influencing conditions of time and place:

1. Place:

a) location: Italy, Western Europe

b) geography: hilly, urban centers

c) materials: timber, stone, ruins of Roman buildings

d) climate: varies from warm to moderate, clear, sunny

2. Time:

a) dates: 4th – 6th centuries AD

b) concurrent events: 325 AD – Church Council at Nicea

c) social conditions: change, unrest, upheaval, discontent
Decline of the Roman Empire, split between East and West
Rise of feudalism and monasticism

d) religious conditions: change from pagan polytheism (belief in many gods) to Christian monotheism (belief in one god)
God at centre of belief system rather than man
Christianity required training and learning
Emotional reaction of faith and devotion to Church

B. Needs: Simple, cheap, easily built churches to accommodate worship for assembly and lecture

C. Forms:

Basilica with central nave, side aisles, semi-circular apse, narthex porch and later side transepts and bell tower

High central nave with clerestory windows, truss roof, supported by light columns (often from demolished Roman buildings)

D. Expression:

- Exteriors plain and unadorned
- Interiors very decorative, ornamented with marble and mosaics.

Early Christian architecture came about after a dramatic change in social structure in the Roman Empire. Christianity became the officially sanctioned religious system of the Roman Empire under the rule of Emperor Constantine. Constantine confirmed the chosen religion through the Edict of Milan issued in 313 AD.

It has been reported that Constantine received a vision of a burning cross while in battle. It was this vision that convinced him to convert to Christianity and confirm the Empire as a Christian domain. This confirmation followed on the heels of the persecution that Christians had earlier suffered at the hands of the Roman Empire.

This Edict allowed Christians to openly gather and worship. The demand for new facilities in which to worship (churches and halls) was immediate and intense.

The Pagan belief system (belief in many gods) no longer satisfied the spiritual needs of the citizens. People looked for more spirituality in terms of salvation and a stronger belief system.

Christianity had developed during the reign of the Roman Empire and was considered a Roman initiative. This belief in the basis of the religion prompted Constantine to confirm its legitimacy. Paganism (polytheism) was reduced to the level of local superstition.

Early Christian architecture, prior to the Edict, consisted of modest meeting halls (converted apartments) or catacombs (underground burial areas). The Christian Church, once confirmed and promoted by the ruling power, required places of worship suitable for the conventions of mass and religious events.

Pagan temples, the primary building monument prior to the Edict, remained as shrines for those who to the superstitions. These structures were not suitable for the gathering of the Christian masses due to their small size. The Pagan temples were also emotionally tainted due to their previous function and the belief system they represented. It was felt that they could not serve as Christian 'Houses of God'.

Social factors affected the development of architecture. The Emperor initiated a move in his seat of power from Rome to the newly christened City of Constantinople (now Istanbul) in Turkey. This move effectively split the base of power within the empire. Rome retained much of its influence and grandeur while Constantinople became the new power base of the Emperor. This split in power was reflected in a separation of design styles within the empire. There are distinct styles between the East and West zones of the Roman Empire relative to the design of the new churches.

Eastern zones (Constantinople areas) promoted planning and design in the form of centralized plans, radially balanced layouts. These plans had a central dominating form, with symmetry on all sides. The Hagia Sophia in Constantinople is an excellent example of this style.

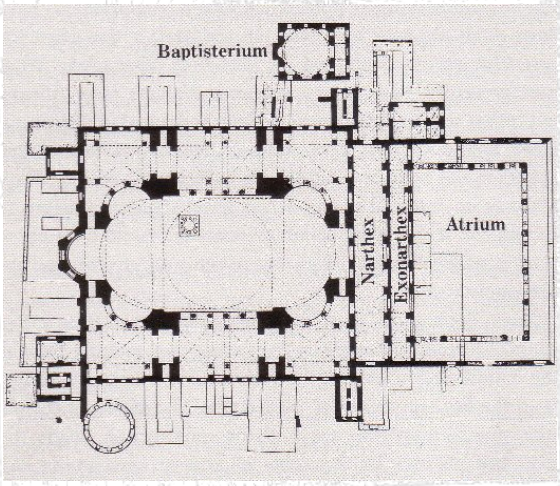


Figure 34: Plan of Hagia Sophia (532 a.d.)

Western zones (Rome and west areas) promoted planning and design along the established form of the Roman Basilicas. These forms provided a large central space with shallow side aisles.

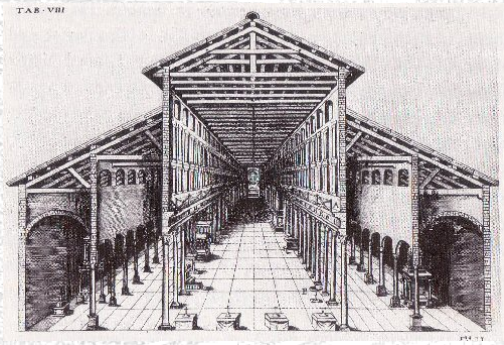


Figure 35: Early St. Peter's Basilica (333 a.d.)

The Basilica floor plan was initially thought of as symbolic to the form of a cross, though variations in the Basilica form existed throughout the western empire. The plan did not actually take on the cross shape for almost fifty years.

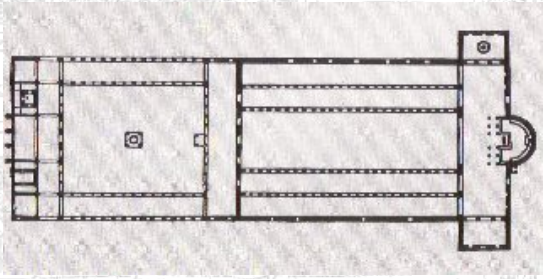


Figure 36: Plan of St. Peter's Basilica (333 a.d.)

The basic beliefs of the Christian religion were incorporated into the designs of both East and West empire churches, including:

- Bell towers (campanile) were removed from the main body of the church, but remained connected.
- Baptistery locations were fully removed from the main body of the church. It was the firm belief of the church that those who have not entered the faith through baptism should not be allowed to enter the main body of the church.

Both primary styles (East and West) were simple in form and decoration. It must be remembered that the Christian church was quite new at the time. The belief system of the Empire did not change overnight.

By design, both forms are in direct contrast to the Greek temple influences. The structural systems (columns and beams) were now exposed on the interior of the building. The exterior walls remained flat and undecorated. It is almost as if they had turned the Greek language of building inside-out.

The early churches constructed in the Western zone were basic Roman forums reorganized to identify church functions, including:

- Nave: public area, later incorporating seating
- Sanctuary: altar area
- Apse: area behind the altar
- Side aisles: secondary public area on the long sides, typically containing statues, artifacts, shrines or candle areas
- Clerestory: the upper nave, sometimes incorporating a balcony or choir loft

Planning in this building form used the Roman technique of “theatrical” lighting in order to enhance the interior visual experience. Through the use of windows, the church was brightened over the celebratory areas (Sanctuary) and darkened by shadow in the outer spaces (nave, side aisles). This feature added drama to the altar by creating a visual focal point.

Planning in the modern form of a church (the form we commonly ascribe to churches) changed to the shape of a cross in 373 BC. This year marked the time when Milan, Italy became the country seat of the Emperor as well as the central location for the Pope (the Holy See). The use of the vault/dome concepts, as perfected by the Roman technology, allowed greater spans over the nave as well as domes to be constructed over the Sanctuary area.

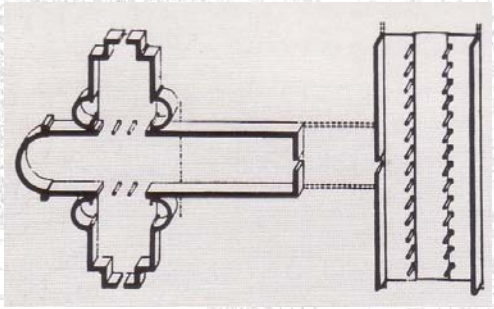


Figure 37: Church of the Holy Apostles, Milan (382 a.d.)

The requirements for churches expanded to become highly complex and regimented due to the clerical functions. Requirements applicable to new church design included:

- a clear wide path for the procession (entry and exit) of the clergy
- a reverent altar location raised above the congregation
- space to separate the clergy from the congregation (adding to the drama of the clergy as elevated, important figures)
- areas to separate those just entering the faith (involved the use of the side aisles as well as a separate baptistery)
- area for display and worship of artifacts (typically the side aisles)
- Burial zone for celebrated members of the church. These areas were tombs or catacombs beneath the main floor. Church designs also allowed for internment immediately below the main floor with stone floor tiles marking the location

BYZANTINE ARCHITECTURE

A. Influencing conditions of time and place:

1. Place:

a) location: Byzantium, Constantinople

b) geography: centre of trade routes

c) materials: bricks, concrete, imported limestone and marble

d) climate: warm, sunny

2. Time:

a) dates: 4th – 10th centuries AD

b) concurrent events: 323 AD – Constantine changes capital of Roman Empire from Rome to Byzantium (Constantinople)

325 Council of Nicea

375 Huns invade Europe

800 Charlemagne proclaimed Emperor by Pope

1453 Constantinople captured by Turks

c) social conditions: social change, upheaval, turbulent decline of Roman Empire accompanied by barbaric invasions, Flourishing trade, Feudalistic despotism

d) religious conditions:

Monotheistic Christianity,

Split between East and West,

Church gradually became more political and wealthier.

B. Needs: fireproof buildings, monumental central space

C. Forms:

Dome and vault, strong central space

Dome on square support by means of pendentives (an advance in structure)

Most outstanding example: Hagia Sophia (532 – 537)

D. Expression:

- Lavish, rich, ornamental decoration on interiors
- Marble and mosaics in intricate geometric patterns
- Appeal to the emotions and the senses

Byzantine architecture is the next step in design advancement following Early Christian architecture.

Early Christian architecture is noted to be plain, undecorated and flat relative to the wall surfaces. This architecture reflected the early non-materialistic values of religion. A life of servitude, poverty and non-material wealth was what the church promoted. This philosophy is in direct contrast to the ideals previously seen in Egyptian architecture where glory of a man came after death, being entombed with worldly goods for the afterlife. New Christian beliefs spread throughout the Empire espousing the non-materialistic approach.

Byzantine architecture grew out of this early belief system as the religion matured and gained spiritual and political strength. The Byzantine style grew from the stark, severe aesthetic of Early Christian architecture. The Byzantine style was intended to serve the liturgy, providing an experience of the mass and emotional experience for the persons within the church.

It is for the enhanced experience of the liturgy that a symbolic architectural expression of religious ideals was developed. The building became more than a shelter for worship. It became an expression of the significance of the new religious faith. The designs for Byzantine churches created dazzling visions of the symbols related to the sacred themes of the church.

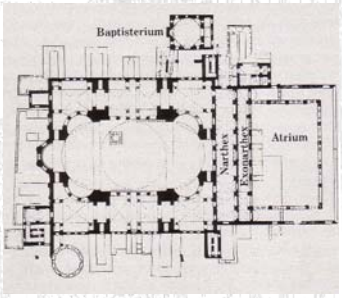


Figure 38: Hagia Sophia Plan (532 a.d.)

It is through the use of ornamentation of both the building structure and form that the basic building form evolved. Interior decoration and ornamentation were combined with fundamental design techniques developed for Early Christian churches.

The geometric planning of Byzantine architecture was typically based on the dimensions of a cube – height, width, and depth were all of equal dimensions to provide a clear, definitive space. This planning method produced a square central core of the building. The core design provided additional design challenges related to the structural systems required to dome the area.

A new structural system was created for this type of design which involved the use of pendentive dome structures. This method produced the structural ability to support a round dome on the square corners of the rotunda below. The use of pendentives is considered an advance in structural design, used to solve a difficult problem.

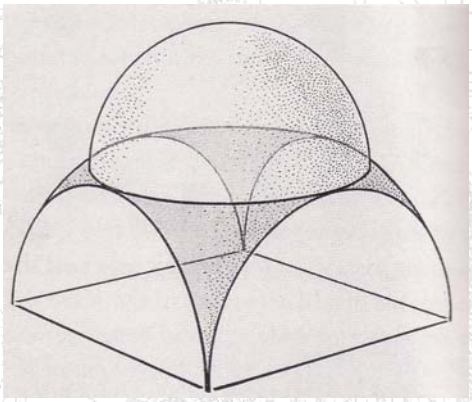


Figure 39: Byzantine Dome on Pendentives

The Byzantine style of design and construction is isolated within the Byzantine and Constantinople regions. This style is primarily an Eastern empire development, though its influence relative to ornamentation was widely felt within the Western empire design philosophy.

The prime example of this style is the Hagia Sophia located in Constantinople. In this structure, no visible surface is left in a natural state. Decoration, art and sculpture are located everywhere.

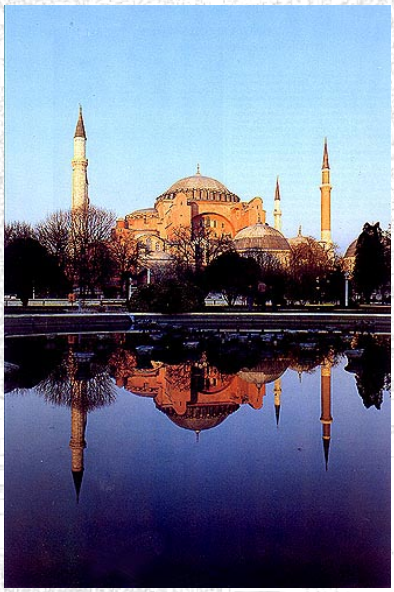


Figure 40: Hagia Sophia, Constantinople (532 a.d.)

The social and political conditions during this period had dramatic affects on the church, both physically and organizationally.

The Church was growing in power and influence since its proclamation as the religion for the Empire. The Church leaders became more powerful as the bank accounts of the papacy swelled. It is important to remember that salvation for the common people came through the act of giving financially to the Church. The clergy were revered by common folk as spiritual and community leaders, thus providing the clergy with immense power over parishioners through their influence as the voice of God.

The strength of the Roman Empire was declining as the Christian Church grew in power. Social change, barbaric invasions and a decaying rule of the Emperor led to the fall of Constantinople to the Turkish forces in 1453. Rome also fell to the marauding invaders. The constituencies previously governed by the empire were left to either establish their own governing bodies or fall prey to marauders sweeping Europe. Feudalistic empires were created by those with the force to rule.

Figure 41: Hagia Sophia Interior

The power of these individual smaller monarchies paled in comparison to the power of the Church. The Church still held power over people from the previous Roman Empire. The governmental organization of the Church remained in place, facilitating a continuation of its own spiritual rule.

ROMANESQUE ARCHITECTURE

A. Influencing conditions of time and place:

1. Place:

a) location: Western Europe, especially Italy, France, England, Germany

b) geography: trade routes, regional influences

c) materials: local materials, stone, brick, old columns

d) climate: regional differences such as:
North: dull, cold, more snow and rain
South: brighter, warm, no snow

2. Time:

a) dates: 1000 to 1200 AD

b) concurrent events: 1096 to 1270 Crusades

c) social conditions: feudal system, growth of villages

d) religious conditions: monastic system, religious pilgrimages

B. Needs: Castles and fortifications, Churches: fireproofing, several altars

C. Forms:

Castles concerned with fortification rather than aesthetics
Monasteries were often several buildings grouped around cloisters
Churches derived from early Christian basilicas
Vaulted stone ceilings with ribbed intersections and clustered columns
Round arch and round vault, square bays
Bell towers developed near entrance
Horizontality, alternating big and small columns, basic stonework

D. Expression: Regional Differences predominate

- North: more massive rugged masonry and decoration, more vigorous
- South – more classical and geometric decoration, more quiet and refined

Romanesque architecture was developed during the time of Medieval Europe. This period was one of knights and ladies, kings and castles, monks and cloisters and the Holy Crusades.

European civilization was in a state of confusion. The decline of the Roman Empire combined with the struggle for power between monarchies left society in a state of flux. The end of the Roman political and social institutions was followed by decay of the classical way of life. There was little construction undertaken during the 5th to 7th Century periods (500-700 A.D.).

The Christian church survived this period, managing to provide a sense of continuity, stability and culture for the citizens. It was due to intervention of the Christian church in 800 A.D. that a new leader was chosen. On Christmas Day, 800 A.D., Pope Leo II crowned Charlemagne as the Holy Roman Emperor. He became the first head of an empire that would survive the next 1000 years. Napoleon dissolved the Holy Roman Empire in 1806.

Figure 42: Baptistery, Florence Cathedral (1066 a.d.)

Charlemagne ruled over territory that included Germany, Italy, Czechoslovakia, Austria, Hungary, Yugoslavia, France, and the smaller intermediary countries. He led the revival efforts for the new cultural evolution by engaging scholars and artists throughout Europe to provide a new direction.

The new buildings undertaken at the outset evoked the original Roman efforts by copying the detailing and design. There was however a loss sustained in building design. The Roman buildings had remained relatively intact, available for use as examples or sometimes even for materials, however the talent of skilled trades had been lost during the dark years of war and turmoil. The new artisans could attempt copies of the originals, but the copy never surpassed the original quality.

Figure 43: Mont St. Michel Cathedral, Normandy, France (1023 a.d.)

Charlemagne died early into his reign in 814 A.D. He had accomplished much prior to ascending to the throne but never had the opportunity to see his efforts truly realized. It would be another two hundred years after his death before monumental building would begin in earnest.

Building began after 1000 A.D. with a new style and philosophy that had derived from the earlier abstractions on Roman planning. The new architecture held true to the Roman ideology of construction using column/wall combinations and the versatile arch. The new style however, presented variations in abstraction, fragmentation and the volumes enclosed.

The new design philosophy took the Roman ideals to the extreme and sometimes beyond. Cloister designs for abbeys (centers of the monks) and planning for worship areas shows a block geometry being followed.

The groupings of buildings and enclaves brought forth building shapes of rectangles, cubes, cones, and cylinders for the various parts. These block shapes were adorned in a new fashion, similar to the Byzantine style yet not quite as dramatic.

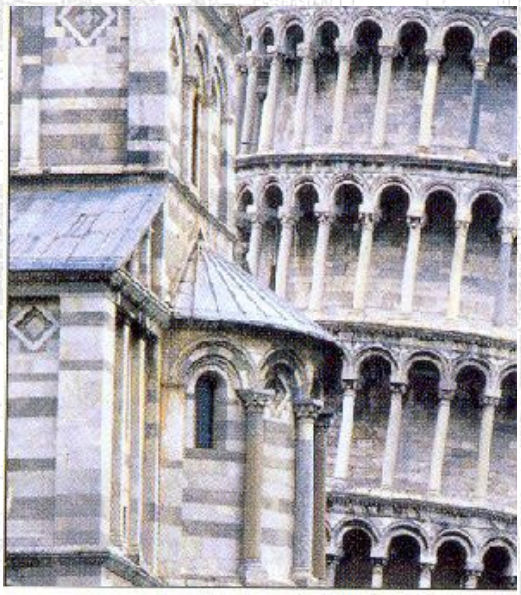


Figure 44: Pisa Cathedral, Italy (1063 a.d.)

The exterior structure of the building was partially exposed, a reverse trend from what had happened during the Early Christian architectural period. The interior scale remained relatively simple in decoration but the volume (height-to-width ratio) had now increased beyond Roman proportions. Early Christian architecture was based on the Roman basilica and carried through the Roman philosophy of proportion. Romanesque architecture challenged these proportions.

The height and massing (visual weight) of the structures increased dramatically, lifting the interiors to new levels. The use of colonnades in the planning of the new structures allowed for variations in the width of the central aisle. Colonnades aided in narrowing the central aisles, though the planning included additional side aisles on both sides of the church. The side aisles increased the overall width of the plan, therefore lifting the overall sloped roof height. A higher roof level over a narrower central aisle created a large narrow volume of space for the individual person to perceive.

The five aisles included the centre aisle (main traffic lane), two main side aisles for public seating or gathering and two outer aisles. These outer aisles were termed the ‘ambulatory’, meaning that they were to be used for circulation and display of artifacts.

A higher central aisle caused a corresponding change in the location of the light source. Many churches were only dimly lit by candles, thus relying on daylight to illuminate the interior space.

This style of architecture provided very little in the way of windows or glazing. This fact, combined with the reality that the limited glazing installed was excessively high, meant that far less light traveled down to the floor area. This situation contributed to a mysterious, almost ghost-like feeling to the interiors, playing on the emotions of the participants.

Figure 45: Speyer Cathedral, Germany (1030 a.d.)

Regional styles were developed using the basic interpretation of Romanesque design principles. Due to the fact that a central ruling authority such as the Roman Empire no longer existed, regional styles varied greatly. This design methodology allowed a lot of interpretation and abstraction depending on the specific conditions of the individual building. The opportunity to absorb a style, yet develop regional guidelines to its interpretation, signaled the beginning of specific regional architecture.

Examples of regional styles are found throughout Europe, including:

- Pisa Cathedral (1063) and Bell Tower (1173), Italy (known as the Leaning Tower of Pisa)
- Tower of London, England (1078)
- Speyer Cathedral, Germany (1030)
- The Cathedral of Florence Baptistery (1066)

The Pisa Cathedral and Speyer Cathedral are examples of buildings that followed the basilica planning methods, with increased proportions in their vertical form.

Figure 46: Interior, Speyer Cathedral

Structural advancements were made during this period. The problem of fire-proofing the buildings remained quite serious. It was not uncommon for fire to destroy the wooden roof structure of a church while the stone walls remained standing.

During this time of discovery, the use of flat roofs was explored; however, installing a flat roof system over vaulted aisles presented a serious flaw in the design aesthetic. These flat roofs still burned easily.

The concept of rib vaulting was subsequently developed. This method allowed spans of arches to link over square floor plans, facilitating changes in direction. This method also allowed greater spans in the roof/ceiling systems. Rib vaulting (sometimes known as groin vault) presented a new appearance wherein the structure of the roof system became apparent. Panelized sections were created and utilized in the artistic depictions. The panelized ceiling systems brought a new aesthetic of line and motion to the interior space, adding to the drama felt by the users.

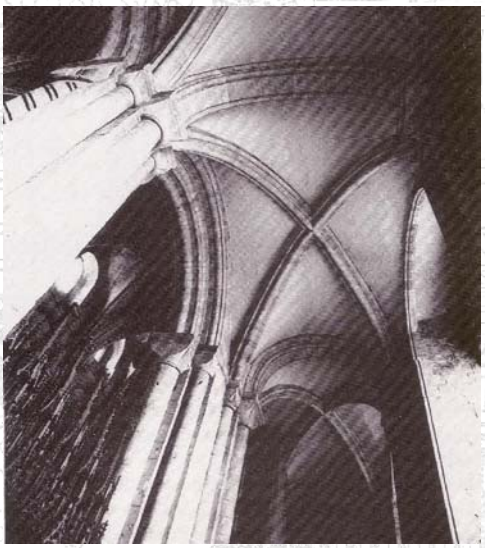


Figure 47: Rib Vault Ceiling,
Durham Cathedral, England (1093 a.d.)

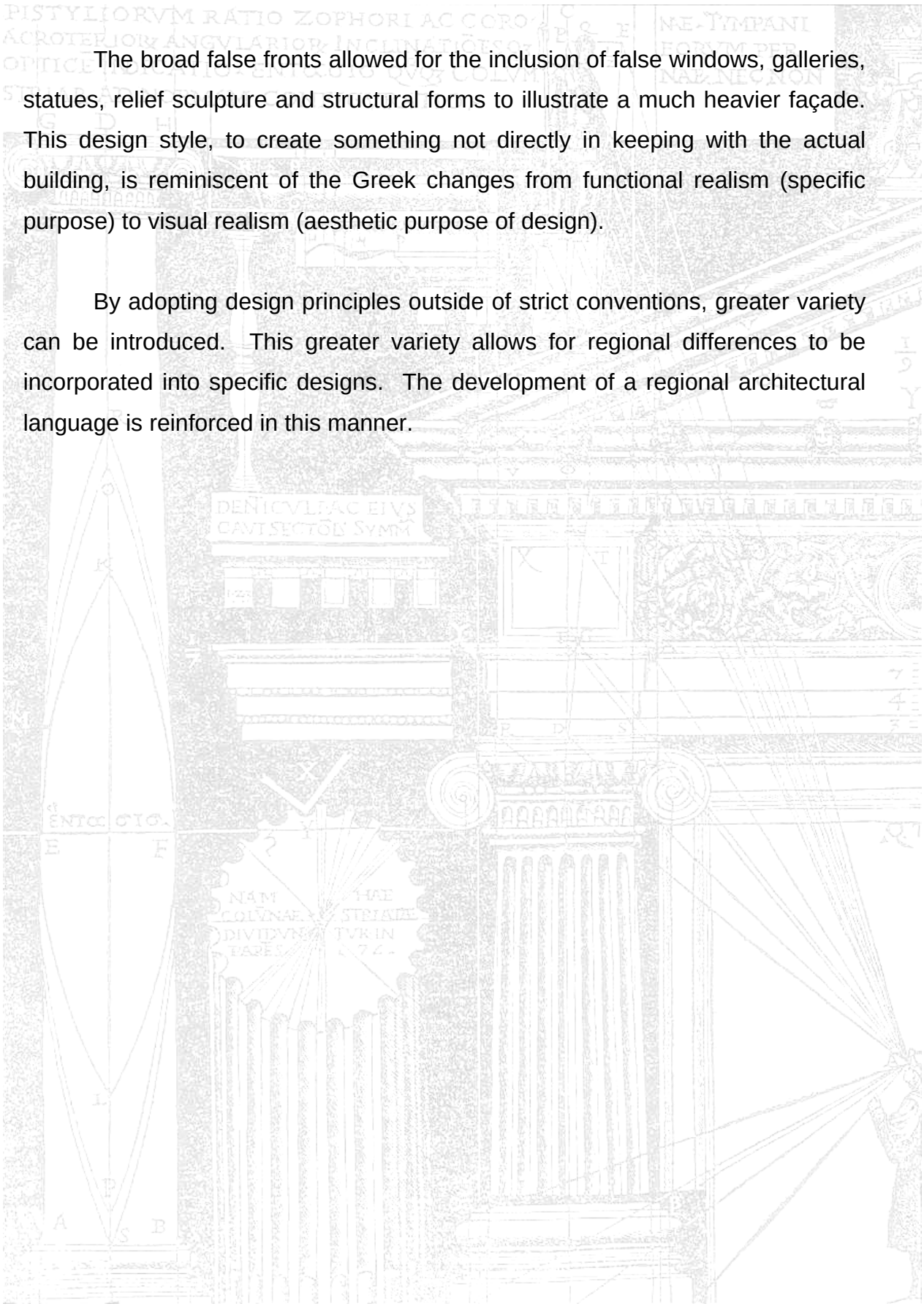
Romanesque architecture provided a further development relative to design which is the false front. Previous building elevations reflected the actual shape of the structure itself; a basilica form would be seen from the exterior and interior. Romanesque design abstracted the exteriors, presenting a building form unlike the actual profile of the structure. This method gave complete freedom to the design of the façade, no longer governed by the actual building shape.

Figure 48: Apse of Pisa Cathedral

Impressive façade screens were constructed, almost independent in form from what was behind them. The actual building profile would be quite narrow in the centre (since they had narrowed the central aisle) yet quite tall (since they had stretched the height). The actual building profile did not present a strong imposing front; it was skinny and tall without any true presence.

The broad false fronts allowed for the inclusion of false windows, galleries, statues, relief sculpture and structural forms to illustrate a much heavier façade. This design style, to create something not directly in keeping with the actual building, is reminiscent of the Greek changes from functional realism (specific purpose) to visual realism (aesthetic purpose of design).

By adopting design principles outside of strict conventions, greater variety can be introduced. This greater variety allows for regional differences to be incorporated into specific designs. The development of a regional architectural language is reinforced in this manner.



GOTHIC ARCHITECTURE

A. Influencing conditions of time and place:

1. Place:

a) Location: France, England, Germany, Italy, Spain

b) geography: Trade and travel throughout all Europe

c) materials: Marble in Italy, Stone in England & France, Brick in Germany

d) climate: North: snow, rain, low sun angle
South: Heat, glare, high sun angle

2. Time:

a) dates: 12th to 16th Centuries
Early and High Gothic: 1150 – 1250
Late Gothic: 1250 - 1500

b) concurrent events: 1140-1144: St. Denis Abbey Built
1145: Chartres Cathedral began
1271 – 1295: Marco Polo's travels
1337-1453: Hundred year war (France/England)
1348: Outbreak of Black Death
1456: Publication of Gutenberg Bible

c) social conditions: Growth of towns and guilds
Civic pride and competitive spirit
Expansion of trade, commerce, travel
Decline of feudal system, increase in freedom

d) Religious conditions: intense enthusiasm, fervor, devotion, emotional devotion, unquestioned faith in church

B. Needs:

Cathedrals: centre of social and religious activity in towns
Guild halls, markets, town houses

GOTHIC ARCHITECTURE

C. Forms:

Romanesque cathedral plan remained

Ribbed vaults, developing into fan vaulting

Pointed arch, rectangular bays

Flying buttresses

Slender masonry supports, stone cage skeleton

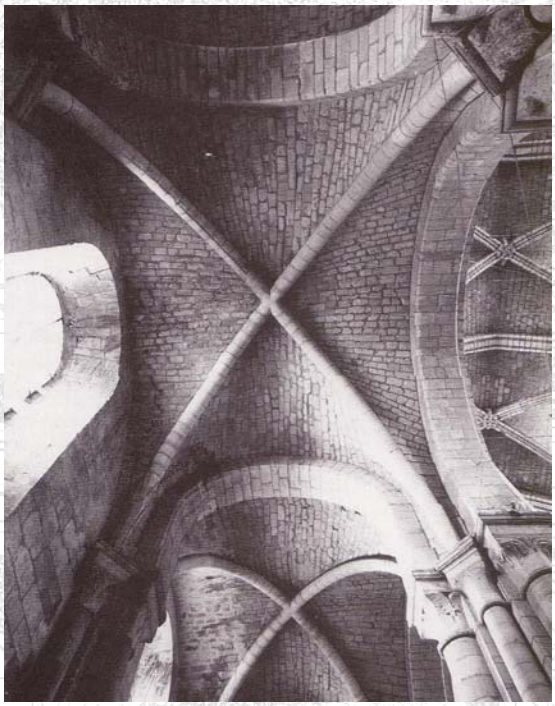


Figure 49: Ribbed Vault, St. Etienne Cathedral, France (1125 a.d.)

D. Expression:

- Great verticality, dramatic structure, lacy, intricate forms
- beautiful stained glass, doorways richly ornamented with sculpture
- French Gothic is more vertical, lacy; unified plan, west towers
- English Gothic is more quiet, square; cross-shaped plan, central spire
- Late English Gothic developed more decorative, elaborate fan vaulting
- Italian Gothic is more static, smaller openings, more horizontal

Gothic architecture produced a radical change from the architecture of the Romanesque period. The Romanesque period pushed the limits of scale and massing but left the actual decoration of the interior space to a minimum. Gothic architecture spun this philosophy around to the point where there is almost no wall surface or structure system left untouched.

The Gothic system of design is accredited to France where it is most recognized. Notre Dame is the epitome of Gothic architecture in Paris. The actual origins of the phase stemmed from Normandy, England.

Figure 50: Notre Dame Cathedral, Paris (1163 a.d.)

The period of Gothic architecture is marked by great social change. These changes contributed to the ideals of Gothic architecture by creating additional reverence for the presence of God within everyone's lives.

Marco Polo's travels opened up a brand new world of contrasting cultures to those known in western civilization. The influence of this information on a peasant mentality cannot be fully analyzed. It may be said that a larger world, contrasting cultures and a different set of beliefs in religion and philosophy would cause the average person to seek his own security and purpose in the world.

There was a decline in the feudal system of governance, providing more freedom to generations of families. This freedom marked a dramatic change from earlier Roman and even feudal rule. Even though a peasant may be considered free in a legal sense, they will still seek comfort and security on a spiritual scale. It should be noted that the majority of citizens remained unschooled; ignorant in terms of basic skills related to reading and writing. Paganism had been reduced to superstition during the time of Early Christian architecture. Superstition however did not disappear, living on through spoken word.

Other events occurred during this period which further brought citizens closer to the church. The 100-Year war broke out between France and England. This conflict, as does all war, brought the potential aspect of death home to every family. Death may have been honourable in the Roman society; death in these times meant the possibility of an afterlife or perhaps the unpleasant alternative. Piety and servitude were required by the Church in order to better one's opportunity for entrance into the Kingdom of God.

Figure 51: Chartes Cathedral, France (1194 a.d.)

The Black Death, plague of the Middle Ages, broke out in 1348. This catastrophe took the lives of thousands in many painful, unpleasant ways. The cause of it was not understood by many at the time, relative to their knowledge base which was quite limited. The methods of preventing the spread of disease were also unknown and so the scourge prevailed. The Church in this case was the best likely source of protection they could believe in. The Church had survived through hundreds of years including battles, varied crisis actions and challenges. It was thought to be invincible; therefore those who participated in the rites of the faith may receive protection.

Positive aspects during this period included:

- Continued growth of urban and semi-urban populations. Increased numbers of people were gathering in concentration, thus a more accessible audience could be had for worship services and contributions.
- Trade, commerce and travel were all on the rise. Trading markets (cities and towns) were growing, requiring additional resources. This additional trade spurred the levels of commerce in a positive growth circle; each citizen contributing to the growth of the other. Travel was increased as the populations became centralized, allowing for accessing goods and services on the way to alternate locations.

- Civic pride grew as residents took responsibility for their chosen town or birthplace. The effect of these influences is seen in the way a city could be regarded almost as an independent state in much the same way early Greece operated. Civic administration had wide-ranging authority and control with all citizens participating. The best example of this is seen in Florence where construction on the Cathedral of Florence was begun under the pretense of raising a structure so beautiful that no man would ever succeed in surpassing its glory. The funds for this effort came from all sources, including a civic tax applied to the reading of the wills and testaments of the deceased. Citizens of Florence were taxed even in death to pay for the intended cathedral. The Cathedral of Florence stands out as a superior achievement of the Italian Gothic period. Whether or not its beauty was ever surpassed remains a personal question for every observer.

Figure 52: S. Maria del Fiore Cathedral, Florence (1296-1436)

Each of the social conditions noted relate to the spiritual needs of the population. Religious participation reached a high in its intensity, enthusiasm, and emotion. The publication of the Gutenberg Bible in 1456 allowed for the wide-range distribution of a previously-regarded sacred text.

The printed word spread throughout nations far and wide, bringing the word of God directly to the mass population. This spread added fuel to the religious fire which was already raging. There was a clear devotion to the Church carried forth on unquestioned faith. Mankind was truly insignificant when contrasted to the greater reality of God and spirituality.

Figure 53: Notre Dame Interior, Paris

Cathedrals occupied the centre of focus within towns, serving as focal points, gathering places and safe houses in the times of crisis.

A secondary shift in social activities occurred during this period. The rise of craftsmen guilds was facilitated as common tradespersons created a new level of organization. The concentration of increased numbers of skilled trades within urban settlements allowed for the trades to bond under a united organization, thus the creation of the guilds.

There had been a loss of skilled trade during the Romanesque period; a loss of the skills attributed to the Roman technology. The formation of new guilds for each trade (masons, carpenters, sculptors and artists) allowed for trading of information and training in the specific skill. The positive affect of this development is found through the exquisite detailing and structural advancements made in construction during this period.

The formation of guilds also contributed to the design and construction of new meeting places for the members and the public. Construction on new market areas, guild houses and town halls saw a marked increase during this period.

Gothic traditions through the implementation of the guild methodology affected the architectural profession immensely. This period saw the actual creation of workshops for architects. These workshops were the first of their kind where those thought gifted in the art of architecture could be clearly identified and trained by the elders of the guild. The guilds sought to promote and enhance their talents, theoretically being the first opportunity for schooling in architecture.

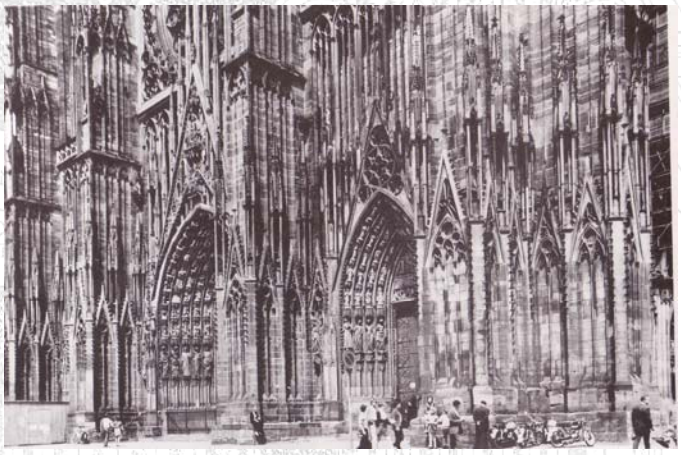


Figure 54: Strasbourg Cathedral, Germany (1277 a.d.))

It is through the creation of guilds that specialization among the construction industry was begun. No longer was the lead mason or patron of a structure responsible for the final product. This responsibility was turned over to those trained in achieving the artistic vision and structural integrity of a building. The Gothic architect carried many roles relative to each commission, including design authority, structural engineer, and lead builder as well as contributing artist.

The designs of the new structures took a radical turn during this period of architecture. The structures of the previous Romanesque period were thought to be overbuilt relative to the wall thickness and weight of the building. Solutions were sought to reduce wall thickness and weight in order to speed production as well as create a new effect of lightness and verticality. Every aspect of the building was considered relative to the whole in the effort to achieve a unified coherent result. There were no false fronts involved at this time, as were present during the Romanesque period.

The basic principles of Gothic architecture were derived from the logic of Roman designs. A building must achieve success relative to its structural integrity, its visual impact and its symbolic meaning.

(1) Structural Integrity

The Gothic designs carried forward on the premise that the structure of a building must be seen exposed for participants to visually feel the bones of the building. Gothic architecture slimmed down the thickness of the wall systems found in Romanesque. This slimming was made possible by emphasizing the skeleton structure on both the interior and exterior of the building.

The walls were substantially thinned almost to the point of structural failure due to their height. It is true that many attempts to achieve a "weightless" wall system met with failure as the wall fell to the ground during construction.

The solution to a thinner wall came in the form of bracing on the exterior. These knee-braces, known as buttresses or flying buttresses, were used to butt the main wall structure and brace it against the forces generated by the wall and roof system.

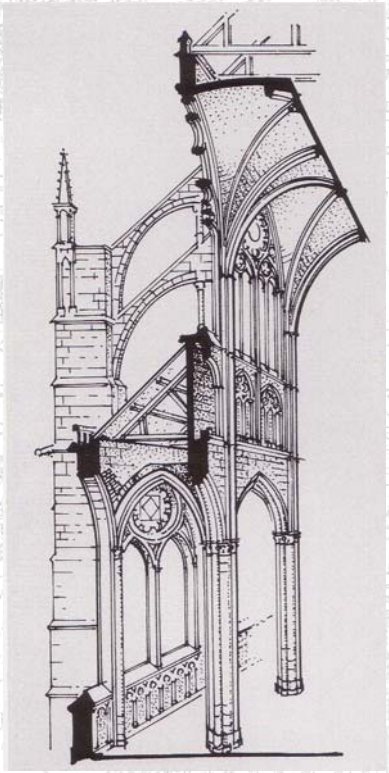


Figure 55: Buttress Section, Amiens Cathedral (1220 a.d.)

Buttresses were primarily used for a structural purpose. They were integrated into the overall aesthetic through sculptural detailing and ornament in keeping with the main body of the church. In this way, they also contributed to the visual appeal of the Church.

Buttresses also allowed the opportunity for an increase in the number of windows contained within the wall system. Since the structural loads were being reinforced and redirected outward, the wall could be opened up to allow more light to the interior spaces.

Figure 56: Buttress Detail, Lyon Cathedral

The structural advancements made during this period included variations on the original semi-circular Roman arch. The Romanesque period had developed the method of rib vaults to handle transitions in the roof system. Gothic design took the rib vault concept and stretched it vertically to form ridge points, evidenced in the vaults and roof structures.

Groin vaults were used at changes in directions of the roof system. The crossing of the ribs was used to accentuate the floor area below, being a sacred or special location within the Church.

The use of rib vaulting, springing almost vertically from the walls, created the illusion that the roof system floated over the upper (clerestory) windows. This structural method contributed to the feeling of weightlessness within the interior. The rib vaults also aided in redistribution of the structural load due to the large number of them included.

(2) Visual Impact

The visual impact of the new cathedrals was both breathtaking and humbling. Parishioners were able to feel that they were a part of a worldly congregation, participating in a soaring, spiritually uplifting place of worship. The use of the exposed structural forms, a web of columns, vault, ribs, and buttresses, was meant to enclose an overall space that soared to the heavens.

The scale of the buildings exceeded the limitations of the Romanesque period, lifting the roof structure to new heights, changing the vertical proportion of height to width within the building.

Figure 57: Milan Cathedral (1387 a.d.)

Whereas Romanesque churches were felt to be dim and mysterious due to their minimal windows set far above the congregation, Gothic churches were the exact opposite.

The structural system allowed for a greater number of windows, both large and small. Gothic architecture took advantage of this opportunity. Gothic churches achieved unsurpassed visual effects in lighting, using the same consideration as the Romans; the use of glazing and light sources for drama.

Extensive glazing was used over the entire wall area. The scale and height of the building was emphasized by the huge windows. Monumental designs in stained glass, window shape and placement, and the focus of light within the interior contributed to the visual impact of the church. The use of "tracery" was developed during this period.

"Tracery" was the term given to the process of thinning down the exterior walls and exposing the structural elements on both the exterior and interior. This method developed through applications in England where tracery was employed as exaggerated ribs and vault lines. This effect furthered the weightlessness feeling, lifting the overall visual appeal of the interiors.

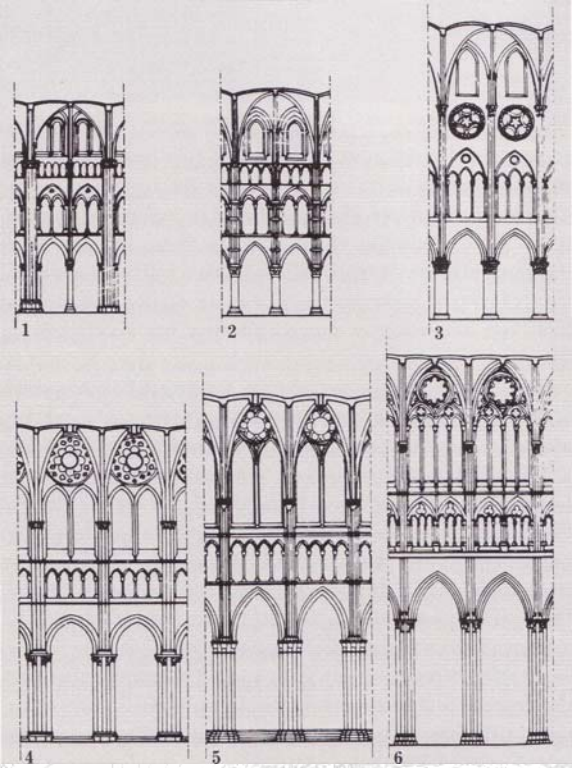


Figure 58: Interior Wall Heights of Cathedrals

1: Noyon
2: Laon
3: Paris
4: Chartes
5: Reims
6: Amiens

The use of sculpture and sculptural elements applied to the buildings was another concept explored during this period. The exteriors of the buildings were finished with elaborate sculptures on almost every available surface. If it didn't have a window, it likely had something carved.

Sculpture served a dual purpose in many cases. It could be intended as decorative or spiritual (gargoyles incorporated to frighten away evil spirits of Satan) while at the same time hold a functional purpose (the same gargoyles were the drainage points for the roof system).

Structure contributed to the visual appeal in the manner that it too was carried out to replicate common worldly elements. This situation is seen in the bases of columns carved to mimic tree roots, securing the structure firmly to the earth. Column capitals were intricately carved in Corinthian or Ionic forms, derived from the Greeks and interpreted for the new symbolism of the period.

(3) Symbolic Meaning

The symbolic meaning for the new churches was found through the combination of the structural impact and visual appeal. It was important to identify the cathedral as an image of Heavenly Jerusalem within the House of God. The building had to achieve a sense of transcendence above earthly limitations, soaring to the heavens in order to create the spirit of a 'higher being' within the parishioners.

It should be remembered that religious fervor was high during this period due to social changes noted at the start of this section. Persons seeking salvation had to feel that they had arrived at a place unlike anything they would experience elsewhere in the city. This feeling would facilitate and reinforce their beliefs, continuing on the tradition of worship.

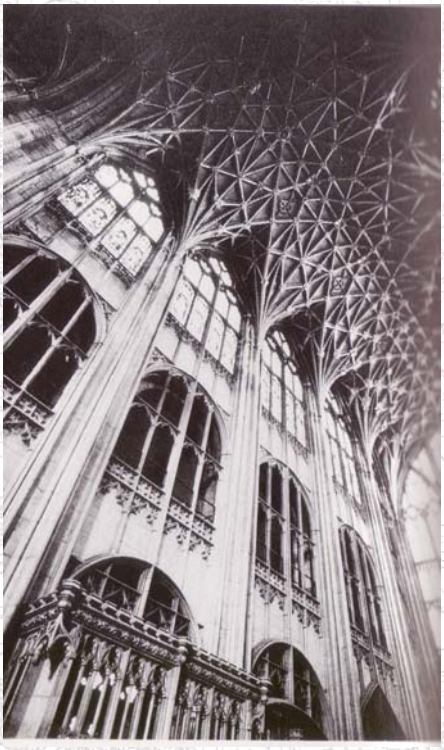


Figure 59: Gloucester Cathedral, England (1337 a.d.)

These affects and intentions relative to the design of churches also facilitated the elevation of clergy and the Church within the social system. The Church was revered and feared more than ever for the power it held over the common man. It was the most powerful political entity of its time.

RENAISSANCE ARCHITECTURE (ITALY)

A. Influencing conditions of time and place:

1. Place:

a) location: Italy (Florence and Rome)

b) geography: City-states of Italy which held prestige and power

c) materials: marble and travertine, ruins of old Roman buildings

d) climate: bright, sunny Mediterranean climate, high sun angle

2. Time:

a) dates: 1420 - 1600

b) concurrent events: 1456: Publication of Gutenberg Bible
1492: Columbus discovers America
1519: Magellan circumnavigates the globe

c) social conditions: Man begins to make his own decisions again
Humanism – interest in worldly things
Skepticism – questioning and doubting realities
Classical Re-interest – Roman antiquity
Proud independent city-states
Individual clients; self-expression

d) religious conditions:
Questioning of Church authority, more worldly church glory to man, not God

B. Needs: Impressive houses for new wealthy class, palaces, churches

C. Forms:

Church took on two forms: basilica form and vaulted form
Dome with lantern became important
Villa was classical, formal, symmetrical, well-proportioned
Landscape was formal, symmetrical, related to architecture

D. Expression:

- Self-expression, based on re-interest in classical antiquity
- Preoccupation with surface, façade, proportion, vision

E. Architects and Buildings:

1. Brunelleschi:

Foundling Hospital, Florence	1419
Dome of Florence Cathedral	1420
Palazzo Chapel, Florence	1420
San Lorenzo Church, Florence	1425
San Spirito Church, Florence	1440
Pitti Palace, Florence	1435

2. Alberti:

Rucellai Palace, Florence	1451
Sante Maria Novella, Florence	1456-1470
San Andrea, Mantua	1470
De Re Aedificatoria published	1485

3. Bramante:

Tempietto of San Pietro, Rome	1502
Plans for St. Peter's Cathedral, Rome	1506

4. Michelangelo:

Medici Chapel, Florence	1521
Laurentian Library, Florence	1526
The Capital, Rome	1540
St. Peter's Cathedral, Rome	1546

5. Palladio:

Basilica, Vicenza (Venice)	1549
Villa Capra, Vicenza	1550

6. Vignola:

"Rule of the Five Orders"	1562
IL Gesu Church, Rome	1568

RENAISSANCE ARCHITECTURE (FRANCE)

A. Influencing conditions of time and place:

1. Place:

a) location: Paris and Loire Valley

b) geography: Unified kingdom after 1500

c) materials: stone

d) climate: cool, dull light, northern climate

2. Time:

a) dates: 1500 - 1560

b) concurrent events: 1453: End of Hundred Year's war
1517-1555 Reformation, begins in Germany
1545-1563 Counter Reformation
1535 Cartier discovers St. Lawrence River

c) Social conditions: Unified royal centralized government
Military expeditions into Italy brought contact with Italian Renaissance
After 1559, civil and religious war in France

d) religious conditions: Few new churches built after Gothic period
From 1558 to end of century, France was involved with religious wars between Catholics and Protestants

B. Needs: Fashionable mansions and chateaux for newly enlightened nobles to emulate the Italian merchants and bankers

C. Forms:

Gothic castle tradition preserved in the towers, dormers, large windows, high roofs, enormous chimneys and masonry construction of the.
Symmetry, horizontality, round archways and classical decoration applied as Italian craftsmen adapted to the French clients.

D. Expression:

- Italian renaissance ideas manifested themselves in the French tradition after 1515 when the King brought Italian craftsmen to France to work on the new chateaux along the Loire Valley.

E. Architects and Buildings:

1. Loire School of Fontainebleau:

Chateau of Blois	1515-1525
Chateau of Chambord	1519-1547
Chateau of Fontainebleau	1528-1537
Chateau of Chenonceaux	1556

2. Pierre Lescot:

Palace of the Louvre	1546-1559

Figure 60: The Louvre (Seine River Elevation)

RENAISSANCE ARCHITECTURE (ENGLAND)

A. Influencing conditions of time and place:

1. Place:

a) location: London and immediate area

b) Geography: isolation by the sea, maritime contact with European continent

c) materials: stone, brick, timber

d) climate: temperate, humid, dull

2. Time:

a) dates: 1550-1642

b) concurrent events: 1558-1603 Reign of Elizabeth I
1588: Defeat of Spanish Armada
1603: Shakespeare publishes “Hamlet”
1611: English Bible published
1642: Civil war begins in England

c) social conditions: Increased freedom and travel
Expanding commerce and trade
New class of wealthy merchants and middle class
Renaissance ideas and way of life become fashionable

d) religious conditions: Henry VIII became head of Church (1534)
Elizabeth I enacts 39 Articles of Faith (1563)

B. Needs:

Stately mansions for new gentry class of wealthy merchants who wanted to express their Renaissance style of living

C. Forms:

Symmetrical forms, rectangular mansions, with large rectangular windows

D. Expression:

- Regularity, formality, horizontality, classical decoration
- Formal, symmetrical gardens

E. Architects and Buildings:

1. Indigo Jones:

Queen’s Banqueting House, London	1619-1621
Queen’s House, Greenwich	1618-1635

RENAISSANCE ARCHITECTURE

Renaissance architecture symbolized a change in both social philosophy and architecture. The previous period of Gothic architecture responded greatly to fears of the known and unknown world. These fears eventually passed, leading to a new age of thought and reason.

Many divergent streams of thought began during the Renaissance period. The history of the time has typically been broken out into the differing paths of Italy, France, and England. There remain many similarities which will be explored in this section.

Wars had ended (Hundred-Year War between France and England), the plague was defeated and new commerce and trade flourished throughout Europe. This period was one of growth and expansion relative to commercial enterprise.

The publication of the Gutenberg Bible spread the word of God during this period, though not without some controversy between theologians and the Church. The Church had become highly politicized thus it was being seen as more of a governmental institution than a religious organization.

Figure 61: St. Peters, Rome (1506 a.d.)

The wealth generated by expansion of trade and commerce grew. This growth in wealth created a whole new class of citizens; those who could afford the extremes in art, building, clothing and self-promotion. These citizens now desired expansive homes and gardens, artwork to glorify and promote their positions, and demonstrate their power of wealth. These citizens, previously timid, were now bold.

Socially, the new health and overall civic wealth of the nations allowed for a turn in philosophy. Citizens were able to question the nature of politics and reason rather than being solely concerned for survival. A new skepticism arose that questioned the rule of nations as well as the power of the Church. Mankind was feeling strong – this feeling was reflected in the ideas of Humanism. Humanism is a philosophy that puts mankind at the centre of his own enquiry, whereas it had previously been God.

Figure 62: Palazzo Medici, Florence (1444 a.d.)

Mankind began learning from themselves, rather than taking Gospel as the sole direction of life. This attitude fostered the creation of proud, independent city-states that grew in wealth and power. Humanism led individual patrons to seek new methods of self-expression through art, patronage, and architecture.

An interest in historic values accompanied the reviewed interest in mankind. Scholars, artists and patrons looked for guidance on rational design. As was noted during the Gothic period, design was a sense of proportion or abstraction of volume. Artisans of this period sought a new way to ascertain design philosophy with reason. Their solution was to look back hundreds of years, to the time of the Roman Empire and the architecture of that period.

The Renaissance period saw the rediscovery of Vitruvius, the Roman writer who penned “Ten Books on Architecture”. Vitruvius’ writings were relative to design of many items from architectural buildings to military warfare devices. His book spoke of clear proportions, rational planning and meaning applied to each component of a building. This book promoted the essence of proportion to be based on the size of a man.

Humanist proportions were derived strictly from the proportions of mankind. The book detailed the mathematics required to fully plan and execute construction of many public building types – town halls, cathedrals, homes and public stadiums. This book was treated as the designer’s "handbook" for the current time.

Artists of the Renaissance went through a new kind of training; being skilled in all possible arts as opposed to only one. This breed of artist was the type of person we now refer to as a “Renaissance Man”. A Renaissance man may be termed “Jack-of-all-trades” to define a person who is highly skilled in many arts.

Figure 63: Baptistery Doors, Duomo Florence (1410)

The skills of Renaissance architects covered areas of sculpture, painting, poetry, science and philosophy. These men were highly educated through schooling and guilds. The guild movement was very active for all arts and trades, providing highly skilled personnel as well as excellent teaching capabilities.

Renaissance artists and architects included famous persons such as Leonardo da Vinci, Raphael, Michelangelo and Bramanti. These men went through the training whereby a master builder became an architect through study of literature and historic buildings. Leonardo da Vinci produced a famous art work on the proportions of man. This work was based on the writings of Vitruvius.

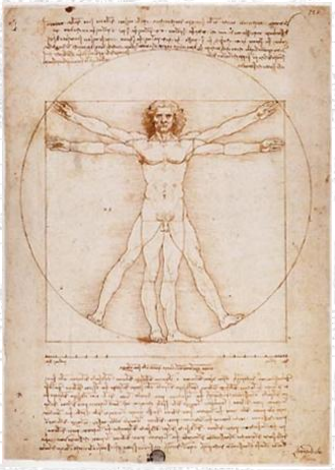


Figure 64: Da Vinci, The Proportions of Man

The knowledge base of the period grew rapidly. The vision of this period was founded on the spiritual and intellectual autonomy of the individual. There was a new faith centred on the power of human reason. Mankind was the focus once again through the philosophy of “Humanism”.

This knowledge base also brought forward a new interest in antique culture, spurned on by the discovered writings of Vitruvius. Writings became a means to spread knowledge and teach newcomers to the profession. Alberti created three current treatises based on art, sculpture and architecture. While considered new at the time, his text was originally based on the knowledge put forth by Vitruvius.

All this knowledge and acquired skill combined to create new architecture. The new talents were also used to solve old problems, namely the dome of the Florence Cathedral. This Cathedral, begun in 1066, was a mixture of styles with the bell tower Romanesque and the Cathedral itself Gothic. The dome over the sanctuary had never been completed. Brunelleschi was the man, originally a sculptor but now an architect, who solved the structural impossibility to cover the church. His manner and methods were proven to be a major breakthrough in design and construction.

The success of this one man, and many talents practicing throughout Italy, carried forward a new level of status, training and recognition for architects. New designs were being attributed to individuals, thus granting them recognition. Patrons sought out the talent to improve their own palazzos and villas, as well as social standing of having their own talent. This period also produced some of the earliest text focused on the biographies of the famous designers. Mankind had begun to glorify itself.

The breakthrough of structural design of the dome in Florence lent the Cathedral to be known as the Duomo of Florence. This technique in design carried on with many famous examples, the most notable being St. Peter's Cathedral in Rome. The actual design for St. Peter's was begun by Bramanti and later finished by Raphael and Michelangelo. These men were artists of great renown who were also regarded as architects of immense talent. St. Peter's has been copied around the world including the Capital Building in the United States, constructed hundreds of years later.

Figure 65: S. Maria del Fiore Cathedral (The Duomo of Florence) (1420)

Planning for new buildings relied once again on mathematical proportions relative to all items constructed. Column size, spacing, height and width of the building were all considerations. These formal rules were reflective of the Greek methodology studied early in this section. It was of the Greeks that Vitruvius wrote and it was of Vitruvius that the Renaissance flourished.

Figure 66:St. Maria Novella, Florence
(Orig. 1246, Revised 1460)

Italy

The height of the Italian Renaissance is found in the works of Palladio. Palladio was educated in the humanist philosophy, studied ancient buildings and proportions, and dedicated himself to following the rules and norms of architectural design as prepared by ancient architecture. He based his classic building solutions on proportion, symmetry, harmony and the beauty of mathematics. Every detail for every space was proportionally related to each other detail. His work symbolized the accomplishment of the Italian Renaissance period; antiquity had been rediscovered, revived and reinterpreted for the new world.

Figure 67: Villa Capra, Italy (1550)

France

France underwent a similar transformation in philosophy during this period. There was a greater level of detail applied to design relative to the teachings learned at the hands of the Italian craftsmen. Travel was frequent during this period which led to a greater exchange of ideas. Persons would often travel to new locations for months or even years to work, study and teach.

The French style differed from the Italian, a divergence in regional architecture. Regional styles were to become more pronounced as the centuries progressed.

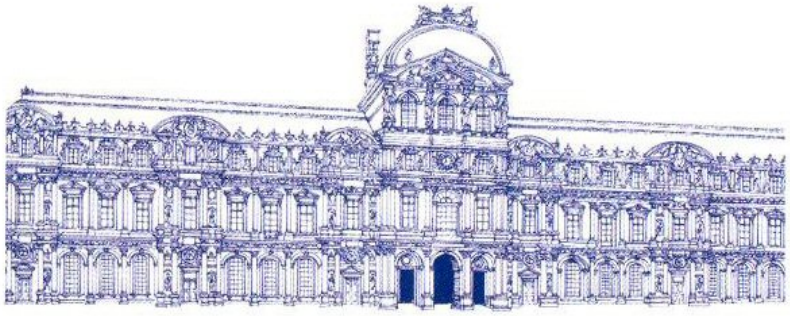


Figure 68: The Louvre, Paris (1546)

The French style preserved the Gothic castle tradition, incorporating towers, dormers, large windows and steeply pitched roofs. Weather had an effect as the French climate was cooler with more precipitation (snow, rain) than the Italian climate.

Symmetry, horizontality and proportional detailing soon found their way into French architecture. The King brought Italian craftsmen in to work on Royal projects, which influenced French architects and patrons towards the new philosophy of Humanism. In 1540, Serlio arrived from Italy to serve as the King's architect, a renowned position in the Royal Court.

Figure 69: Chateau de Chanonceaux, France (1515)

England

England was also a part of the great change relative to architecture. Civil changes occurred throughout the period including the succession from the Catholic Church in 1534 as Henry VIII took on the role of leader of the Church in England. Shakespeare published “Hamlet”, performed at the Stratford-on-Avon, theatre in the round. The English bible was published (1611), and there was a resounding defeat of the Spanish Armada, the naval fleet (1588).

A new class of wealthy merchants and middle class citizens emerged, ready to accept the fashionable way of life promoted by the Renaissance. Stately mansions were erected for these new (and old) patrons of English architecture.

The new designs were clearly focused on the rudimentary design styles of the Renaissance – symmetry, formality, horizontality, combined with classical decoration. Even their landscaped gardens were kept to the same principles of design. Large windows were incorporated to capture as much northern light as possible, while the proportions remained in keeping with the Renaissance philosophy.

BAROQUE ARCHITECTURE (ITALY)

A. Influencing conditions of time and place:

1. Place:

a) location: Rome

b) geography: City-states of Italy which held prestige and power

c) materials: marble and travertine, ruins of old Roman buildings

d) climate: bright, sunny Mediterranean climate, high sun angle

2. Time:

a) dates: 1600-1750

b) concurrent events: 1642: Galileo dies

c) social conditions: World of contrasts and broadening horizons
Foundations of modern science laid

d) religious conditions: Questioning, struggle, reformation, reformation gave Italian Church more power and unity

B. Needs:

Popes and Cardinals required magnificent churches, palaces, tombs to commemorate themselves and to assert their renewed power and authority

C. Forms:

Oval rather than circular forms

Space and form became much more plastic and sculptural

Illusion replaced logical visual organization of form and space

Space-time architecture (Time becomes key component), spatial flow

D. Expression:

- Three dimension curve, dramatic detail, illusion, visual movement

BAROQUE ARCHITECTURE (ITALY)

E. Architects and Buildings:

1. Michelangelo:
   (Father of Baroque Architecture)
   The Capital, Rome (Designed 1540, completed 1655)

2. Maderno:

St. Susanna, Rome	1596-1603
St. Peter's, Rome (Nave and façade)	1606-1612

3. Bernini (Greatest Baroque sculptor)

Altar Canopy, St. Peter's, Rome	1624-1633
Colonnaded Plaza, St. Peter's, Rome	1655-1661

4. Borromini

San Carlo alle Quattro Fontane	1633-1667

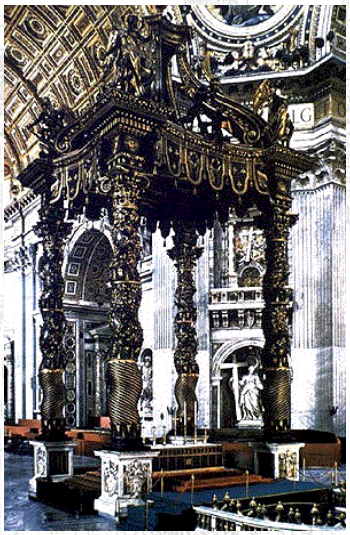


Figure 70: Altar Canopy, St. Peter's, Rome (1624)

BAROQUE AND ROCOCO ARCHITECTURE (FRANCE)

A. Influencing conditions of time and place:

1. Place:

a) location: Paris and Versailles

b) geography: Unified kingdom after 1500

c) materials: stone

d) climate: cool, dull light, northern climate

2. Time:

a) dates: 1600-1715: Baroque
1715-1760: Rococo

b) concurrent events: 1598: Edict of Nantes
1608: Champlain founds Quebec
1643-1715: Louis XIV reigns (Baroque)
1715-1774: Louis XV reigns (Rococo)
1763: British gain Canada for Treaty of Paris
1789-1795: French Revolution

c) social conditions: Military dictatorship
Absolute Monarchy
Struggle and strife
Baroque: formal, pageantry, pompous, public
Rococo: informal, intimate, casual, private

d) religious conditions: Edict of Nantes in 1598 gave religious rights and freedoms to both Catholics and Protestants

B. Needs: The absolute monarchs of the Baroque required elaborate palaces to express their supreme position and accommodate the pageantry of their courtly style of living. Middle class bourgeoisie required intimate Rococo salons, townhouses, apartments

C. Forms:

Baroque palaces: large, symmetrical, central entry and articulated corners
Grand scale and oval planning for pageantry
Rococo mansions: Smaller, more intimate in scale, asymmetrical planning

BAROQUE AND ROCOCO ARCHITECTURE (FRANCE)

D. Expression:

- French Baroque more restrained than Italian Baroque but more sculptural and decorative than the French Renaissance. Illusion was introduced by means of mirrors. French Baroque landscape was geometrical with axial vistas radiating from the main building
- Rococo interiors were more restrained than those of the Baroque, using light pastel colors, asymmetrical flowing lines and more intimate and delicate spaces

E. Architects and Buildings:

1. Perrault:

East façade of Louvre, Paris	1665-1770

2. J. H. Mansart:

Palace of Versailles	1678-1710
Dome of the Invalides	1693-1706

3. Le Notre:

Gardens of Versailles	1680-1700

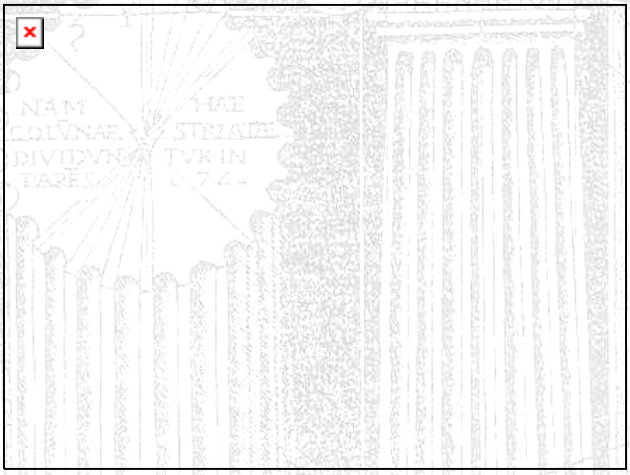


Figure 71: Original Palace of Versailles (1678)

BAROQUE ARCHITECTURE (ENGLAND)

A. Influencing conditions of time and place:

1. Place:

a. location: London

b. geography: isolation, maritime contact with European continent

c. materials: stone, brick

d. climate: temperate, humid, dull

2. Time:

a) dates: 1660-1760

b) concurrent events: 1560: Restoration of Monarchy
1666: London fire
1763: Treaty of Paris gives Canada to Britain
1776: United States declares independence
1768: Watt's steam engine completed.

c) Social conditions: Parliamentary system not permitted
Centralized, autocratic government
Continuity of English life from Renaissance times

d) Religious conditions: Glorious Revolution gave religious tolerance to all

B. Needs: Great Fire of London necessitated rebuilding of London and its many churches. Increase of prosperity required mansions for the wealthy class

C. Forms:

Refinement of simple geometric massing; spires on churches

D. Expression:

English Baroque not as sculptural as Italian; it was more restrained. Homes were designed more for comfort than pageantry, although symmetry and formality were characteristic

E. Architects and Buildings:

1. Christopher Wren:

St. Paul's Cathedral, London 1675-1710

2. Vanbrugh:

Blenheim Palace 1705

Castle Howard 1699

BAROQUE ARCHITECTURE

The period of Baroque architecture contains diverse areas of study, similar to the Renaissance. Baroque design led to new periods including Rococo and Georgian architectural styles. These latter two styles are somewhat sub-texts of the overall Baroque period, though they were sufficiently developed so as to warrant their own labels.

Baroque architecture began as a movement spurred on by social upheaval on all levels – spiritual, political and cultural. This period reflected an optimism which arose from a spiritual victory over the Protestant Reformation.

The Christian Church had decreased in power and influence during the Renaissance due to the focus at the time on Humanism and Mankind. It was during that time that the Protestant Reformation erupted. The values of the Christian Church had met with sufficient skepticism to produce a religious reformation movement. This movement challenged the Papacy and Christian Church, shaking it to the foundations of the belief system. Once again, the Christian Church survived this challenge to emerge as the dominant religion in the Empire.

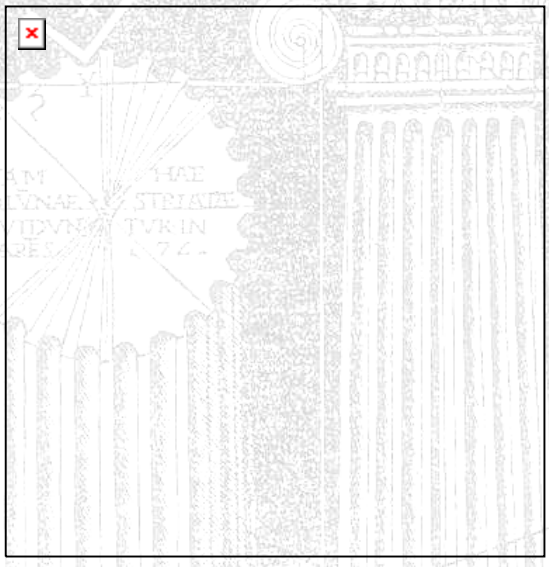


Figure 72: St. Peter's, Rome (1600)

At the end of the Protestant reformation, the Papacy was centralized in Rome. Spiritual values that had been challenged were now confirmed and reinforced. This reaffirmation of faith brought new power to the Church. New power meant new opportunities to build, especially for the purposes of the Pope and senior administration. New buildings were a clear means to assert and display the renewed power of the Church.

This period also saw great developments occurring in the field of science. A rational world was defined through the discoveries of Galileo, Newton and Kepler; scientists and philosophers who were solving the puzzles of the world and known universe. The theory of planetary motion relative to the sun was a critical development within the science of the times. The world and the universe were proven in mathematics, line and form. These forms became important elements within the new architectural designs.

Figure 73:St. Paul's Cathedral, London (1675)

Architecture had become international with distinct movements spreading throughout Europe as was seen by the overlap of Italian styles into France during the Renaissance. European countries from Italy to France, including England, Spain, Austria and Germany, as well as the New World of the Americas, benefited from the new design philosophies.

Michelangelo was the driving force in the development of the new style. He produced a radical, sculptural concept of architecture (a living form) that served as the departure from Renaissance styles.

Baroque design presented a fluid form and shape with expressive use of the oval, now known as the shape of the planet's pathways around the sun. The oval form symbolically linked the design scheme to the universal planetary pathway; an alliance with the heavens.

Baroque architecture served as an umbrella style under which a wide variety of design forms were assembled in previously unknown combinations. This style was much more interpretive and sculptural than the rigid mathematical forms of the Renaissance.

Figure 74: Orsan Michele, Florence (1650)

The term ‘Baroque’ was used to categorize the style of art and architecture that departed from the established norm, without a clear, rigid definition of itself. Baroque styling was dramatic and majestic with the use of illusion to create effects within the space. The lines of structure and sculpture were exaggerated to provide greater prominence. The combination of sculptural, expressive detail with fluid form and space created a new sense of wonder.

The Baroque style often appeared bizarre, grotesque, and even irregular when compared to previous classical designs. Baroque forms expressed ornamentation, promoted color variations, and used both direct and indirect lighting for theatrical effects. The key to fully understanding the design concept for Baroque architecture lies in contemplating the plan in conjunction with the presented façade. It is through this method that the grand, theatrical nature of the style can be seen.

The Baroque style also contained sub-styles of design development. These sub-styles presented variations of the overall Baroque philosophy. Variations were due to regional differences, stylistic desires and personal talents of the architects. The sub-styles included Mannerism, Rococo, and Georgian architecture.

Baroque Mannerism (Italy)

Mannerist designs adhered to one of two design styles – either copying or abstracting.

The copy style was produced by designers who were content to mimic (copy) the style of design from the Renaissance. This method may have been followed due to the reverence of Renaissance structures and the Renaissance architects. Many practitioners of this style were hard pressed to claim that they could actually improve on what may be regarded as a flawless design of Leonardo de Vinci or Raphael. The lack of confidence in the new design professionals led them to copy the original design.

Figure 75: Palazzo Medici Courtyard

The unique nature of the Mannerist copies is found in the absence of detail, plan form, or clarity of the completed structure. While these new structures were elegant and complete, they lacked the cohesion and originality of the original building.

The second movement of mannerism was the abstraction movement. This group would begin in the same manner as the copyists; however greater liberties were taken in the final building designs. Abstractionists used the classical elements and created variations of use, composition or placement affect change.

Figure 76: Entrance Facade (1733)

Classical forms were integrated with contrasting or complementary styles to create a new language of architecture. Columns were paired, windows previously centred on a grid system were shifted off-centre, pediments were raised, buttresses were added and new rhythms integrated into the buildings. This movement created a unity of styles previously unseen in a single structure.

These professionals were designing with knowledge gathered by training but incorporated intuition and skill to produce new, unique yet reminiscent building styles. There was a noted return in this style of elaborate surfaces, curved walls reflecting overall plan schemes, and scalloped or articulated cornices.

St. Peter's and the Capital in Rome are defined as achievements within the Baroque Mannerist styles.

Baroque Rococo (France)

Architectural styles of France experienced both the Baroque and Rococo movements during this period. These styles led a shifting movement in artistic design strength from Italy to France. Italy had led the design philosophy for architecture during the past 500 years. French developments in design style were now regarded as the lead proponent of architectural design.

The influence of French design is found in the overlap occurring near the end of the Renaissance. Italian artists were brought to France by the monarchy at that time. The skills and talents of these artists were assimilated into the French cultural style and re-emerged as a new design force.

French Baroque design presented a more restrained expression than found in Italian Baroque designs. The architecture of the time was a blend of Gothic and Renaissance styles. The Baroque styling took the current building forms and incorporated a highly decorative and sculptural resolution to the surfaces.

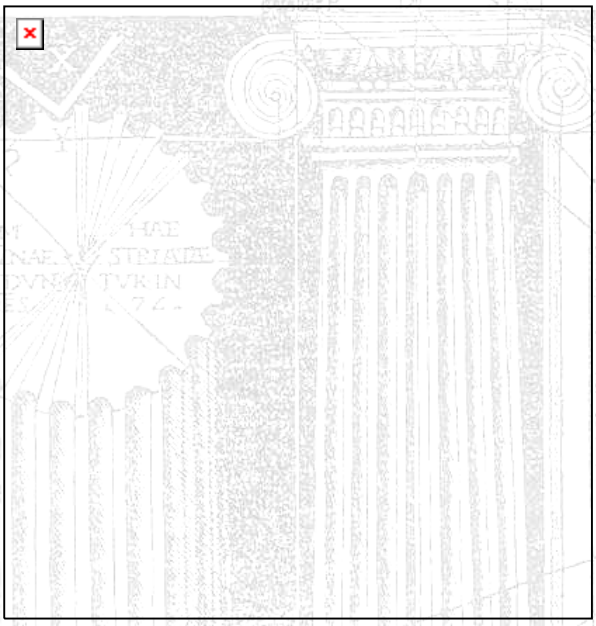


Figure 77: Chateaux Detail (1650)

Baroque was the style primarily used for palaces and mansions of the monarchy. Palaces were large symmetrical plans with an emphasis on a grand central entrance with increased depth and articulation of the façade (main elevation). The planning used the oval form extensively in laying out grand ballrooms and entries. This design method emphasized the expected pageantry of the space.

The concept of illusion was incorporated by the use of mirrors throughout the elegant spaces. The Palace of Versailles features a hall of mirrors, presenting a space that seemingly never ends.

Baroque designs extended into the landscaping, thus integrating land and building into the overall concept. Landscape design featured geometrical planning with defined views and approaches to the building. This manner of design is similar to the philosophy presented earlier with the Romans, whereby access to, views of, and overall affect of each building was controlled.

Figure 78: Versailles, France (1669)

Baroque Rococo design styles followed the main Baroque period. Rococo design styles were primarily used for wealthy citizens and gentry of the time. These buildings were mansions in their own right; however they were smaller and less formal than the Baroque palaces. Socially, it was not wise to possess a building of greater quality in design and finishes than the monarchy.

Figure 79: Rococo Detailing

Rococo structures abstracted the Baroque principles to use asymmetrical planning in the order of the buildings. The interiors were generally lighter in colour. The level of detailing was restrained to provide for intimate casual spaces as opposed to spaces designed for the pageantry of royalty.

Both design streams carried forward on the basic design themes. They presented a combination of various styles, carved relief and decoration, elaborate interiors and utilized wall murals to accentuate the space.

Baroque Georgian (England)

The Baroque movement expanded to England. It did not have the intensity of the Italian movement. English design styles presented a restrained solution, a more sober interpretation of the philosophy. The buildings constructed lacked the level of sculptural integration and detail as seen in Italian designs.

Figure 80: Gate, Chiswick House, England (1621)

English manors were designed more for comfort than royal pageantry. A sense of architectural formality was maintained. The use of symmetry was characteristic of structures during this period.

Figure 81: Queen's Banquet House, London (1619)

These design solutions provided the architectural field with the full spectrum of capabilities relative to Baroque styling. While Italian designs pushed the design limits, English designs integrated styles and classical elements to present a unified and formal appearance.

THE EIGHTEENTH CENTURY
(Neo-Classicism and the Industrial Revolution)

A. Influencing conditions of time and place:

1. Place:

a. location: France, Italy, England
b. geography: Central Europe
c. materials: stone, brick, wood
d. climate: varies depending on country

2. Time:

a. dates: 1760-1860
b. concurrent events: 1763: Treaty of Paris gives Canada to British.
1768: Watt's steam engine completed
1776: United States declares independence
1776 Book: Adam Smith's "Wealth of Nations"
1789 French Revolution
1806 Holy Roman Empire comes to an end
1859 Book: Darwin's "Origin of the Species"

c) social conditions:

- Disintegration of Renaissance, Baroque, Rococo system of social, political, religious way of life
- Political revolution
- Industrial revolution
- Religious and philosophical revolutions
- Industrial change produced slums, more products, generalization of taste and fashion, more secular way of life
- Adam Smith philosophy encourage exploitation of labour and universal education

d) religious conditions: Glorious Revolution gave religious tolerance to all

B. Needs:

New Building types:

- Factories, warehouses, rail stations, bridges
- Commercial: banks, stores, markets, offices
- Public: justice, parks, government, hospitals, hotels, resorts, libraries
- Mass housing becomes a new pre-occupation

C. Forms:

New aesthetic philosophy in the Picturesque style. Style incorporates the sublime, the picturesque and associatism

- Sublime: subjective reaction to aesthetic stimuli
- Picturesque – aesthetic ideal, pictorial representation
- Associatism: associating rejuvenated styles with historical references

These three items become more explicit, even forming a part of the building program

Sir John Vanbrugh:

Buildings of the distant past should be conserved because they inspire. "More lively and pleasing reflections on the persons who have inhabited them, on the remarkable things which have transacted in them, or the extraordinary occasions of creating them"

D. Expression:

- Rome becomes the emotional centre of Neo-Classicism
- Paris becomes the cerebral centre
- Picturesque style produced compositional assemblies, as opposed to the typical symmetrical buildings previously constructed
- The study and categorization of architecture leads to a greater awareness of the past.

E. Buildings:

Revival Styles and Examples:

- Neo-Classic: Pantheon, Paris
- Neo-Gothic: House of Parliament, London
- Neo-Renaissance: St. Genevieve Library, Paris
- Neo-Baroque: Paris Opera House

Figure 82: House of Parliament, London (1860)

THE EIGHTEENTH CENTURY (NEO-CLASSICISM STYLE)

The return of architectural design style to classicism, termed “neo-classicism”, (1756-1850) covered the period following the Baroque era. This movement was stimulated by many design and social shifts, as was seen in the previous periods.

Baroque design had reached its realistic limit, where the same ideas were being replayed with more and more dramatic flair. There was no room to grow in this style anymore.

Socially, the environment had changed due to changes in philosophy and the arts. Rationalism developed as a philosophical thrust. Music and art developed using Greek and Latin principles as the basis. The rules governing the arts steered towards clear guidelines and established principles.

Classical architecture was defined as the style in keeping with rational principles, with clearly defined rules regarding implementation. Roman architecture fit this definition with solid clarity.

Figure 83: Pantheon, Paris (1756)

Archaeology was now in practice, with the new discoveries of Roman and Greek ruins. These findings were studied in great detail to learn the principles and styles present in the antiquity.

Philosophically, it was felt that a revival of Roman architecture would revive the spirit present in the original Roman Empire; greatness, achievement, honour and glory. This philosophy was clearly a force in the design of Napoleon's Arc-de-Triumph, Paris (1806).

Neo-classicism provided the means to "revolt" against the current styles and authority of the governing bodies. The power of the people was the key element to spearhead beliefs in individualism, self-sacrifice, Spartan simplicity and heroism. All the beliefs may be linked directly to the foundations of the Roman Empire.

Figure 84: Interior of Pantheon

The new designs in neo-classic style rejected the frivolous, extravagant elegance of the court style. The desire was to reflect the clear, undisputed principles of the ancients – Greece and Rome.

Neo-classicism led to the development of sub-styles which included Romanticism and Eclecticism.

Romanticism approached architectural design with empathy for antiquity and a nostalgic appreciation of the greatness of Rome. Romanticism allowed for a discovery of other styles which could be integrated into the new designs.

Romanticism was a new attitude of integration, a reaction to the social, religious and political conditions of the times. The solidity and stability of the culture was revealed through a revival of architectural historical styles.

Eclecticism was a derived form of Romanticism, based on the integration of various details into the design solution. Eclecticism brought forth a style which "borrowed" ideas from different architectural styles to suit the current need. This style copied what was considered "beauty" in architecture to reinvent the molded-together forms.

Figure 85: Gate Houses, Paris (1785)

Eclecticism can be found in the application of Roman aesthetics (colonnades, facades, domes) on buildings based on current or recent styles. Combinations of styles were used to suit the ideology and type of building forms that citizens would normally "expect"; banks should be formal with Roman facades to denote stability and longevity.

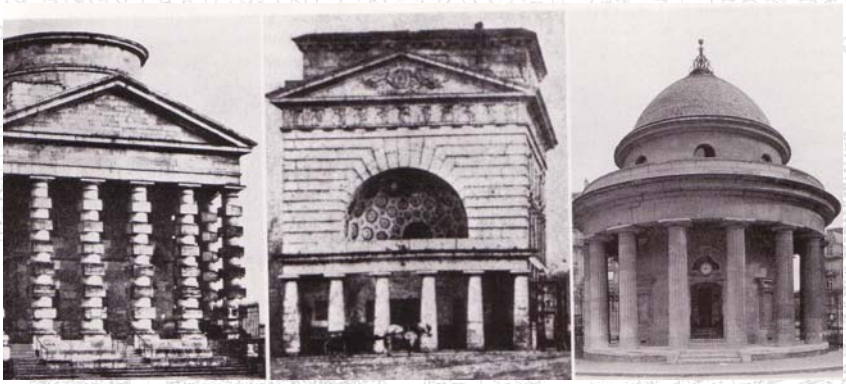


Figure 86: Gate Houses, Paris (1785-1800)

Revival movements of ancient styles flourished during this period. Each reinvented movement was categorized by the prefix “Neo” to denote application of the original style in a new setting. Examples of these applications included:

Neo-Classic:	Pantheon, Paris
Neo-Gothic:	House of Parliament, London
Neo-Renaissance:	St. Genevieve Library, Paris
Neo-Baroque:	Opera House, Paris

Social events redefined the entire cultural system of Western Civilization. Political revolutions changed the governing systems of nations such as the American Revolution (1776) and the French Revolution (1789). Religious revolutions took place as the decline of the Holy Roman Empire came to its end by 1806.

Philosophical changes occurred as new information and thoughts were published regarding society (Adam Smith, “Wealth of Nations”, 1776), and mankind directly (Charles Darwin, “Origin of the Species”, 1859).

Each cultural change contributed to the rise of Neo-Classicism through the disintegration of the social and political systems that supported the Baroque/Rococo design styles.

The greatest change of this period was the Industrial Revolution. Watt's invention of the steam engine (1768) provided the power required to mass produce. Adam Smith's writings advocated the exploitation of labour while providing universal education. Cities and towns swelled in population, now capable of providing available, expendable and cheap labour.

Figure 87: Opera House, Paris (1861)

The Industrial Revolution was the catalyst for creation of slums within the civic centres as the demand for centralized labour increased. The ability to mass produce products readily available for the consumer market created a generalization of taste and fashion throughout society. This mass production led to a more secular way of life. Neo-Classicism, especially Romanticism, provided a brief respite from the continuity and new-found drudgery created by undesirable social conditions. The architecture inspired through reference to what was considered a "great time' of mankind: architecture provided a link of history between the revered past and the despised present.

The disappointment in this period of architectural development is that no new styles, new movements or new growth in the architectural spectrum was achieved. Designs reached to the past, collected various elements and reflected typologies to reinforce the aesthetic of a time long lost.

THE EIGHTEENTH CENTURY (INDUSTRIAL REVOLUTION)

The industrial revolution changed the way of life in Western Civilization. It also changed the need for architectural design; causing a shift from buildings in the public domain (churches, monarchy) to buildings serving the needs of industry. There was an immediate need to provide commercial structures of all types.

Industry:	factories, warehouses, shipping stations
Commerce:	banks, stores, markets, offices
Civic:	justice, hospitals, hotels, libraries, resorts
Private:	mass housing to accommodate growth of the urban work force.

The effect of these requirements on architectural development was gradual; starting in programming, then construction, and culminating in new monumentality dedicated to the spirit of industry.

The knowledge base of architectural doctrine had grown immensely through extensive study of historic styles and philosophy:

- Individual thought, action and achievement had been promoted through the Renaissance.
- Reason was cultivated with emotional experience promoted through the age of enlightenment.
- Historicism provided a variety of styles to suit the tastes and needs of the patron/client.
- Classicism and classically derived styles presented a direct historic link to antiquity. This desire for a link to antiquity promoted a revival of the philosophy of Palladio. Palladianism dominated the English design spectrum well into the mid-Eighteenth Century.

Formal architectural education and study was active and developing toward a high degree of sophistication and knowledge. There was a new precision involved in researching and dating the various historical styles that were being revived during this period.

Ancient Rome became the intellectual, emotional and material centre of the new design philosophy; present day Paris became the cerebral knowledge centre for the time.

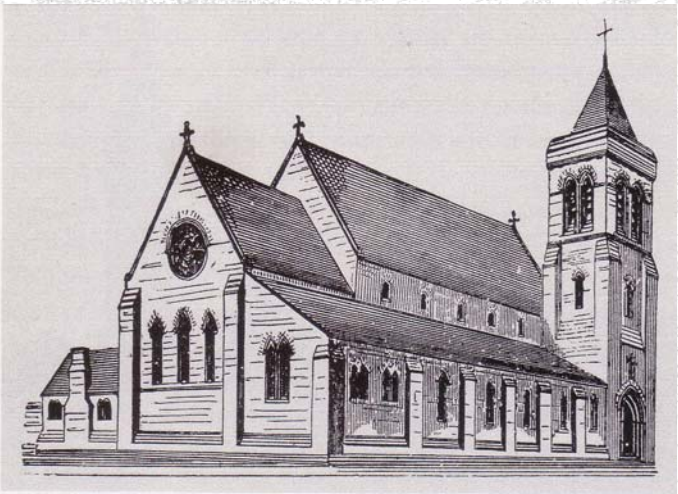


Figure 88: St. Wilfred, England (1839)

A new aesthetic philosophy developed. This philosophy based architectural design on its ability to respond to these criteria:

1. The sublime: the subjective reaction provided by aesthetic stimulation.
2. The picturesque: the overriding aesthetic ideal to be reflected in the building's character.
3. Associatism: the use of detail and design elements to provide for sublime reactions while maintaining a high aesthetic appearance through the picturesque application.

These three elements gathered ideological strength during this period, and became a part of the criteria required to complete a building design program.

By application of this aesthetic philosophy, this style is considered “Picturesque”. Picturesque designs presented the concept of architecture as an expression of literary ideas, images and values. The building designs produced compositions directly opposed to the rigid formality of symmetrical Palladian structures. The picturesque style emphasized irregularity and variety for the purpose of interest and variation in the building form. The architectural design for a facility adopted a new artistic, compositional tune.

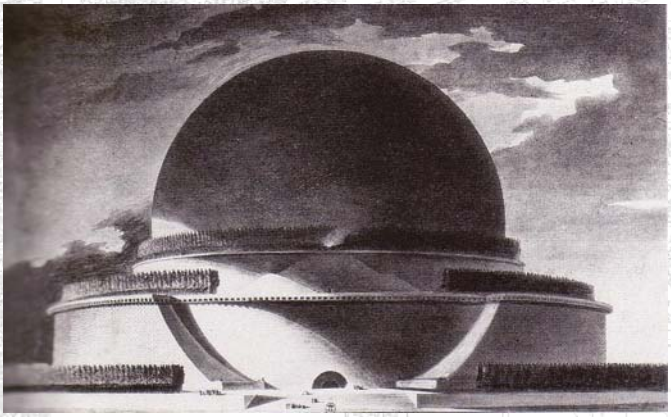


Figure 89: Newton's Cenotaph, Paris (1783)

Design ideologies changed, branched and developed new styles based on old principles. Architects were free to experiment and push the limits of rational design in an effort to develop new styles. Visionary architects, maintaining a practice, were free to compose and create new styles based on the old models. Etienne-Louis Boullee was a classic visionary of this time who thought outside the standard design ideology. The challenge to push architectural philosophy beyond contextual limits allowed Boullee to investigate, assemble, and propose new typologies in building design.

The use of individual architects by wealthy patrons continued through this period as styles and talents were defined relative to the design philosophy of the architect. Each architect was an individual unto himself. Many felt strongly enough about the clarity and purpose of their philosophical direction to publish writings relative to the architectural requirements of what they felt was the governing, proper architectural form.

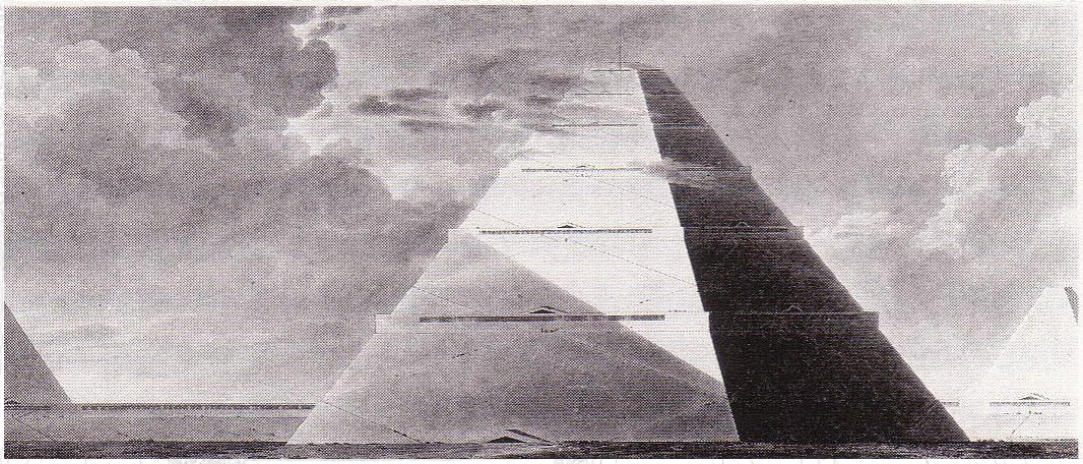


Figure 90: Egyptian Style Cenotaph (Boullee - 1783)

THE NINETEENTH CENTURY

A. Influencing conditions of time and place:

1. Place:

a. location: Western Europe (France, Germany, England)
United States of America

b. geography: flat lands

c. materials: stone, brick, wood, steel and glass

d. climate: temperate climate

2. Time:

a. dates: 1800-1900

b. concurrent events: 1806: Downfall of Holy Roman Empire.
1816: Downfall of Napoleon Bonaparte
1819: Formation of Ecole des Beaux Arts
1840: Ferroconcrete created
1848: Communist Manifesto Published (Marx)
1871: The Great Chicago Fire
1876: Telephone invented
1879: Edison perfects the electric light bulb
1885: Benz develops gas automobile
1886: Aluminum sheet metal developed
1887: Electric elevator produced

c) social conditions:

- Growth in International economies
- Expansion into United States of America
- Divergent schools of thought and design created
- Splits occur in design ideology
- Industrial revolution in full swing
- Industry takes charge of social development
- Growth of urban settlements
- More wealthy middle class citizens
- Growth in regional and national governments

d) religious conditions:

- Church decreased in power as governments increased
- Church is a stable entity but not governing
- Industry, commerce and wealth the new "religion"

B. Needs:

- Factories
- Libraries
- Public Amenities (Opera Houses, Museums)
- Government facilities (Parliaments, Regional Offices, Schools)
- Business blocks
- Apartments and mass housing to serve industry locations

C. Forms:

- International Neo-Classicism: Return to Roman and Greek style
- Ecole des Beaux Arts: Formality, Roman influences
- Victorian Gothic: Return to Queen Anne (Shingle) style of articulation and decoration – primarily residential
- Steel forms take precedence in new engineering triumphs

D. Expression:

- Steel and concrete design bring new forms to old design methods
- Housing regarded as romantic, Industry regarded as technological
- Government regarded as formal (Roman/Greek appearances)
- Skyscraper designs appear in United States

E. Buildings:

- Ste. Genevieve Bibliotheque, Paris (1842)
- Crystal Palace, England (1851)
- Trinity Church, Boston (1872)
- Eiffel Tower, Paris (1887)
- Wainwright Building, St. Louis (1890)

THE NINETEENTH CENTURY

The Nineteenth Century marked more dramatic changes in society and architectural design.

Europe underwent extreme social change due to several key events:

- The downfall of the Holy Roman Empire (1806)
- The downfall of Napoleon Bonaparte (1815)

Society struggled between maintaining tradition or embracing innovation. This struggle was between social classes as well as design styles. The past reference for buildings became a fixed anchor in what was regarded as 'society in flux'. The world remained in a process of disruptive change and conflict; maintaining historic styles was a means to establish solidity of presence in the building.

Figure 91: Ulm Cathedral, Germany (1877)

Three stylistic currents emerged during this period:

1. International Neo-Classicism
2. Ecole des Beaux-Arts style
3. Victorian Gothic

INTERNATIONAL NEO-CLASSICISM

International Neo-Classicism style was carried forward from the Eighteenth Century design style. The International movement of this style traveled across Europe and the Atlantic Ocean, establishing itself within the United States.

The United States lacked precedents for style or tradition. The reigning styles were brought over from Europe through a transfer of ideas.

The English Georgian style was the first style applied to monumental structures within the United States. It was a conservative blend of Neo-Palladianism (based on the design style of Palladio) with Neo-Classicism, the reigning style of Europe.

Figure 92: Meeting House, Lancaster (1815)

The United States eventually modified the blend of styles to create a hybrid form. This blended style was termed “Federalist” due to its extensive use on federal government buildings. The Federalist style was a blend or mix of Neo-Classicism with Roman and Grecian overtones. The philosophy and historicism relative to these cultures were the dramatic overtones related to Greece, combined with a theory of government for the people based on the Roman senate concept.

THE ECOLE DES BEAUX-ARTS STYLE

Paris was the site of one of the first architectural schools – the Ecole des Beaux-Arts, established in 1819.

The school was originally conceived in 1671. Its intended purpose was to promote and establish architectural ideas through the study of the five orders of architecture: Tuscan, Doric, Ionic, Corinthian and Composite.

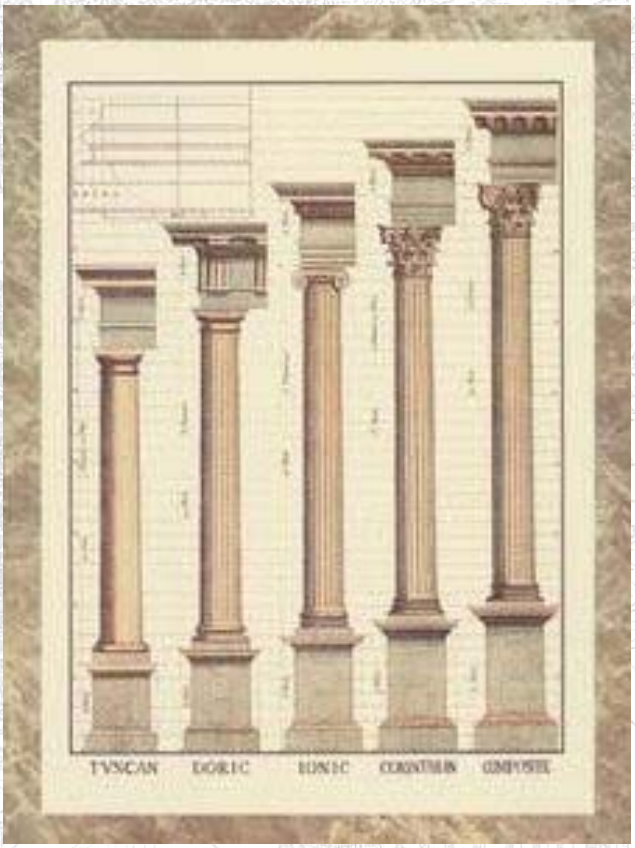


Figure 93: The Five Orders of Architecture

Experience was also gained through study of Roman and Renaissance designs and structures. Each year, one student was selected through competition to study in Rome. This prize was known as the 'Prix de Rome', a highly prestigious award.

The school ran a tough, in-depth educational program of study spanning nine years. The first four years involved study in Paris. Study involved theory in the classroom with design technique gained through work in Ateliers (studios of the Masters) and competitions. The basis of the school was highly conceptual drawings with a clear focus on draughting techniques.

Figure 94: Ecole des Beaux Arts (1836)

The Prix de Rome was won by the top student of each year. The competition was intense as this prize would enable further study and prestigious promotion. The prize involved five years of study in Rome:

- Years 1-3: involved completing analytical studies of ancient buildings in and around Rome.
- Year 4: the student would complete a full drawing reconstruction of one ancient building.
- Year 5: the student would complete an original design for the entire scheme of a new building.

Upon completion of the studies in Rome, an exhibition was held which profiled the student's educational career and subsequent graduation from the school.

The school promoted study of architecture, painting and sculpture. Two principles formed the core of the educational curriculum:

1. Abstract and Conceptual concepts: These concepts created the building's ordered scheme in plan and elevation (footprint and façade).
2. Functional and Experiential concepts: These concepts involved the theoretical movement of the participant through the building.

Figure 95: Cours du Murier Courtyard (Ecole des Beaux Arts)

Architecture was primarily to be experienced aesthetically. A key structure completed under these principles is Ste. Genevieve Bibliotheque (Library), designed by Jacque-Germaine Soufflot in 1842. The Paris Opera House is also regarded as the epitome of philosophy and civic design relative to the principles of the school.

Figure 96: Ste. Genevieve Bibliotheque (Library) (1842)

Key elements of the educational curriculum include:

- The Parti: taken from the French (prendre parti) meaning to take a stand, establish a philosophical position. This position would relate to the solution of the basic scheme for the building. It is to form the meaning of the plan's resolution. The fundamental solution of the functional program also related to the Parti. How the elements and features of the building tied together related to the essential concept (parti) of the solution.
- The composition of the design: This item was concerned with the detailing of the Parti. It involved the distribution and arrangement of the elements, their articulation and link into a cohesive whole; a total building based on a solid theoretical concept.
- The Point: The principle volume of the building.
- Circulation: The network of access and movement involving corridors, open spaces, and entry points.
- The Grid (known as the mosaique): This item referred to the structural and geometrical layout of the building's design system.

- Le Grande Marche: This item related to the imaginary experience of walking through a building; the experience of the building known by the architect prior to construction. Typically the building was perceived as a sequence of architectural images, an ordered series of tableaux illustrations.

These key points were the basis of the education received at the school. The overall education theory combined with the student's experience in the Atelier system, and finalized with the experience in Rome was felt to fully prepare the candidate as an architectural practitioner.

Figure 97: Cour Vitree (Exhibition Court) Ecole des Beaux Arts

The Ecole des Beaux-Arts remained the premier architectural educational program for almost 100 years. The Ecole style was principally based on proportional design and massing techniques as evidenced by the Renaissance. The basis of the education received at the Ecole was Roman/Renaissance, thereby leading the majority of their students to produce works based on these principles.

THE VICTORIAN GOTHIC STYLE

The Victorian Gothic Style was based in England. Architects in England lacked the formal training process that the Ecole provided in France. English studies were based on training acquired through apprenticeship in the offices of the Masters of England.

This process of training produced a greater number of successful practitioners each year than the Ecole's one solitary yearly graduate. The training process differed between offices, which also provided for freer association of design and stylistic modification by architects. The English graduates learned in different ways and at different rates whereas the Ecole provided a solid fixed curriculum. English architects produced a large number of buildings with far greater range in styles than those found under the previous two styles existing at the time. Two key figures emerged from the English training methods – Augustus Pugin and John Ruskin.

Figure 98: St. John the Baptist Hospital (1839)

Augustus Welby Northmore Pugin learned gothic detailing from his father who was a professional illustrator and draughtsman. During his career, Pugin published two works on architecture. He advocated Gothic design as the true style of design. Each functional part of the design must present the necessary volume and plan. The design solution must assemble all the individual parts in an orderly fashion. No traditional faces were used in his designs.

The architecture of Pugin used neither symmetry nor pictorial asymmetry. His architecture was derived from function to plan, from plan to volumes and massing, to the formal articulation of the final product.

John Ruskin, a contemporary of Pugin, was primarily an art critic and promoter of artistic endeavours. He produced two major literary works relative to architectural design of the period. The key literary work was "Seven Lamps of Architecture" published in 1849. Ruskin maintained that good architecture results only from good men involved in true, honest work within the context of a healthy society. He believed decoration was the element that distinguished architecture from basic construction. It was Ruskin's contention that the creation of good buildings could confirm and contribute to the improvement and goodness of society. He promoted style along the lines of Eighteenth Century Picturesque.

The search for style dealt with two critical issues: whether to create a new style or select an existing one. It was recognized that style is evolutionary, based on preceding types. Architectural design during the mid-point of this period took a "back seat" to engineering triumphs (the Brooklyn Bridge, New York City and the Eiffel Tower, Paris)

Figure 99: The Eiffel Tower (1887)

Philosophy and science once again contributed to the development of the architectural profession. Men such as Hegel, Marx and Darwin initiated scientific scholarship that lead to a new clarity of styles. Technology provided the means to construct new designs in iron, steel and glass. Copying old styles produced tensions between the old ways and the new results.

Architecture during this period was distinctly affected by the changes in technology. The Industrial Revolution provided the means and methods to mass produce steel. It was this opportunity that changed the dynamic of architecture.

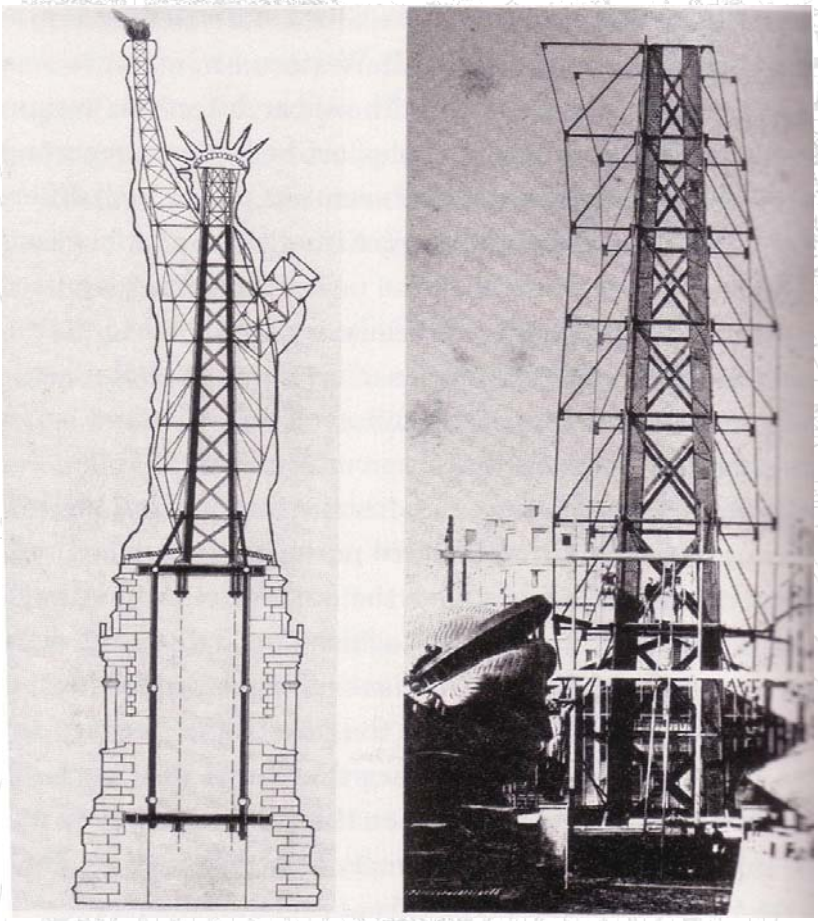


Figure 100: The Statue of Liberty (1876)

Steel was a composite material milled through heat and a mixture of compounds. Three types of differing materials were created through the industrial process:

1. Cast Iron: cast iron is the basic type of the three materials. Cast iron members were heavy steel, rough in appearance and extremely strong. Cast iron as a material though, was hard and brittle, with a defined breaking point. Cast iron would not bend or flex; it would break and fail once the weight load exceeded the beam's capacity.
2. Steel: steel was considered the middle product produced through the milling process. Steel is heavy like cast iron but not to the weight extremes. Steel remains quite flexible. It demonstrates the ability to carry heavy loads. Steel will flex under loading, bending to the point of failure. Steel, however, does not break as cast iron would. Steel will bend under failure, still retaining some local bearing capacity. Steel's ability to be cast in light or heavy members, excellent loading capabilities, and ease of installation made it a very useful material in construction.
3. Wrought Iron: wrought iron is the softest of the three materials created by milling. Wrought iron is considered malleable and flexible, perfect for forming into decorative shapes. However, due to the "soft" nature of this material, it is not suitable to carry loads as steel or cast iron could carry. This material was primarily used for finishing, decorative, or light duty functional purposes. Uses of this material include fences and gates, scroll work, and metal articulation on wall surfaces.

Cast iron was the principle choice of materials during this period. Its reign as the primary structural member lasted until 1880. By that time, the process of milling steel members had advanced to the point where quality control allowed for greater precision during production.

Cast iron was most commonly combined with large expanses of glass to produce striking structures. These structures, such as the Crystal Palace (1851) were unique in an environment which had previously only known stone construction. The new method was almost transparent. The exposed structure reflected the earlier rib vaulting aesthetic without resorting to decoration or frivolous attachment.

Cast iron was problematic due to its breaking point weakness. It was highly susceptible to complete collapse during fires. Cast iron was mostly used in the construction of factories and markets but it also saw use in the construction of offices and even cathedrals.

Steel advanced construction methods rapidly, once the milling process was perfected. Methods developed through which to enclose and fireproof steel members, thus protecting the building and owner's investment from the inevitable collapse during a fire.

Figure 101: The Crystal Palace, London (1851)

England led the way during this period with advances in production and milling of structural members. England also produced some of the most striking examples of the new construction. France followed England's design lead through engineering triumphs in steel such as the Eiffel Tower and the Statue of Liberty (designed by Gustav Eiffel).

Concrete was an ancient construction material that underwent a significant change during this period. The early concrete mixes had been developed by the Romans. No significant changes had occurred to this material until 1821, when the mixture of Portland cement was created. Portland cement provided greater strength, durability, and fire resistance than the ancient lime cement mix of the Romans.

Steel was an advance in 1840 for the use of concrete. Steel bars could now be mass produced for use in concrete assemblies. Steel bars were incorporated into the concrete casts to compensate for the inherent weakness of concrete.

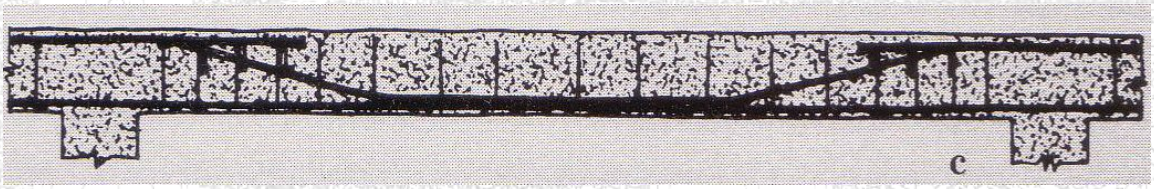


Figure 102: Steel-Concrete Design (1870)

Concrete has an incredible compressive strength. Concrete, however, is brittle when it comes to tensile strength (bending or twisting). Steel was included with concrete in order to allow for tensile forces without the concrete failing.

Prior to the Nineteenth Century, structural forces were gauged or established by experience. Designers had learned through many failures how to compensate for structural loads and forces. The thickness of load-bearing walls, the angle and spacing of buttresses, and the overall structural composition had always been approximated.

Science had progressed rapidly starting at the end of the Eighteenth Century to the point where exact knowledge could replace the guesswork in structural design. The science of statics, laws of forces and weights, combined with gravitational calculations were developed from Newton's laws. These formulas became the basis for new architectural standards. A new profession emerged through the training and application of this new knowledge; the profession of civil engineering. The process of structural engineering relative to construction was now removed from the architect's responsibility. The responsibility passed to the new professional engineers.

Theoretical design conflicts emerged with the new discoveries of concrete (now known as *ferroconcrete*) and steel. The formal design system of the Greek and Roman cultures was invalidated by these new materials. Concrete could be cast in different ways, carry different loads, and be used more sculpturally. Steel could span greater distances than the arch, carry heavier loads, and yet produce a "lighter", less weighty structure. The use of steel and iron challenged the previously fixed proportions of columns and beams visually, as steel did not need the mass or proportional scale of masonry construction. Construction occasionally had to add steel members to present the appearance of heavy support when in fact additional support was not required. The base of the Eiffel Tower had additional arches installed in order to appease the public perception that the lightweight base was not stable.

Figure 103: Base Detail, Eiffel Tower

Nineteenth Century architects responded to the new design opportunities in three ways:

1. Substitution: designs merely substituted new structural materials where old forms would have been. This method produced copies of original design forms using the new materials.
2. Modification: designs were based on the older forms in shape and aesthetic, however the designer had freedom to exploit the new strength and opportunities. This exploitation led to abstraction of the old form into a new, yet recognizable structure.
3. Creation: designers used the opportunities presented by the new materials to redefine the aesthetic in brand new forms. These new forms could be:
    - pure engineering solutions (bridges);
    - formalist inventions (modernism style); or
    - a combination of historical styles, modified to suit the material's strengths.

Figure 104: Forth Bridge, Scotland (1882)

The creation of new design forms may either hide the overall structure (Statue of Liberty) or combine an internal steel structure with an external masonry shell. Variations of this type abound.

MODERN ARCHITECTURE

The rise of Modern Architecture came about due to a break in historicism. The design style was used to break the bonds with the past and establish a new aesthetic based on new materials.

Intellectual shifts occurred in philosophy and the study of evolutionism. Mankind could adapt to a rapidly changing environment. A new philosophy based on the individuality of mankind (Individualism) developed. This new philosophy is similar to the Humanist philosophy that emerged during the Renaissance era.

This philosophy focused on the ever-increasing achievements of mankind – telephones, steamships, motor cars, trains, and even airplanes. It reflected a new age of technology and design; a new spirit of man. The industrial revolution had been tamed by mankind. The production of new materials with boundless possibilities was at his disposal through the use of the machine. Philosophical thought went so far as to view the human body relative to a machine. The human body does its own repairs, sees to its own maintenance and fueling and has the capability to produce new machines (babies) to sustain the population.

Architecture had taken on diverse styles with philosophical approaches at either end of the design theory. Several key architects emerged as leaders in the field with their own philosophies regarding design.

Le Corbusier was one of the first early modernists. The bulk of his career and achievements is reviewed under the next chapter. Le Corbusier believed that the machine aesthetic (to look like or mimic in appearance) was the proper solution for a new architectural design style. Buildings did not have to function or operate like machines, but they should reflect a “machine-like” appearance to make the most out of the new materials.

The “machine-like” style idiom became the core design philosophy for Modernist Architecture.

Eugene Emmanuel Viollet-Le-Duc, a French architect, was an early proponent of Modernist theory. He studied the historic building forms, especially Gothic architecture, to analyze the buildings in terms of structural stability, relevance and basic building form. His theories proposed rationalism in architecture to incorporate the structural aesthetic in the building.

Viollet-le-Duc concluded that Gothic Architecture was the most effective way to build a church with stone material (maximizing light and height). He also concluded that iron should not be used to fake ancient shapes. It was his belief that shapes which were highly efficient for stone (the best material available in the Middle Ages) were not suitable for iron. His use of decoration on a building was one where the use of a decoration kept the structure visible. Viollet-le-Duc never applied his theories but several of his proposals for iron structures where built by Art Nouveau architects.

Figure 105: Art Nouveau Metro Entrance, Paris (1900)

Figure 106: Queen Anne Style House (1890)

England, having led the field in structural steel advancement, now experienced an aesthetic backlash against the modernist movement. This response developed a new design style based on models constructed during the reign of Queen Anne, in the Seventeenth Century. This new design style adopted the name of 'Queen Anne Style' for the historical reference period.

The nature of this design was a Gothic style modified to present a simpler, less intricate form. The Queen Anne style was transported to America where its modifications presented it with the new name of the "Shingle Style". This design style was greatly sought after by the wealthy as part of their desire to retain or emotionally return to the elegance of the period.

The use of the 'Shingle Style' throughout the United States required modifications to its basic building materials. This stylistic approach, coming from the English also underwent sociological change.

Basic construction changes substituted the use of local, available materials (wood framing and exterior finish materials) for the historic use of materials (tile walls and clay forming).

The sociological change was related to the different cultures between the United States and England. The new American family was more open and tolerant and a more democratic unit when compared to the British model. Due to the open, tolerant approach, the requirement for a separation of household members was removed. This integration enabled the application of an open planning concept in single family housing.

Figure 107: Trinity Church, Boston (1872)

A combination of the English styling, together with French schooling, is found in the American architect, Henry Hobson Richardson. In a country lacking historical precedents, H. H. Richardson became the first American architect to establish a personal, individualistic style of architectural design. H. H. Richardson was trained at the Ecole des Beaux-Arts before establishing his practice in the Boston area. His styling was a combination of French Gothic with High Victorian English. The resulting designs were monumental and forceful in their composition. These styles were aptly named “Richardson Romanesque”.

It is an interesting study in the definition of styles when relating to H. H. Richardson. Here was a man trained in France, producing combinations of French/English-based designs, yet he is tagged with Roman influences, through the ‘Romanesque’ term. His architecture reflected the solidity, strength and apparent endurance of the Roman themes, thus the designation "Richardson Romanesque" accompanied his designs.

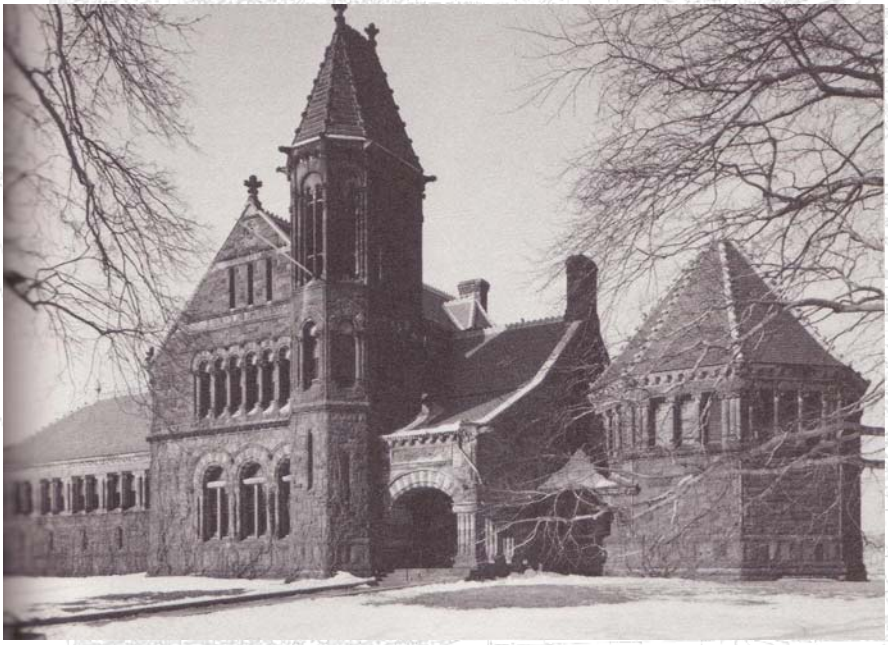


Figure 108: Winn Memorial Library, Woburn, Mass (1876)

The emergence of individual architects practicing Stateside soon exploded. This dramatic shift in the recognition of architects was combined with what was considered a catastrophe for a city, but was an incredible opportunity for architecture.

The Great Fire of Chicago in 1871 left a thriving city desolate. Commercial spaces as well as residential accommodations had been wiped out. This event provided a clean slate for the architects to show their design talents. The architects of the era responded to the challenge. Their efforts did not disappoint those ready for a change.

Chicago experienced an economic and social boom during this period. Land prices climbed astronomically, especially in the downtown business district. The need to maximize rentable floor space on less land was crucial to the developers. The architect's solution to serve this need was to design vertically. The first "high-rise" structures began.

Figure 109: Reliance Building (1894)

The advancements in steel manufacturing greatly aided the new design style. Steel structures could be fireproofed, easily erected and provided a very quick (relatively speaking) construction schedule.

A further advancement in the exterior wall system also carried the vertical thrust. Curtain-wall systems were created. These exterior wall systems were bolted to the steel frame at the outside edge of the floor plate. These systems helped to speed construction through mass production of their components. They also helped the developer by having only a minimal impact of the lower level floor areas, thus leaving more square footage open for renters.

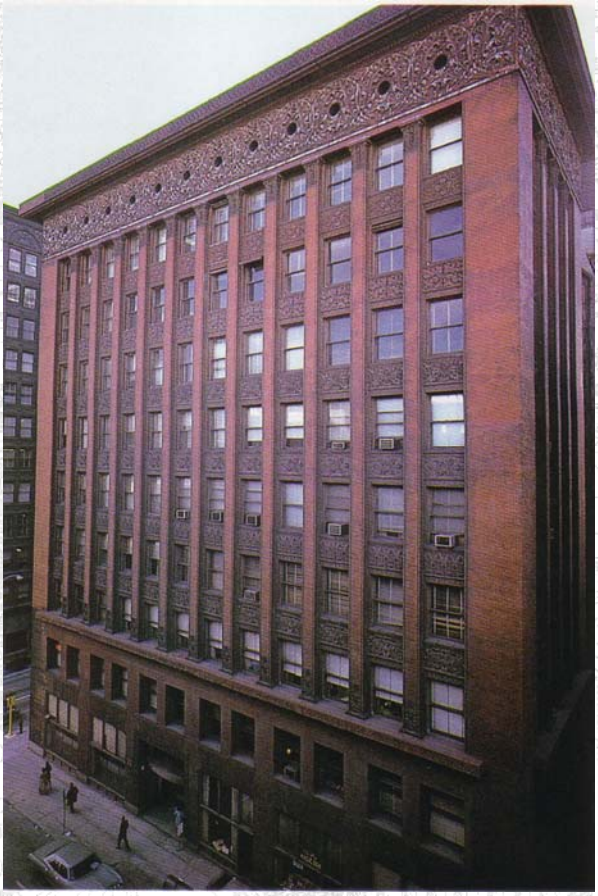


Figure 110: Wainwright Building, St. Louis (1890)

THE TWENTIETH CENTURY

A. Influencing conditions of time and place:

1. Place:

a. location: Western Europe and North America

b. geography: varies depending on country

c. materials: unlimited: stone, brick, wood, steel, concrete, metals, glazing

d. climate: varies depending on country

2. Time:

a. dates: 1890-2004

b. concurrent events: 1897: Chicago World's Fair
1900: First escalator used in Paris
1914: World War I Conflict
1917: Bolshevik Revolution (Russia)
1929: Stock market crash
1933: The Great Depression
1939: World War II Conflict
1965: Vietnam Conflict
1988: Collapse of Berlin Wall
1988: Collapse of Russian Empire

c) social conditions:

- Growth in Western lifestyles
- Gap between wealthy and poor increases
- Residential diversity increases
- Mass media, internet usage
- Global village shrinks

d) religious conditions:

- Church essentially powerless
- Icon of Church remains, attendance waxes and wanes
- Struck by scandal and suspicion

B. Needs:

- Urban development
- Transportation facilities
- Increased social housing
- Government offices and service centres
- Suburban developments
- Shopping malls

C. Forms:

- Unlimited
- All streams of architecture noted previously remain, developing divergent streams of thought

D. Expression:

- Unlimited. Expressions vary depending on use and users
- Corporate expression maintain in Western cultures

THE TWENTIETH CENTURY

The Twentieth Century brought forth a dramatic shift in architectural design and philosophy. Changes occurred at a rapid pace throughout the Western World. It had taken the Renaissance movement nearly two centuries to spread from Florence through western civilization to England. Changes in design style, philosophy and construction moved from their place of origin within months.

Society and the general populace were slow to embrace the new ideology. There was a general tendency to cling to the past as a comfortable known entity.

Technology allowed for great leaps forward in design and style development. The use of iron, steel, glass, and the new concrete technology (previously known as 'ferroconcrete') was abundant and unrestrained in the new design styles. Concrete was expressly used as both a form generator as well as a finished surface.

Figure 111: Goetheanum Centre, Dornach, Switzerland (1924)

Technology led many designers to focus on the philosophy that a structure should reflect the needs of the users, without adding decoration or stylistic appearances. Designers also felt that the structures should reflect the new technology in appearance by exposing structure and materials. Symbolism in this form was merely implied through the building design, though it was often not readily apparent.

The styles and techniques applied during this time varied greatly. Previous chapters were able to focus on the governing style of the period (Gothic, Romanesque, etc.). This period of architectural development branched out in many different directions according to the individual philosophies of the respected leaders of each movement.

It is somewhat difficult to group all of the practicing architects of the period under a limited number of headings. The simplest method is to create the general categories consisting of four prevalent styles during the period. These four basic design approaches are:

1. Organic: architecture is based on human scale. The structure must be designed in harmony with nature. Materials are used solely for their intended purpose and function. Ornamentation is either eliminated or minimized in order to allow the true form of the building to show.

Figure 112: Michaelaplatz Store (1910)

This category relates to the architecture of Adolf Loos, practicing in Europe. He proposed a link between ornamentation (the addition of elements for decorative purposes) and a crime upon the honesty of the structure. His philosophy was clearly expressed through the publication of his treatise on architecture entitled “Ornament and Crime”.

2. Mechanical: The architecture of the mechanical designers saw buildings as machines for use. This philosophy was applied to the building regardless if the function was a church, factory, house, or office complex.

The architecture generated through this style is commonly referred to as the “International Style”. It is a style without contextual reference to culture, country or local custom. Steel frames with glass skins were the epitome of this style. Ornamentation was abandoned as it did not reflect the necessity of the structure.

This architectural style lives on in modern-day designs. At the time of its generation, it was quite unique. The movement known as “Futurists” was spawned through this philosophy. Antonia Sant’Elia was a key figure within this movement.

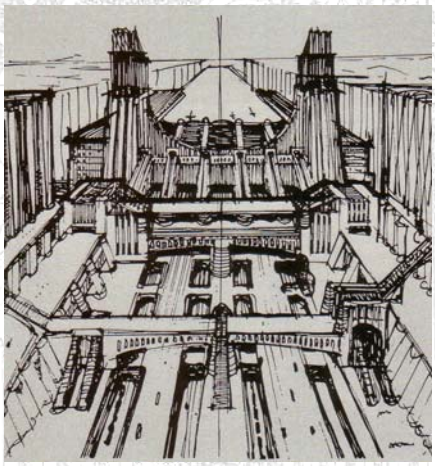


Figure 113: Milan Central Transport Station (1914)

Sant'Elia's philosophy, known as "Futurism", drew inspiration from the new mechanical world being experience at the time. He believed that since the ancient cultures took their inspiration from the world during their time, therefore it was right to do the same now. New architecture should be a part of the transitory experience, in keeping with the theory of movement and change. Architecture, like machines, should always be kept in a state of perceived motion.

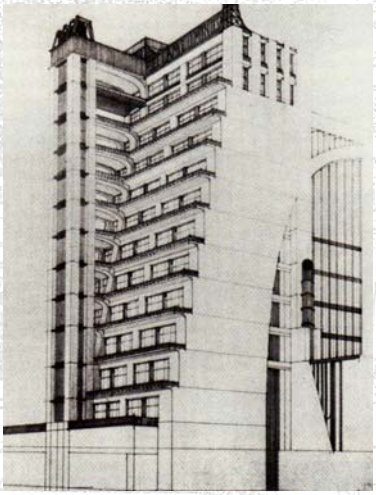


Figure 114: Proposed Apartment (1914)

The designs produced by Antonio Sant'Elia were incredibly complex in the level of foresight he applied. Cities and developments designed using his philosophy were designs planned for movement. Architecture should be integrated with the technology of vehicles, trains, airplanes and motion. His designs integrated all modern-day facets of life at the time. It is unfortunate that the vision he possessed died with him during World War I in 1916. His death spelled the demise of the Futurist movement.

3. Sculptural: The sculptural movement applied a more artistic approach to design. These practitioners focused on the line and form of the building, rather than strictly the practical means of construction. There was a curvilinear aspect to the work, similar to organic but abstracted to deliver the building almost as a piece of sculpture. This movement provided the basis for the 'Expressionist" movement, begun in Germany.

Germany was nearly a dead society at the close of the First World War. The goals and values of the people, along with the physical environment, had been destroyed by the ravages of war. This destruction provided the opportunity for architects to create new forms, reflective of the culture in an artistic manner.

The theory of the Expressionists was that a better world may be stimulated and achieved through better architectural design. Architecture was felt to embody the powerful emotions of society. The designs for new architecture focused entirely on reflecting these emotions. Structures such as Einstein's Tower (Potsdam, 1920) are indicative of this movement.

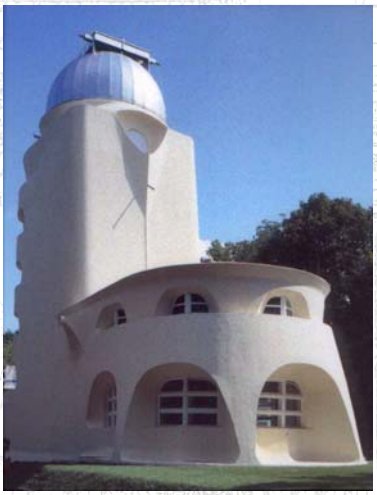


Figure 115: Einstein's Observatory, Potsdam (1921)

An interesting fact of these developing theories is that architects could move freely between the various movements. Ideas and philosophy were shared, debated and incorporated as the intellectual groups swelled and diminished depending on their strength at the time. These exchanges of theory allowed for variations of design to occur; mixed breeds of architecture developed as styles and talents of the individuals were honed.

Figure 116: Chapel at Ronchamp (1950)

Le Corbusier was one such architect who could easily move between differing or complementary groups. His early designs were purely machine-based, coming from his philosophy that “houses were machines to live in”. He was also adept at applying sculptural philosophy success. This success is evident in the Notre Dame du Haut Chapel at Ronchamp.

4. Art Deco (Art Nouveau): The fourth category is in contradiction to the earlier three. Art Deco styling saw a return of symbolism and decoration. The symbolism was often taken to extremes in plan and elevation.

The Futurist and Expressionist movements were early influences on the development of the Art Deco style. It is interesting to note that the development of this fourth style parallels previous periods of architecture. In previous periods the governing style would be adopted and applied until a backlash would occur, contrary to the governing architectural philosophy.

Art Deco is a reaction to the previously-noted three categories. The initial movements did away with ornamentation and unnecessary decoration. Art Deco brought ornamentation back with a vengeance. This style may be likened to the Rococo movement. Art Deco is much more open and fluid than designs seen from the Rococo period.

Figure 117: Chrysler Building, New York (1930)

Art Deco styles presented a translation of two-dimensional patterns into architectural design and décor. This movement was a more organic interpretation of fluidity in building design than other styles of the time. Simple examples presented symmetrical planning with decorative forms included in the building's finishes. The extreme example of this category is seen in the work of Antonio Gaudi of Spain.

Antonio Gaudi saw architectural design as an organic interpretation of the elements. The surname "Gaudi" is the predecessor of a commonly used term "gaudy", meaning expressive, out of place or "off the map" relative to its context.

Gaudi presented a transformation of the standard architectural box. Since there is no such reality as a straight line in nature, then there shouldn't be one in buildings meant to reflect the human nature. His designs reflect this ideal.

Figure 118: Casa Mila Apartments (1905)

The Casa Mila (1905-1910) presented a swooping organic form; windows and doors are incorporated into curving walls: no straight lines are found. The extreme example of Gaudi's work is found in the Sagrada Family Church (began in 1884, still unfinished). This church rises as an organic growth of the landscape, reaching to the heavens while embracing the human form in detail.

Figure 119: Sagrada Family Church (1884)

The architectural environment shifted, reformed and shifted again during the early years of this period. Styles were varied as the cultures across the Western World were exposed to ever changing ideas and opportunities. Within these shifts, new schools of thought were established.

These schools, like the movements previously discussed, presented sound theories based on developed philosophy relative to their design style. This movement created some of the most powerful design styles in the century. This movement also solidified many talented individuals as masters of the profession, relative to their reflective style. The various schools and masters listed below are reviewed in this section.

- The Chicago School
- Louis Sullivan
- Frank Lloyd Wright
- De Stijl Group
- Peter Behrens
- The Bauhaus
- Walter Gropius
- Mies Van der Rohe
- Le Corbusier

THE CHICAGO SCHOOL

The events in Chicago during the last half of the Nineteenth Century allowed for a profusion of design achievements within the field of architecture.

Time Period - 1875 to 1925 (specifically 1883 – 1893)

Major events - 1871 – Chicago Fire
1893 – World's Fair, Chicago

Major developments - Utilitarian design; incorporation of building function with clearly defined structure (William Jenny)
Aesthetic return of decoration, philosophical learnings of Louis Sullivan towards design and expression

Achievements - development of the "Chicago" window style, allows for maximum light and natural ventilation

Characteristic slogan – "Form Follows Function"

Noted buildings - 1884 – Home Insurance Building (Jenny)
1884 – Reliance Building (Burnham)
1889 – Second Lester Building (Jenny)
1890 – Manhattan Building (Jenny)
1894 – Guaranty Building (Sullivan)
1899 – Carson, Pirie, Scott Store (Sullivan)

Figure 120: Manhattan Building, Chicago/William Jenny (1891)

Louis Sullivan emerged as a leader in design from the talented group of Chicago architects. He developed a clear style of design and approach to architectural form which influenced an entire generation of American architects.

Figure 121: Carson-Pirie-Scott Store, Chicago (1899)

Sullivan was educated at the prestigious M.I.T. Institute before traveling to France to complete his education at the Ecole des Beaux-Arts. This training provided him the basis to derive his architectural philosophy that “form follows function”. The slogan implies that the final form of a building will be set by the functions it is intended to enclose. The use of space or design elements relative to the basic planning was strictly maintained as only those which were required to suit the client’s needs.

Figure 122: Wrought Iron Detail, CPS Store (1899)

" The social and material environment, whose needs were so pressing, posed an evolutionist challenge to architecture, to which it responded organically, evolving new forms to meet those needs. "

Louis Sullivan

The architect, in Sullivan's perception, was a natural force inspired in shaping the environment with creative individualism. This philosophy, while derived from the 'organic' stream of architecture, held close ties to the ideals of the Modernists.

Industrial advancement provided a functional means to construct elevators. This invention allowed greater heights to be achieved, using an ever-decreasing amount of land. As land prices soared, the need evolved to go vertical. Elevators responded to this need.

Figure 123: Walker Warehouse, Chicago (1888)

The World's Fair came to Chicago at the close of the Nineteenth Century. This event brought architects from the entire globe to view the new achievements of the Chicago School. The ideas, innovations and theories were absorbed and traveled back across the world to be abstracted by alternative design methods.

Frank Lloyd Wright:

The most dynamic, and well known, architect of the Twentieth Century emerged from the Chicago School. Frank Lloyd Wright began his career under the training of Louis Sullivan in the firm of Adler & Sullivan. Many of Wright's best building solutions are located within the Chicago district. Tours to his sites occur to this day. His influence remains felt throughout the architectural profession.

Frank Lloyd Wright was a prolific visionary who managed to capture his ideas in constructible solutions. The level of control that he applied to his projects extended over every aspect – homes, furniture, carpets, bedding, and even the table napkins. He designed an entire existence within his residential schemes, not just the building.

Wright did not receive the formal education of the architects of his firm. He did receive intensive training from an early age related to massing, block forms and composition. The tutelage of Louis Sullivan brought Wright to the point where he struck out on his own.

Figure 124: Winslow House (1894)

The prairie houses he designed (1900-1909) were unique in plan and character. Wright's plans proposed a destruction of the "box" form commonly used in housing at the time. He laid out the rooms based on open planning, allowing for movement, clear sight lines and extensive use of natural lighting. Fireplaces were massive, considered to be the "heart" of the house. The fireplaces were open on many sides and typically set in the centre of the entire living space.

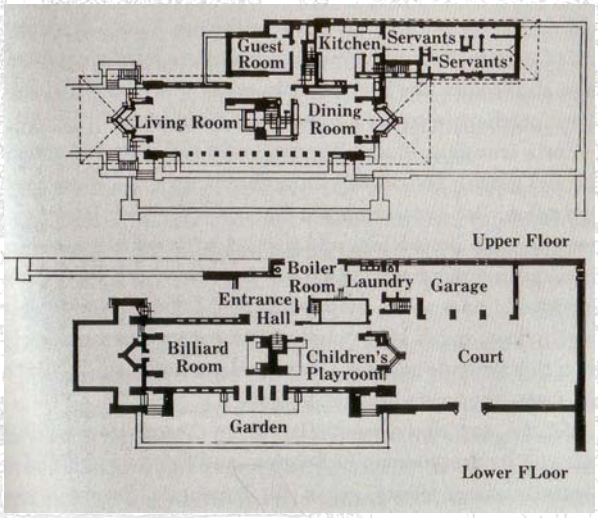


Figure 125: Robie House Plans (1909)

Wright's plans contained a continuity of space and form, using horizontality to reflect the landscape of the area. Human proportions were critical in achieving the correct scale of the building and its individual details. This inclusion of human proportions into the design process is reflective of the Renaissance era. His use of wide overhanging eaves served the functional purpose of sun-shades in the summer. This aesthetic reflects the early Roman designs

Figure 126: Robie House Facade (1909)

Wright was prolific in design throughout his career. His achievements and buildings have been thoroughly documented in a wide variety of media. Any attempt to list his entire career here would result in a completely separate publication. Some key works completed by Wright include:

- Larkin Building (1904) – central office area, skylight, open working space.

Figure 127: Larkin Building Interior (1904)

- Robie House (1909) – best noted prairie house design.
- Unity Church, Oak Park – achieved linear organic ornament integrated into an "H"-shaped plan for the structure. This building presented a clear continuity of space.
- Imperial Hotel, Tokyo (1916-1922) – earthquake-resistant design which was tested during many quakes. This achievement garnered Wright international status.

Figure 128: Imperial Hotel, Tokyo (1912)

- Kaufmann House ("Falling Water"), Pennsylvania (1936) – a house constructed using concrete forms, spanning a natural hillside river. The house provided opportunity for a unity of space, form, material, landscaping and site integration. The house was constructed using the cantilever suspension principle.

Figure 129: Kaufman House - Fallingwater (1936)

- Johnson Wax Building, Wisconsin (1936-39) – (tower constructed in 1950) – an early venture into the cantilever principle extracted to form the column-to-roof connections; tied the two items together in a single fluid shape. The tower was also constructed by suspending the floor systems from the central office core.
- V.C. Morris Shop, San Francisco (1947) – the influences of his early Sullivan training, along with design style of H. H. Richardson, is evident in this design. The floor plan used an interior spiral ramp to move patrons between floors. Wright developed this method of flow further during the design for the New York Guggenheim Museum.

Figure 130: V.C. Morris Gift Shop (1947)

- Guggenheim Museum, New York (1959) – this building features an open central atrium space surrounded by a continuous ramp. The lighting comes from a skylight, used to provide all natural light for the artwork. This building presented a continuity of space, movement and structure.

Figure 131: Guggenheim Museum, New York (1959)

Throughout his career, Wright retained control of the design philosophy for each building. The style of his work moved from square horizontality (functional simplicity) through to the organic, artistic flow of the Guggenheim, completed at the end of his career.

Figure 132: Interior of Guggenheim Museum (1959)

Wright's influence and ideas spread throughout Western civilization by his writings and publication of his works. His travels took him to Europe as well as Japan. These excursions influenced him in design, as he influenced those that followed him.

EUROPE:

The design field in Europe was split in many directions following the 19th Century. All of the technological advancements were combined with a renewed vigor in the pursuit of alternate design schemes.

The fields of art, philosophy and architecture were enmeshed during this period. Unions of theories and styles between these disciplines were frequent. Alternative styles were explored by the great talents of the time. Cubism, the interpretation of space, took form in the art of Braque and Picasso. Futurism, the simultaneous capture of movement, developed under Boccioni. Schools of thought and style were developed in the field of architecture.

The Dutch countries experienced the origin of the De Stijl ("the style") group under the direction of Theo van Doesburg, a largely theoretical practicing architect. This group sought to explore the asymmetrical balance of line, form and space. This exploration ran contrary to the formality of design contributed by the Ecole des Beaux-Arts. The abstract art of Piet Mondrian is the best known artwork example of this group. It was a combination of a style similar to Frank Lloyd Wright with the philosophy of the abstract promoted by Mondrian that formed the theme for De Stijl.

Figure 133: Mondrian Composition (1920)

Frank Lloyd Wright was well-known in Europe through his published writings (1911) and personal travels begun in 1916. De Stijl adopted what they felt were the applicable design theories of Wright within their ideas to create a new sense of design.

De Stijl advocated a universal modern style of design. Their style included humanistic values and idealism as the basis for the design parti. Aesthetic concerns took precedence over the technological limitations. The group was committed to the functional ideal of satisfying the physical and spiritual needs of the client.

Figure 134: Schroder House (1924)

The cultural and societal structure of Europe was changing during this period. The Russian Revolution occurred as well as the catastrophic World War I. European economic recovery was on the rise along with the stability of new representational governments. A new set of hopes and values rose from the philosophy of the time; promoting the belief in achieving a new sense of mankind within the world of technology. A major design individual akin to Wright's reverence emerged in Germany: Peter Behrens.

Figure 135: AEG Turbine Plant (1909)

Peter Behrens was the first architect of this period to develop an architectural philosophy of design that could answer the demands of the newly industrialized civilization. Behrens formed the first important alliance of architect/designer with industry. He was the lead designer for the AEG Corporation, the German equivalent of the General Electric Company. In this capacity, he was responsible to design everything for the corporation; stationery, residential and commercial products, as well as factories and offices. It was in his design for the Turbine Factory (1909) for AEG that the first mainstream use of a glass curtain-wall occurred.

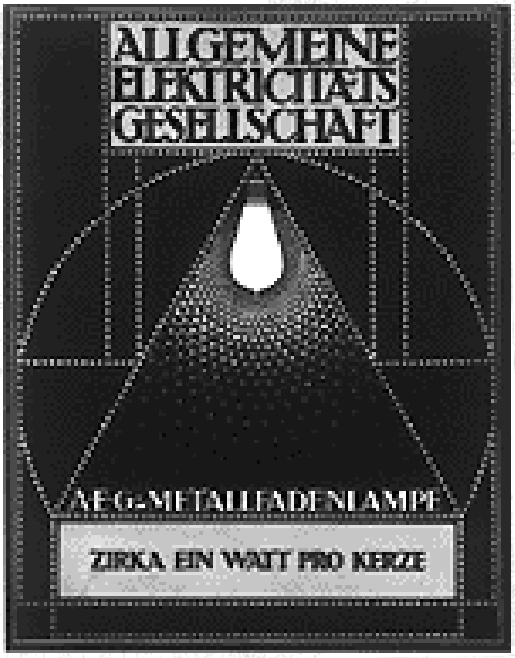


Figure 136: AEG Poster/Peter Behrens (1907)

Behrens maintained an architectural office that was the centre for expression of the new architectural principles. It is a crucial fact to note that the future architectural leaders of the European, and later American, designs all worked for Behrens early in the century. These future leaders were Walter Gropius, Mies Van der Rohe and Le Corbusier.

THE BAUHAUS (Deutsche Werkbund)

The Bauhaus school was Europe's early contribution to architectural design of the period. America was leading the design profession, though it returned to the common methods and materials of the previous era. Europe carried forward with the machine theory; incorporating and developing the new technologies for mainstream construction.

The Bauhaus school was a fusion of the Weimar Academy of Fine Arts and the Decorative School of Arts. The new school was seen as a symbol in the spirit of doctrine, style, methods, and buildings. The school supported a highly individualistic style of design methodology among its students. The modern machine style was the key thrust to this school. The school was started in 1919 by Walter Gropius. It survived until the Second World War, closing in 1933.

Figure 137: The Bauhaus School (1925)

Walter Gropius:

The Bauhaus school was set up as a school of design, building (construction) and craftsmanship. It was intended that the students would learn to unite art and craft: to learn by doing through the construction of design prototypes. It was a school fostering the combination of theory with the practicality of task. The ongoing slogan of the environment was “Art and Technology – The New Unity”. The typical style produced was the International (Modern) style of architecture.

Figure 138: Bauhaus School (1925)

Walter Gropius led the educational sphere at the Bauhaus and later emigrated to teach in the United States. His philosophy respected the machine but placed the emphasis in design on mankind. It was his philosophy that machines were intended to serve mankind, not the other way around. The social conditions facilitated by architecture should always make the human element dominant.

Gropius believed in a division of labour that would create teams of specialists, with the architect as the lead proponent. His approach to education focused on the perfection of the process. “The teaching of a method of approach is more important than the teaching of skills.”

Figure 139: Harvard Graduate Centre (1950)

Gropius completed many major architectural works, including the buildings for the Bauhaus itself. His works include:

- Fagus Works (use of the glass curtain-wall), 1911
- Cologne Exhibition Building, 1914
- The Bauhaus School, 1925
- The Harvard Graduate Centre, 1949
- University of Baghdad, Irag, 1959
- U.S. Embassy, Athens, Greece, 1961

Ludwig Mies Van der Rohe:

Ludwig Mies Van Der Rohe was the second key figure to emerge from the Behrens workshop. His ideal was to attempt to create a classical universal solution for modern architecture, using a structural minimalist approach. His works attempted to achieve perfection in the structure; proportions and detail of the design. Mies demonstrated a keen sense of design related to his use of materials, as evidenced in the Barcelona Pavilion of the World's Fair in 1929.

Mies Van der Rohe is well known for the slogan "less is more". This phrase is meant to imply that the purity of a design solution is found in the simplicity and cleanliness of the integration of structure and enclosing elements. This slogan has been abstracted in many ways, more or less. It was his intention to create a spiritual sense of structure that would provide the "bones" of the building to be wrapped in the "skin" of glazing. He sought to create "universal space" that would provide the solution to the client's needs.

Figure 140: Barcelona Pavilion (1928)

Van der Rohe, like Gropius, began practice in Europe but immigrated to the United States to continue his career. He is credited with the design of the modern glass-walled skyscraper which dominates the skyline of our major cities. An example of this style is the Seagram Building, New York City (1954-1958). This building was designed and erected through a partnership between Mies Van der Rohe and Philip Johnson, a major architect in the United States.

Figure 141: Seagram Building, New York (1954)

Van der Rohe's career, again like Gropius, included professional practice as well as education. His time in the United States included a position as Dean of Architecture, Illinois Institute of Technology. He designed the IIT campus buildings and architectural educational program for the institution. The manner of training advocated by Mies reflected the style of the Bauhaus through incorporation of theory with practical experience. One must know how to physically work with materials in order to fully understand how to build with them.

Figure 142: Farnsworth House (1950)

Noted buildings completed by Mies Van der Rohe include:

- Barcelona Pavilion, Spain,1929
- Tugendhat House, Czech Republic, 1930
- Illinois Institute of Technology, Chicago, 1942
- Farnsworth House, Chicago, 1950
- Lakeshore Drive Apartments, Chicago, 1951
- Seagram Building, New York, 1958
- New National Gallery, Berlin, 1968

Le Corbusier:

Charles Edouard Jeanneret-Gris was one of the three gifted students who passed through the atelier of Peter Behrens. Jeanneret adopted the last name of his maternal grandfather. The adopted name is now known throughout the architectural profession – *Le Corbusier*. Le Corbusier was a talent of many disciplines – architect, urban planner, sculptor, writer, painter (a strict proponent of the cubist style).

Corbusier believed in the machine-style aesthetic for architecture. He believed that machine-like efficiency in design and planning would serve the physical and psychological needs of the users. Architecture according to his philosophy was "the masterly, correct, and magnificent play of masses brought together in the light."

Figure 143: Le Corbusier Centre, Zurich (1967)

The basis of his philosophy stems from the belief that architecture must follow the High Modernist theory in establishing a contrast with nature.

Le Corbusier is noted for many slogans often repeated; “a house is a machine for living in”. His philosophy (a source of quotation for critics and supporters) was laid out by his treatise known as “Towards a New Architecture”, published in 1923. It was through this publication that his method of design using “The Modulor” was explained. The ‘Modular’ is a process of design that maintains the scale and proportions of the human figure when designing a structure. The mathematics of Le Corbusier was largely based on “The Golden Mean” theory. This theory is explored in detail within the Mathematics section.

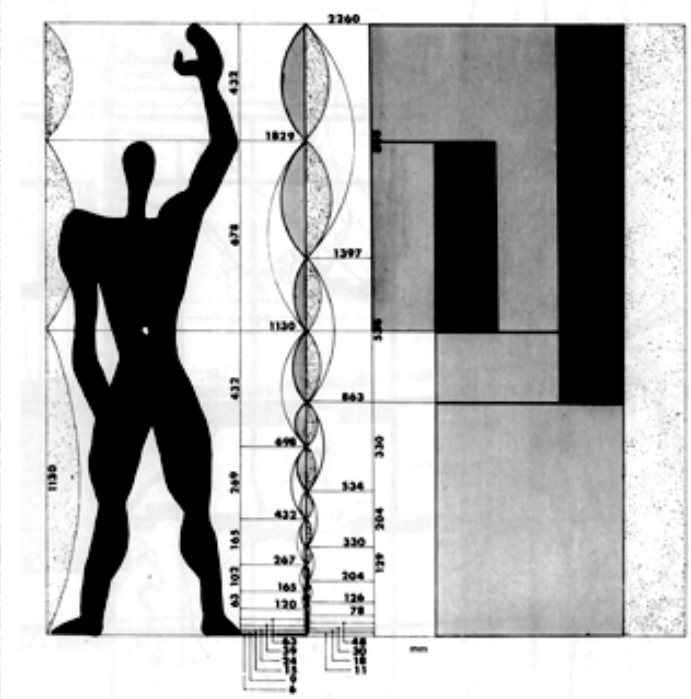


Figure 144: The Modular, Le Corbusier

Figure 145: Villa Savoye (1929)

Le Corbusier's philosophy promoted five key points to architectural design. These key points are:

1. The Pillar: columns, known as pilotis, were used to raise the building off the ground, establishing an open space beneath.

2. The Independent Skeleton: Le Corbusier, like Mies Van der Rohe, believed in a separation of the wall system from the structural system. The independent skeleton would expose the structural system of a building, without tying it to the enclosure systems. This structural system typically contained a flat roof structure. This roof area, known as the Terrace, provided opportunity for garden or leisure activities.

   An interesting item relative to the roof systems is the new resurgence of "green roof" theory for our current structures. It is now determined that green roofs (using soil and plant life) are environmentally friendly, provide adequate insulation, and add to the green ecology of our urban environment. Green roofs are being promoted within the sustainable building strategies sweeping the industry in the new millennium. We have almost come full circle in just 30 years to recognize the value of Le Corbusier's early concepts. Either our society is far too slow to comprehend, or he was a visionary well ahead of his time.

3. The Free Plan: Interior planning of the buildings was to be left flexible, movable and free of as many restrictions as possible. The structure was to be independent of the walls, which left placement of the walls up to the users. Flexibility to adapt is the key thrust of this component.

4. The Free Façade: This component relates to the exterior walls of the structure. Le Corbusier separated the key elements of the buildings (structure, plan, and elevation) to allow maximum flexibility in the design process. Each item was still connected, yet flexible to meet the varied needs of the users.

5. Light: lighting, especially natural lighting, was a critical component of the architecture. Le Corbusier notes in his definition of architecture that the masses are "brought together in the light". His use of glazing was carefully planned and positioned to provide the most dramatic affect. The architectural designs show a preference for the ribbon band of windows. This ribbon effect accents the overall horizontality of the structures, maintaining a machine-look to the building.

Figure 146: Villa Savoye Staircase

Le Corbusier's philosophy and approach to architecture are well documented in publications that rival those written of Frank Lloyd Wright in quantity. Le Corbusier, like Wright, demonstrated incredible talent and vision though the grandest of schemes were beyond the reach of civilization. High-rise housing units set amid vast green fields, with work/shop/live environments, never translated into construction.

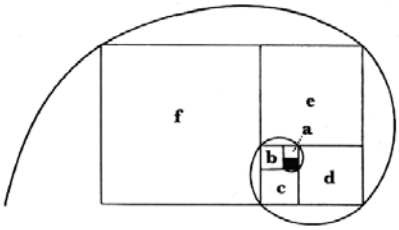


Figure 147: The Golden Mean

Le Corbusier's talents are also demonstrated in a completely different architectural vein; the sculptural form. The Chapel at Ronchamp is a definitive example of the sculptural style that Le Corbusier displayed. This structure shows his talent in mass and scale, while also creating dramatic interior lighting conditions through the careful sizing and placement of the windows.

Figure 148: Main Entrance, Ronchamp (1950)

Major works completed include:

- Villa Savoye, (near) Paris, 1929
- Swiss Pavilion, Paris, 1932
- Marseilles Block (Unites D'habitation), Paris, 1947
- Chandigarh, India, 1951-1965
- Carpenter Center for the Visual Arts, Boston, Mass., USA, 1961

Success and Failure:

These key figures led the way in the movements of architecture up to World War II. There was growing trade in the ideas and philosophies circulating around the Western World. New ideas were infused into the United States for each type or generalization of architecture noted. Adaptations were made, theories altered, new designs sprung forth, and the profession matured.

It should be noted, as a reality check, that integration of new concepts and designs within the existing city layout didn't always work. Designs were at times harassed, shot down, criticized and occasionally rejected. The new philosophy sometimes failed to be carried through in the detailing of a building; producing a hybrid or poor example of the original style. Just as the early builders (Gothic, Renaissance, Romans) occasionally dealt with failure when their theory lacked constructability (falling down in most cases), so the current architects sometimes met with disappointment when the theory failed to translate into success after construction. The failure in modern times was mostly theoretical, rather than structural.

A case relative to this failure involved the public housing units constructed in St. Louis, USA. The housing units, named "Pruitt-Igoe", were designed as a cluster of high-rise apartments constructed out of concrete. The overall complex consisted of 33-11 storey apartment buildings on a 57-acre site, totaling 2,870 apartments. The land area between the individual apartment blocks was meant to be playgrounds and parks. The theory was clear, the designs practically planned, and construction well done. However the project failed once people were added to the mix. Social housing is intended to serve the middle to lower level of economic spectrum of society (the poor, to be blunt). Crime, substance abuse, and violence often accompany the lifestyle of the poor. "Pruitt-Igoe" failed to recognize this social reality.

Crime ran rampant in the buildings. Thieves could escape through any number of stairwells, evading police, if the police dared to chase thieves into the unknown. Drugs were well-known throughout the development since dealers were almost guaranteed unsupervised corridors on almost any floor. Dealers also shared the same means of escape as the thieves. The situation escalated to the level of abandonment when the police refused to travel any higher than the sixth floor. The danger in going any higher grew since the stairwells were dangerous due to blind corners and dark areas. The elevators were untrustworthy since a person could too easily be trapped. The remaining residents eventually settled on the bottom six floors of each building. The upper floors were left for the thieves and dealers to manage.

The integration of building and landscaping also failed in this concept. The land was developed as green space for the families and children. Families were not about to leave their apartments unattended if they didn't have to. A vacant suite was an invitation for the thieves to help themselves. Children were not allowed to go out on their own since the parents could not supervise from their apartments. It was also dangerous in the elevators and stairwells so it was not wise to let children walk alone. The landscaped areas were left unattended and vacant. These areas soon became the property of thieves and dealers.

Figure 149: The Demolition Scene

The situation at the total development was bad and not self-improving. The decision to demolish was made in 1972 when the complex was not quite twenty years old. Social housing based on the high-rise urban theory had failed due to human nature, not design flaw.

Post World War II:

The architectural world opened wide after the Second World War.

A renewed optimism in life occurred at the closure of the second world conflict. Business thrived as the economy of countries grew. The Western World felt a new sense of pride and encouragement towards a bright future. Housing construction expanded outside of the city limits (the urban environment) to create the new sub-urban landscaping (the suburbs). A new corporate lifestyle emerged, particularly within the United States. Work and home were separating; commuting became commonplace, and the use of vehicles widespread.

The affect of architecture came through the urban form of modern structures. Corporations sought to project an image of new and modern entities that dominated the business world. These desires were displayed through the use of the high-rise business block.

Steel framing formed the means to build taller and more efficiently than before. Steel and concrete floor systems were easily erected, allowing quick rise to the structure. The use of glass curtain-walls, similar to those promoted by the Bauhaus school, allowed for easy enclosure as the building rose. The designs for these building types became standardized in planning. There was always a concrete core block which housed elevators, stairs, and essential services (washrooms, ventilation and service shafts). The concrete core helped to support the perimeter steel frame which carried the outside edge of the floor systems as well as the exterior curtain-wall.

A famous example of the sleek, vertical, modern styling achieved through this design methodology is the Lever House, corporate headquarters of the Lever Soap Company. This design, completed by the American firm of Skidmore, Owings and Merrill (Gordon Bunschaft) was constructed in 1950. This building led the way for new American and World architecture of similar designs.

Figure 150: Lever House, New York (1950)

The modern style ruled the corporate environment due to its aesthetic and efficiency. The floor plans allowed for free planning of offices or open areas as well as ease in renovating as corporations grew or shifted their focus. Alternative styles were still very active among other building types throughout the Western Civilization.

The revival of styles can be seen in numerous examples during the mid-20th Century. Brutalist revival demonstrated a return to bulk massing blocks of building forms, aesthetically harsh, solid and “permanent” by their use of exposed concrete and massive wall areas with punched windows.

Figure 151: Pilgrimage Church, Neviges (1962)

Expressionist revivals were artistically used in many structures of a specific purpose. Eoro Saarinen displayed the aesthetic of flight in his design for the Trans-World Airlines terminal in New York (1962). The visual reference to wings of a bird carries forth the aura of being airborne, the purpose of the terminal.

Figure 152: TWA Airlines, New York (1962)

The Sydney Opera House, designed by Jorn Utzon (1959) is based on the form of ship's sails. This building sits on a site joining the harbour to the city, forming the link between land and oceanic forms.

Figure 153: Sydney Opera House (1959)

Additional schools of thought flourished, resulting in architecture of varied forms and appearances. Architectural theory fluctuated depending on the practitioner. The importance of context and local surroundings either governed the design parti or was completely ignored. New buildings blended in or stood out. The same ideals were applied to additions adjoining existing structures. Philosophies were personal and became office specific within the architectural industry.

A new period arose from the dichotomy of architectural thought. This minor movement, known as Second Modernism, sought to bring the varied streams back to a single course of design. It did not succeed. Architecture was on a world stage, as were the architects who envisioned the great works.

The last half of the 20th Century has produced dramatic works in as many building styles as there are architects. Philosophy, theory and practice mature and shift to suit the culture of the country and world. Many individuals have risen to fame within the profession, espousing their theory through both text and professional practice.

Figure 154: Vouksenniska Church (1956)

These key individuals, to name only a few, include:

- Alvar Aalto – believed architectural design should focus on serving the needs of the people. (Vouksenniska Church)
- Louis Kahn – believed architectural design should focus on facilitating the function of the building's purpose. (Salk Institute)

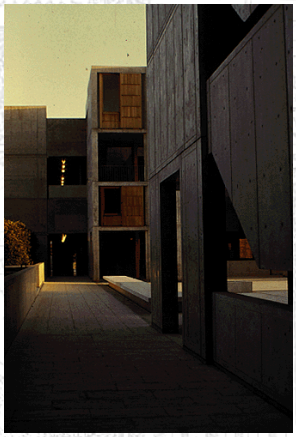


Figure 155: Salk Institute (1965)

- Robert Venturi – promoted gaudy design (Vegas style) which was the style the culture seemed to desire. (Vanna Venturi House)

Figure 156: Vanna Venturi House

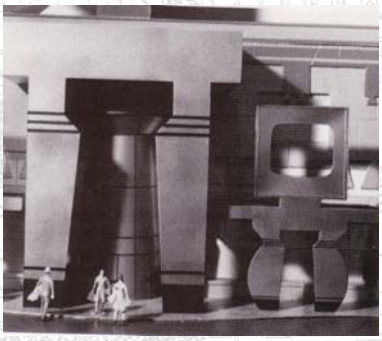


Figure 157: Robert A.M. Stern Storefront (1975)

- Robert Stern – a return to the modernist philosophy of Le Corbusier.
- Michael Graves – post-modernism, using applied elements to mimic historic facades in abstracted forms. (Disney Hotels)

Figure 158: Disney Hotels, Florida (1987)

- Richard Rogers – mechanical design strategies, exposing the structure and systems of the building. (Pompidou Centre)

Figure 159: Pompidou Centre, Paris (1972)

The list is inexhaustible as new talents continually emerge and new styles are born of old theories. The history remains unwritten as the process continues.

There are many notable Canadian contributions to the world-class level of architectural design. Canada remains an open and inviting environment where new forms are stimulated and developed. Canadian architects of note include:

- Moshe Safdie – designed the National Gallery as well as Canadian Embassy in Washington, DC. Currently working in Israel. (Habitat, Montreal)

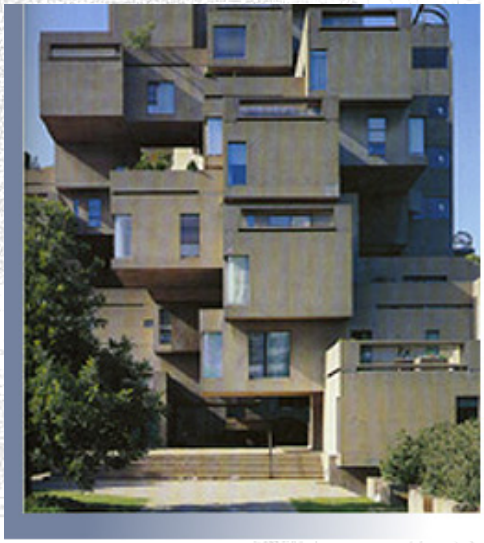


Figure 160: Habitat, Montreal (1967)

- Arthur Eriksen – British Columbia architect who completed Simon Fraser University and B.C. Law Courts Building. Currently working in Vancouver and Los Angeles. (Simon Fraser University)

Figure 161: Simon Fraser University (1963)

- Douglas Cardinal – First Nations architect, completing designs based on organic forms; designed First Nations University of Canada (Regina), Museum of Civilization (Ottawa), and the First Nations addition to the Smithsonian Institute (Washington, DC). Currently working in Ottawa.

Figure 162: Canadian Museum of Civilization (1986)

- Frank Gehry – Toronto-born architect practicing in Los Angeles. Designed the Guggenheim Museum (Bilbao, Spain), American Embassy (Paris), and the Disney Concert Hall (Log Angeles).

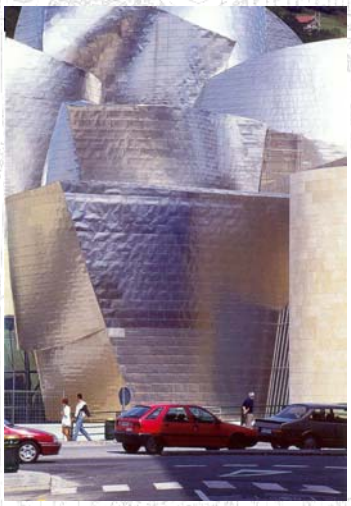


Figure 163: Guggenheim Museum, Bilbao (1993)

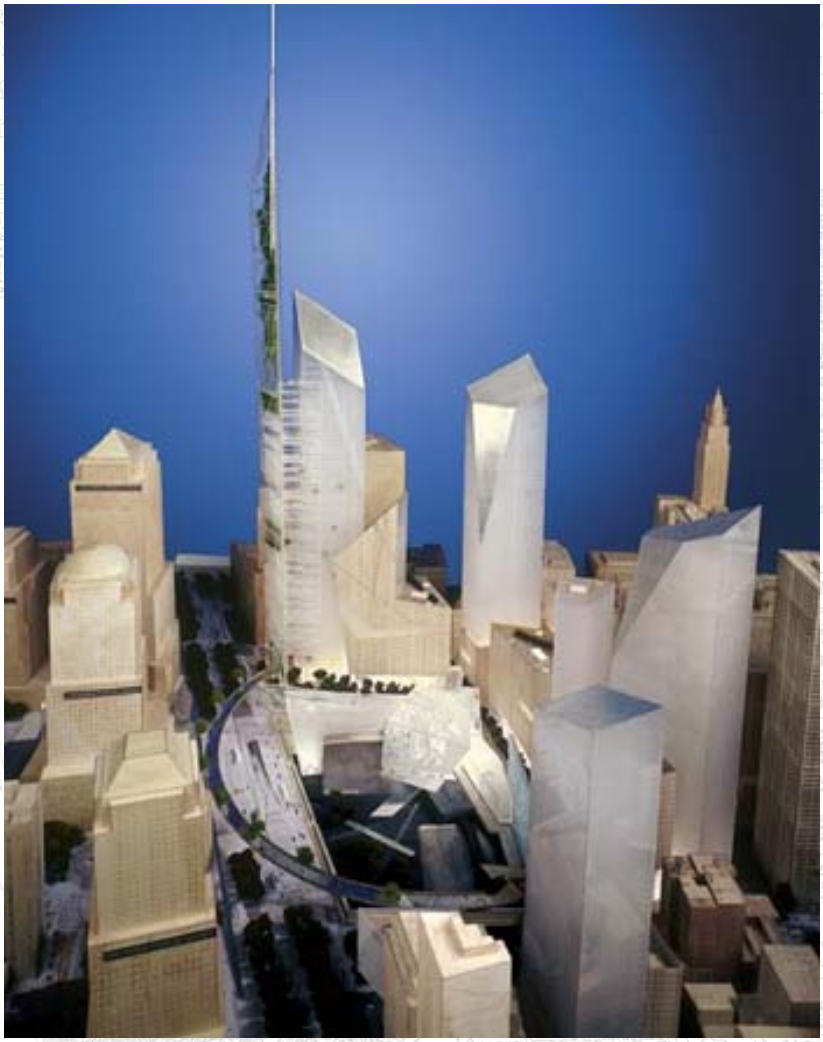


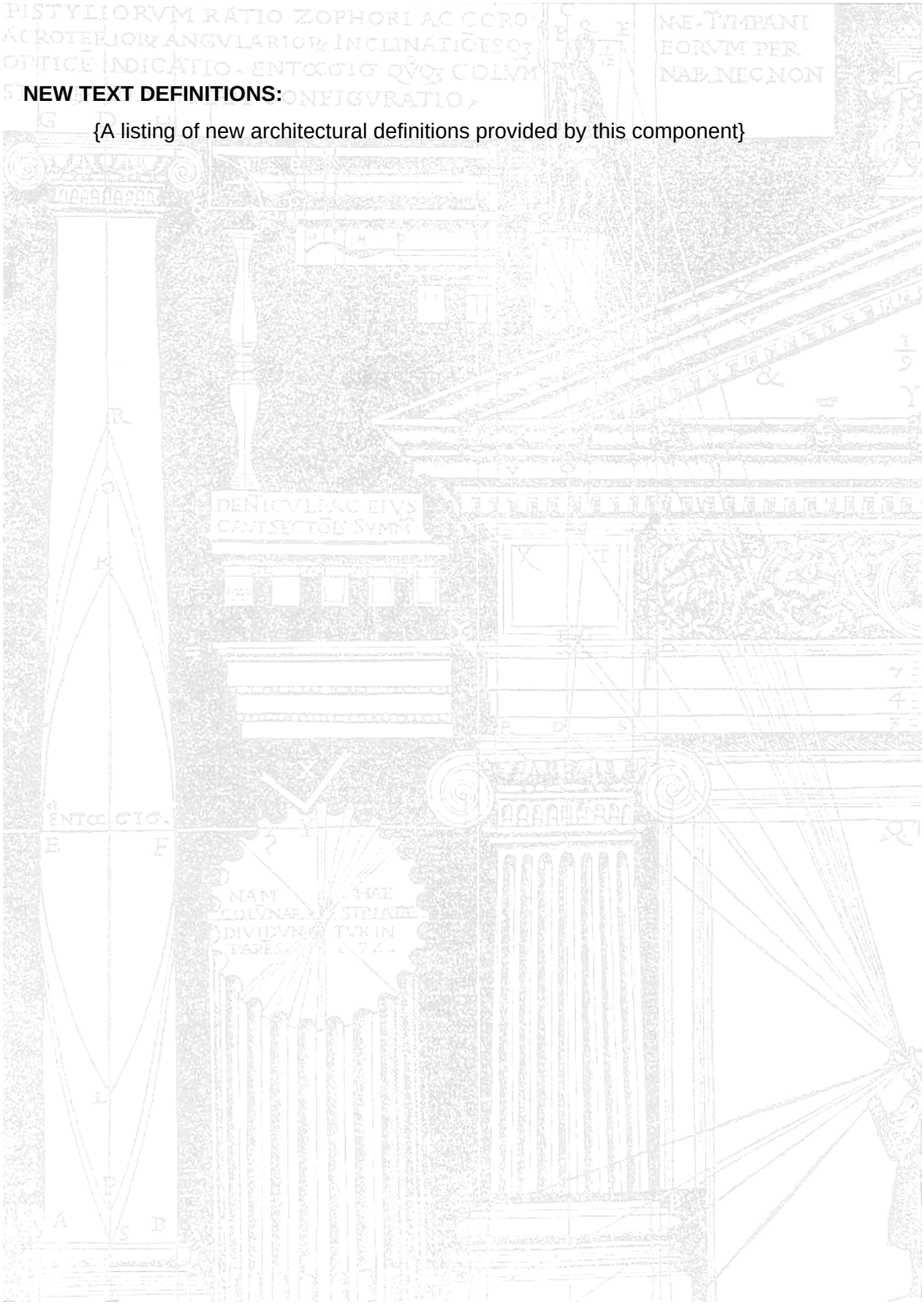
Figure 164: World Trade Centre Site, Daniel Liebeskind Studio (2004)

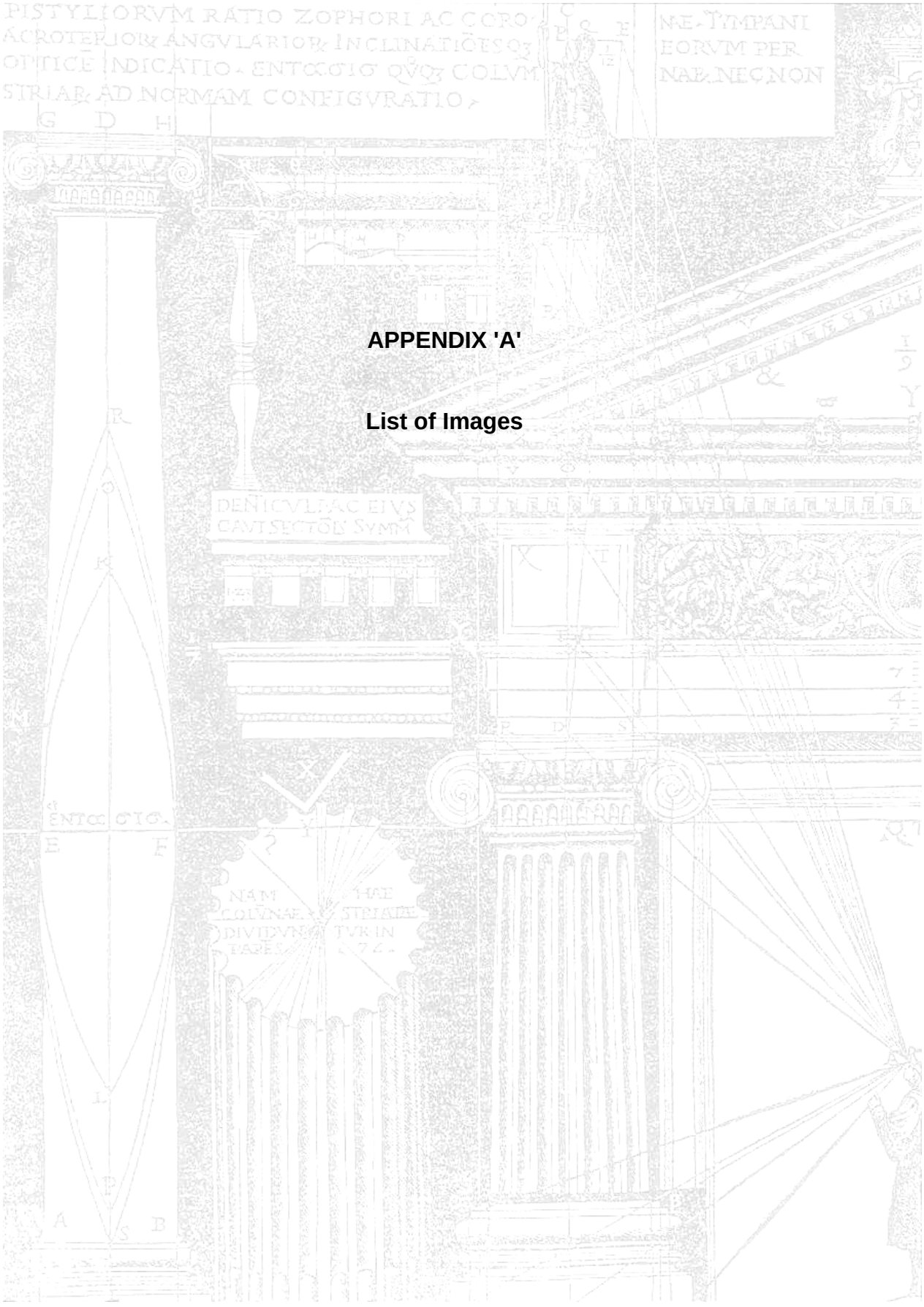
Architecture as an art form knows no boundaries. Designs may be completed based on a known design/period style or based on a free form mass of sculpture. The four basic types discussed at the outset of this chapter still hold true, though definitions do have to be stretched at times to catch a unique building type.

The history of architecture in Western Civilization has been one of growth, development, precedent and reflection. We have achieved a state of world architecture in this era of information, internet and media. With each successive time-period studied, architectural design has become more diverse in theory, practice and construction. The future remains to be seen.

NEW TEXT DEFINITIONS:

{A listing of new architectural definitions provided by this component}





APPENDIX 'A'

List of Images

Reference tags:

A : Architecture: From Prehistory to Postmodernism

B : Buildings that Changed the World

C : The Architecture Timecharts

D : www.greatbuildings.com (or internet resources)

E : Photo by Author

F : H.H. Richardson

Years noted as () are b.c., all other years are a.d.

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4	Old City Hall	Regina, Sask.		E	---
5	Grecian Column Detail	Athens, Greece	---	A	
6	Luxembourg Gardens	Paris, France	1625	E	--
7	Student Presentation	Regina, Sask.	1998	E	---
8	Architecture goes to School	Regina, Sask.	1998	E	---
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10	Catal Huyuk Settlement	Anatolia	(6,000)	A	48
11	Cyclopean Wall	Greece	(7,000)	A	4
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13	Aerial view - Stonehenge	Salisbury Plain	(6,000)	B	11
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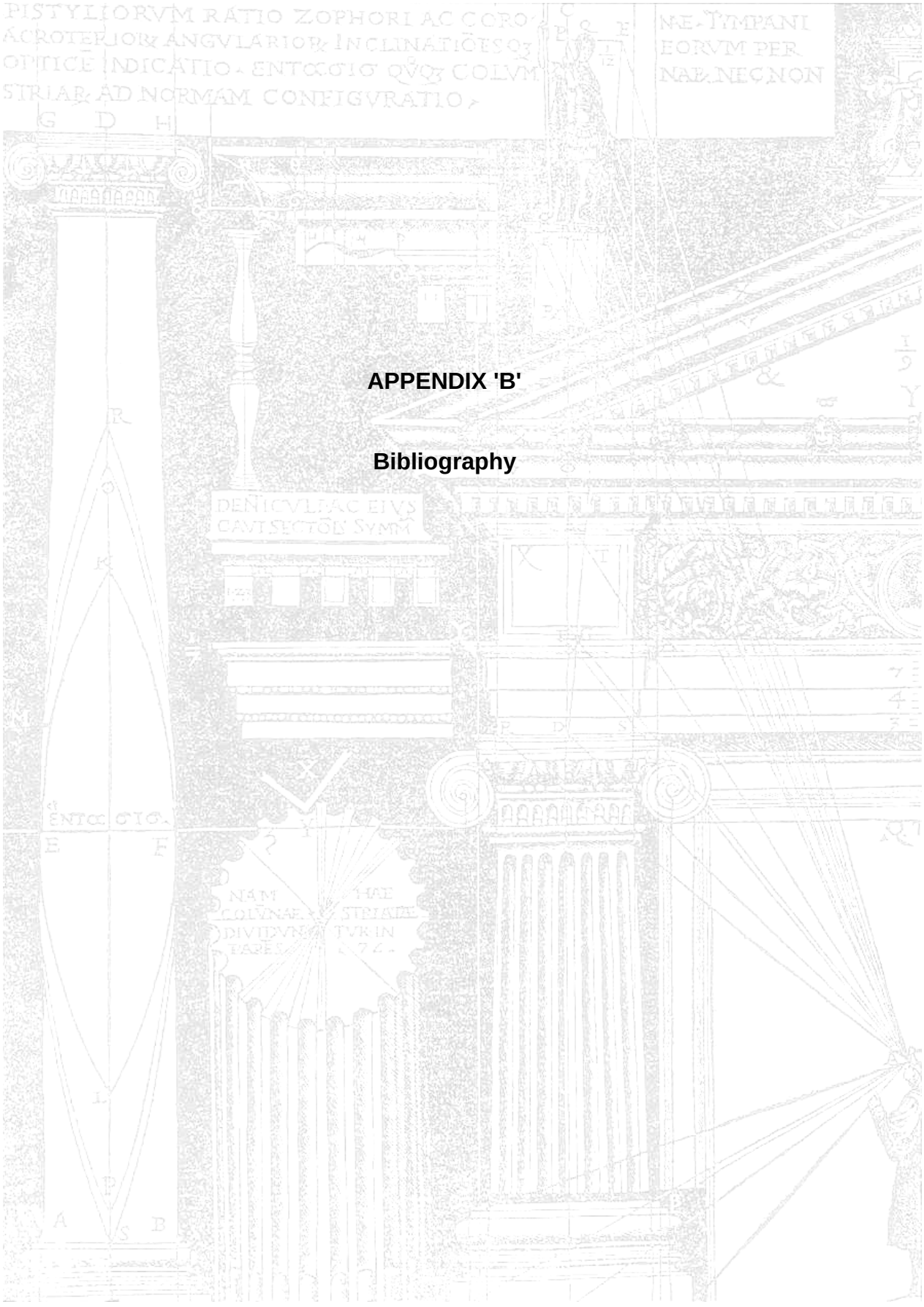

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