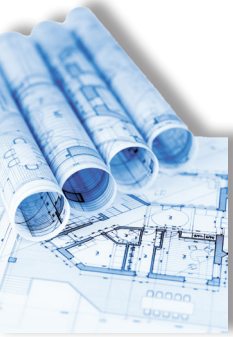
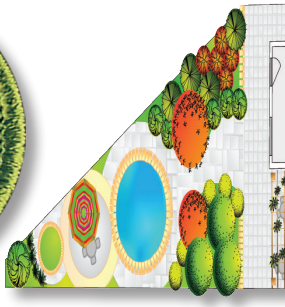
MERIT BADGE SERIES





ARCHITECTURE AND LANDSCAPE ARCHITECTURE

Scouting America

STEM-Based

SCOUTING AMERICA
MERIT BADGE SERIES

ARCHITECTURE AND LANDSCAPE ARCHITECTURE

"Enhancing our youths' competitive edge through merit badges"

Scouting America

Architecture Requirements

Always check scouting.org for the latest requirements.

1. Do the following:
   (a) Tour your community and list the types of buildings you see. Try to identify buildings that can be associated with a specific period of history or style of architecture. Make a sketch of the building you most admire.
   (b) Select a historical architectural achievement that has had a major impact on society. Using resources such as the internet (with your parent or guardian's permission), books, and magazines, find out how this achievement has influenced the world today. Tell your counselor what you learned.

2. In following the Leave No Trace Seven Principles and the Outdoor Code, Scouts pledge to "Travel and Camp on Durable Surfaces" and to "Leave What You Find" and to "be conservation-minded." Discuss the following with your counselor:
   (a) The term *sustainable architecture.* Identify three features typical of green buildings.
   (b) The difference between renewable building materials and recycled building materials, and how each can be used in construction.
   (c) The relationship of architecture with its surrounding environment and the community.
   (d) How entire buildings can be reused rather than torn down when they no longer serve their original purpose.

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SUSTAINABLE FORESTRY INITIATIVE
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SFI-01042

3. Do ONE of the following:

   (a) With your parent or guardian's and counselor's permission and approval, arrange to meet with an architect. Ask to see the scale model of a building and the drawings that a builder would use to construct this building. Discuss why the different building materials were selected. Look at the details in the drawings and the model to see how the materials and components are attached to each other during construction.

Thorncrown Chapel near Eureka Springs, Arkansas; Fay Jones + Maurice Jennings Architects

Pine Eagle Chapel at Camp Tiak Scout Camp, near Wiggins, Mississippi, makes an impressive backdrop for outdoor gatherings; Fay Jones + Maurice Jennings Architects.

(b) With your parent or guardian's and counselor's permission and approval, arrange to meet with an architect at a construction site. Ask the architect to bring drawings that the builder uses to construct the building. While at the site, discuss why the different building materials being used were selected. Discuss how the different building materials and components are attached to each other during construction.

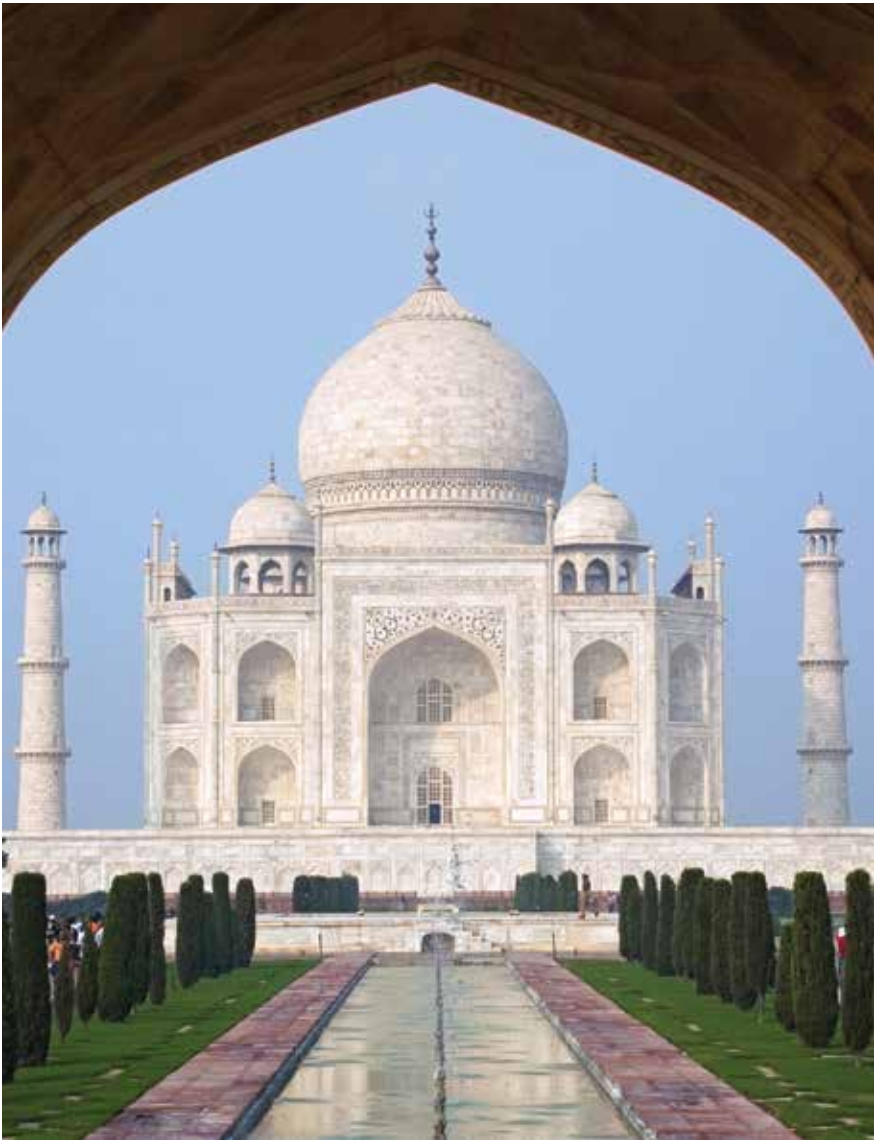
Note: To visit a construction site will require advance planning. You will need permission from a parent or guardian, your counselor, the architect, and the construction site manager. A construction site is a very dangerous place. While there, you will need to closely follow the site manager's directions and comply with all the safety procedures, including wearing a hard hat, protective eyewear, and proper footwear. Be aware of the changing conditions at the site, and stay with the architect or site manager.

(c) Interview someone who might be your client (such as a prospective homeowner or business owner) if you were an architect. Find out what your client's requirements would be for designing a new home or business building. Write a short program including a list of requirements for the project, the functions of the building and site, how the functions relate to one another, and the goals of the project.

4. Measure a room such as one where you live or where your troop meets. Make an accurately scaled drawing of the room's floor plan showing walls, doors, closets, windows, and any built-in furniture or cabinets. Neatly label your drawing with the following: your name, the date, what room you drew, and the scale of the drawing. (Drawing scale: ¼ inch = 1 foot)
5. Find out about three career opportunities in architecture. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.

Architecture Contents

Sydney Opera House; Jorn Utzon, design architect



Taj Mahal, Agra, India; Ustad Ahmad Lahauri, architect

Introduction to Architecture

Defined simply, architecture is the structure that shapes space. It includes the elements that form space around buildings as well as space inside buildings. We constantly experience architecture as we go about our daily lives, and we are influenced deeply by what we see, hear, and feel.

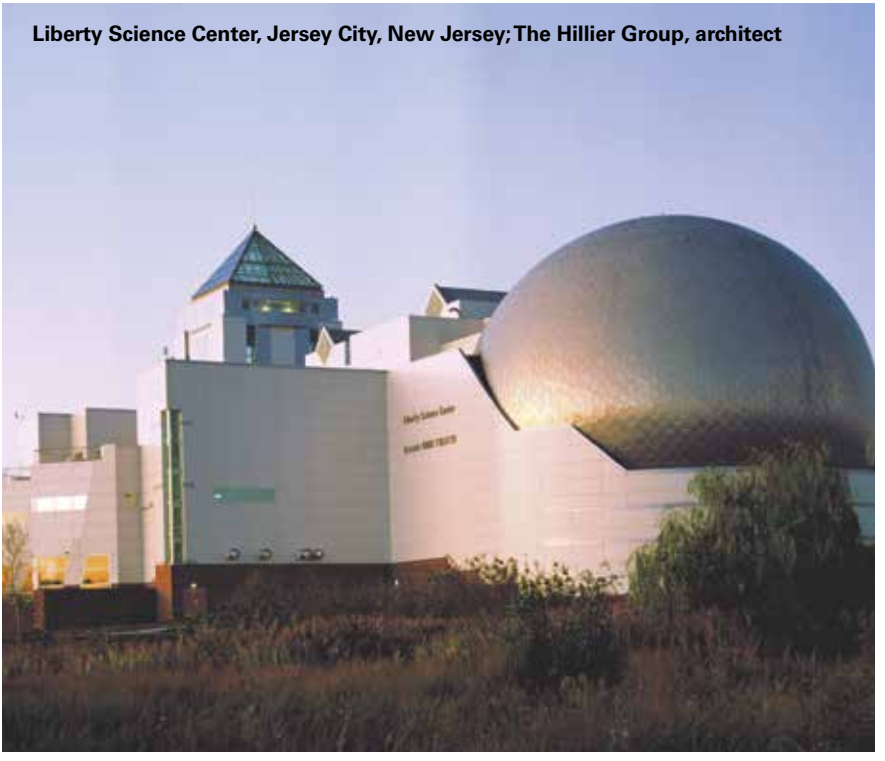
Architecture is not just the special buildings like cathedrals, museums, or sports stadiums we read about or see on television; it is as normal as the homes, places of worship, schools, and shopping malls where we live, worship, work, learn, and play every day. However, architecture is more than just common shelter; building has always satisfied the human need to create something of meaning. Even the simplest form of architecture is a work of art that requires thought and planning.

In a way, all architecture is sculpture in which people live their lives. Each of us creates architecture when we build a clubhouse, decorate a bedroom, or even stretch blankets over dining room chairs to fashion a hideout.

Whatever their work style, all architects must combine their knowledge of art and engineering to create useful places for people to live and work.

Architecture is dynamic and changes with the styles, colors, and building materials that vary from time to time, region to region, and nation to nation according to the different needs, different resources, and different ways that people see and do things. From cave dwellers to astronauts, all humans have influenced, and been influenced by, architecture.

Architects are problem solvers who have studied human nature, art, and science, and who understand how to create architecture that people need. Some architects still draw designs by hand and work directly with clients to design buildings or other "systems" that solve problems. Other architects use advanced computer technology and work in teams with other designers, such as engineers, to design very complicated projects that might be buildings or other systems that solve problems.



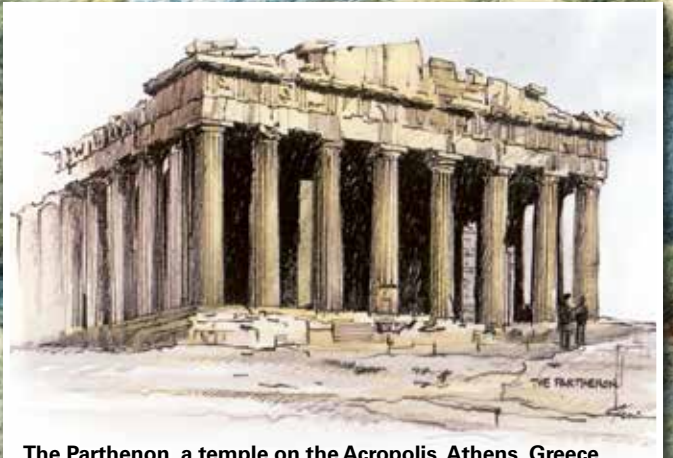
Liberty Science Center, Jersey City, New Jersey; The Hillier Group, architect

Dancing House, Prague, Czech Republic; Vlado Milunić and Frank Gehry, architects

Architecture is an exciting profession that can offer you a real chance to create something of meaning, whether it is a big project or a modest one. Many people with an education in architecture find challenging career opportunities in other fields that require artistic talent and the ability to evaluate and solve problems, such as filmmaking, acting, environmental science, education, law, governmental service, business systems, construction management, and many others.

Architects enjoy many opportunities and face many challenges. They must continue their education to help keep their awareness keen and their expectations high. Like the buildings that architects design, the responsibilities and rewards of the architectural profession come in all shapes and sizes. Earning the Architecture merit badge will give you a new perspective of architecture and a chance to see what architects do.

Kaufmann House (called "Fallingwater"), Bear Run, Pennsylvania, 1936–37; Frank Lloyd Wright, architect (after Norwich)



The Parthenon, a temple on the Acropolis, Athens, Greece (after Fletcher)

History of Architecture

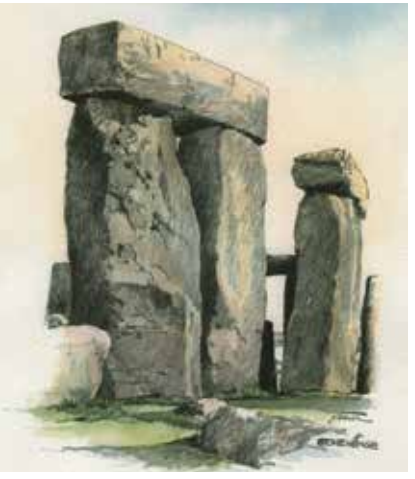
The well-known modern architect Le Corbusier said that architecture is experienced by "the foot that walks, the head that turns, the eye that sees." Architecture appeals to and involves all of the senses. To understand the importance of architecture as the setting for our lives, we need to know something of architecture's history and development. Let's look briefly at architecture through the ages.

Prehistoric Architecture

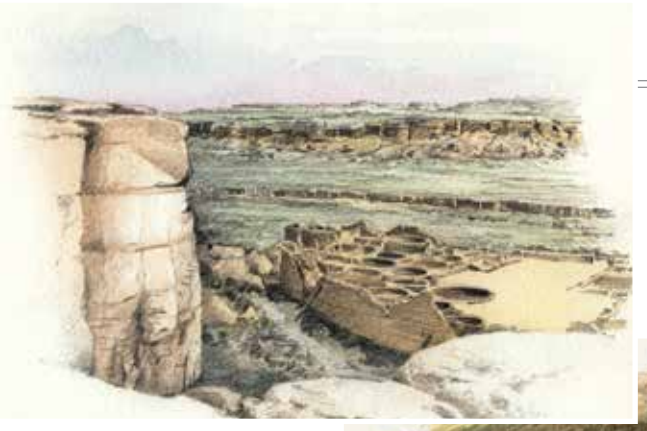
Architecture had simple beginnings. People first sought shelter in caves. Then, they learned to construct simple huts of reeds and to build structures of timber and stone. This is architecture as shelter.

As people began to live together in large groups, and once they had solved the basic problem of shelter, another kind of architecture was developed, that of ritual and ceremony.

Two important aspects of architecture can be seen in one famous prehistoric site, Stonehenge. One aspect is *function.* Function is the way a building or structure does its job—the way it accommodates the uses for which it was built. Stonehenge may have functioned as a unique type of calendar, plotting annual alignments of the sun and moon. The second aspect is *ritual.* Stonehenge is thought to have been an outdoor temple that had sacred and religious meaning.



Stonehenge on Salisbury Plain, Wiltshire, England (from *World Architecture*)



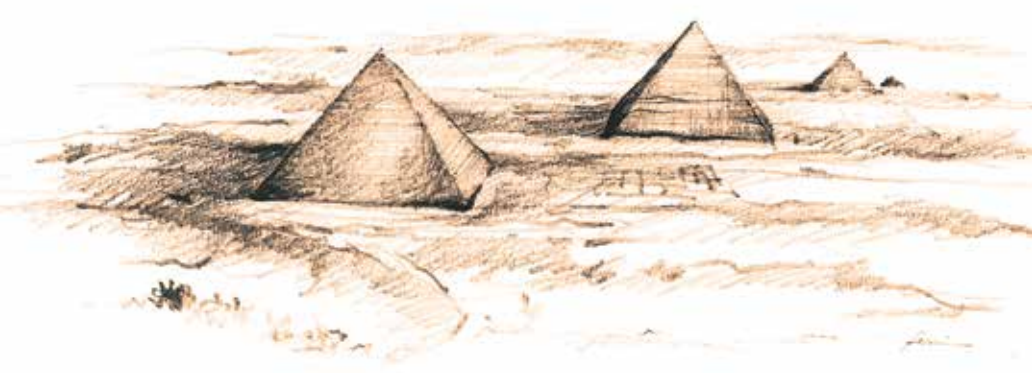
Pueblo Bonito, Chaco Canyon, New Mexico (R. B. Ferrier)

Cliff Palace, Mesa Verde, Colorado (R. B. Ferrier)

Adobe dwelling, Taos, New Mexico

Native American Architecture

Architecture designed by the ancient cultures of North America is among the most significant found anywhere in the world. In the Southwest during ancient times, Anasazi Indians developed a sophisticated culture and an architecture of great complexity and excellent construction. The largest and best-preserved ruins are those of Pueblo Bonito, a five-story building that was constructed in the 10th century.

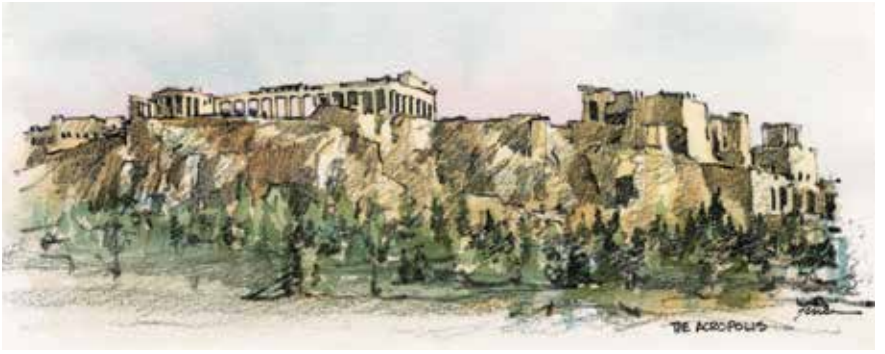


Pyramid complex, Giza, Egypt, 2570–2500 B.C. (after Kostof)

Ancient Egyptian Architecture

The people of ancient Egypt developed a complex society that was reflected in their architecture. They built great pyramids to preserve the bodies and possessions of their kings, who were called *pharaohs.* The Egyptians designed and built religious temples and the pyramids to resist the erosion that would occur over time. The aspects of function and ritual were important in the architecture of ancient Egypt.

Great Temple of Abu Simbel, Egypt, circa 1301 B.C. (after Fletcher)



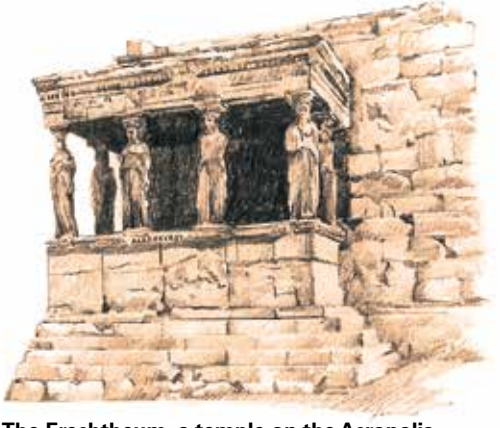
The Acropolis, Athens, Greece (after Norwich)

Greek Architecture

Many people believe that the most significant building site in the history of architecture is the Acropolis at Athens, Greece. The basic elements of classical architecture are preserved in the ruins of the Acropolis, which was erected in the fifth century B.C. (*Classical* refers to the forms and styles of ancient Greece and Rome.)

The Acropolis was dedicated mostly to the celebration of ritual, but it also had functional areas, including markets where goods were bought and sold, and theaters for entertainment.

The term *tripartite* refers to the three parts of a building or column. The classic column has a base, a shaft, and a *capital* (a decorative upper end). The classic temple has a base, a *colonnade* (columns set in a row), and a *pediment* (a triangle-shaped upper structure). This is similar to the human form, which consists of the feet, the torso, and the head.



The Erechtheum, a temple on the Acropolis, Athens, Greece (after Fletcher)

The Greeks' rudimentary building practices limited the height and width of their architecture to the size of stones that could be moved and lifted into place and the distance the stones could span.

Roman Architecture

The architecture of the early Roman Empire was directly influenced by the classical elements of Greek architecture. The Romans refined these classic components. They developed the use of the arch, vault, and dome.

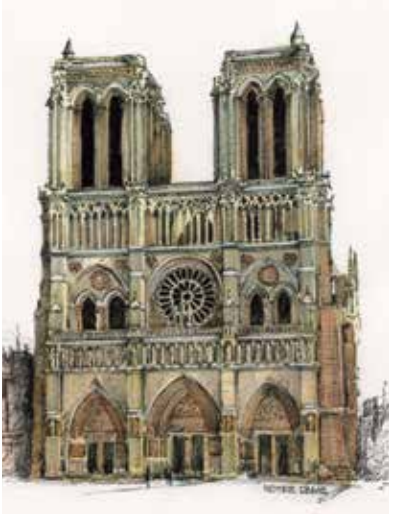
An *arch* is a curved structure spanning an opening. It allowed Roman architecture to incorporate wider spans. These buildings' columns were farther apart, and their interiors were more spacious and open. A *vault* is an arch-shaped structure used as the ceiling of a room or other enclosed space; a *dome* is a rounded vault. The use of vaults and domes created large open spaces such as those at the Pantheon. The use of the arch and vault introduced curved forms, and the Romans were the first to include these elements on a massive scale in their architecture. These classical architectural basics have continued to evolve and can be seen in modern buildings.

Arch of Titus, Rome, Italy, A.D. 82 (from *World Architecture*)

The Pantheon, Rome, Italy, interior view (after Fletcher)

The Pantheon, Rome, Italy, exterior view (after Fletcher)

The major monuments of Roman architecture also show the importance of function and ritual. The Roman Forum—a large, open space in the central part of the city where people gathered—featured functional parts such as shops, markets, theaters, and buildings for conducting legal and political business. Monuments, statues, and the temples of the Forum fulfilled the purposes of religion and ritual.

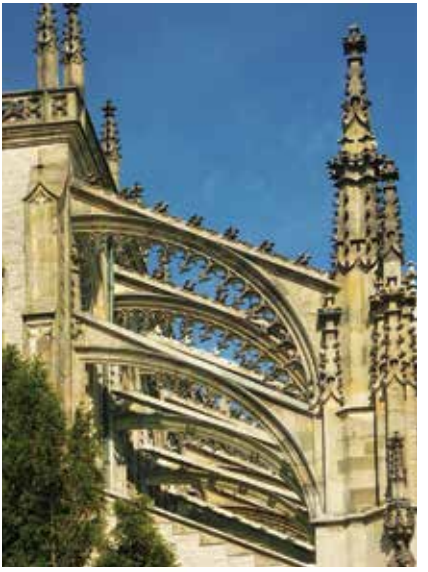


Cathedral of Notre Dame, Paris, France; front view

Gothic Architecture

As the great cities in Italy, France, Spain, Germany, and England flourished, an elaborate new form of architecture emerged in the 12th century. Called the *Gothic* style, it was the dominant structural style in Europe for 400 years. Ornate buildings reached toward the sky, their intricate stone construction emphasizing soaring spaces and allowing larger areas of glass.

Gothic architecture also introduced the innovative use of "flying buttresses" that supported high walls. Gothic buildings designed with these buttresses feature high-ceilinged, light-filled spaces.



Renaissance Architecture

The term *renaissance* means rebirth or revival. In history, the Renaissance was a period from the 14th century to the 17th century in Europe, when great cultural and social advances were made. Renaissance architects studied classical Roman and Greek architecture. They used the ideas of balance, proportion, and order to develop a new architecture based on the principles of the classical era. Important accomplishments in art and architecture were achieved during the Renaissance.

Dome of St. Peter's Basilica, Rome, Italy, 1546–1626; Michelangelo, architect (from *World Architecture*)

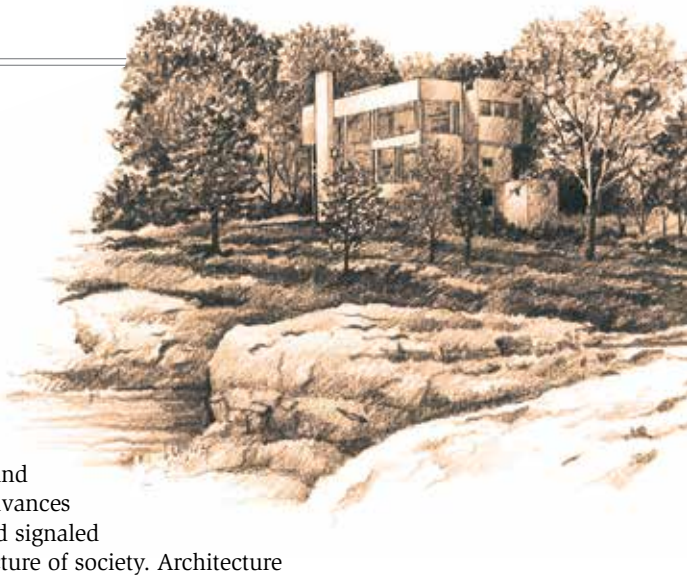
Robie House, Chicago, Illinois, 1908; Frank Lloyd Wright, architect (after Constantino)

La Tour IBM–Marathon Tower, Montreal, Canada; Kohn Pederson Fox Associates, architect

Modern Architecture

The Industrial Revolution, which began in England about 1760, shaped the modern world in which we live. Many people moved from rural areas, leaving their farms to work in factories making mass-produced products. The structure of society changed significantly, and architecture responded with dramatic innovations. By the late 19th century, buildings of concrete, iron, steel, and glass had become the dominant architectural forms. When steel was introduced, modern structures could be built much taller and narrower than was previously possible, and many architects worked to perfect the art of the sleek skyscraper.

In the first half of the 20th century, three architects emerged as leaders of modern architecture: the American Frank Lloyd Wright, the Swiss-French Le Corbusier, and the German-American Ludwig Mies van der Rohe. Study any modern city, and you will see the impact of modern architecture.



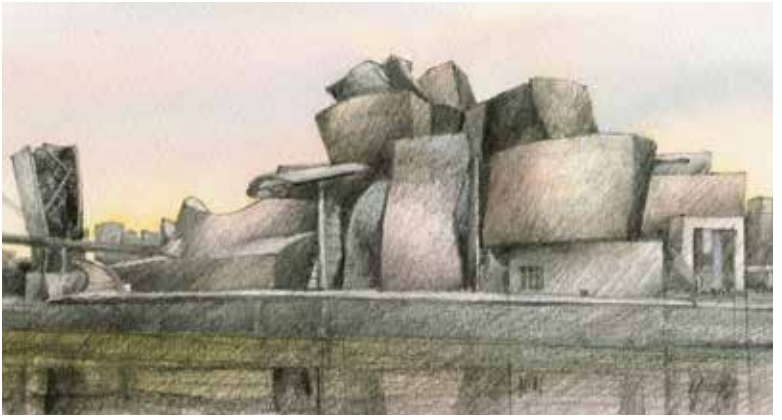
Smith House, Darien, Connecticut, 1965–67; Richard Meier, architect

Architecture After the Modern Era

By the end of the 20th century, computers and the other technological advances of the information age had signaled other changes in the structure of society. Architecture responded in a unique way. Rather than one new movement, architects pursued a variety of directions. For example, Richard Meier's buildings continue to use the highly ordered, all-white minimalist geometric shapes of modern architecture, while Michael Graves designed buildings that use classical elements and descriptive images. Other architects are designing buildings that appear to be incomplete, or in a state of collision and conflict.

Humana Building, Louisville, Kentucky; Michael Graves, architect

Goat House, the Rural Studio, Sawyerville, Alabama; Samuel Mockbee and Auburn University architecture students, architects



Guggenheim Bilbao Museum, Bilbao, Spain; Frank Gehry, architect

Architect Frank Gehry uses computer programs linked directly to the manufacturing process to create many of his signature buildings, such as the Guggenheim Bilbao Museum.

If you look carefully at the buildings in your community, you will be able to see architectural features from various periods of history. For requirement 1, you are to identify buildings that can be associated with a specific historical period. Look at the shapes of windows, doors, columns, and roofs, and the different ways in which building materials are used. Look at homes, places of worship, your city hall, or perhaps an older school or college building to discover how architects learn from the buildings of the distant—or recent—past.

School of Architecture, Prairie View A&M University, Prairie View, Texas; RoTo Architects with HKS

Monticello, near Charlottesville, Virginia, 1770–1808; Thomas Jefferson, architect

Preserving Architecture From the Past

Humans always have been builders. The architecture that early humans leave tells us something about how they lived and what they believed was important in life. Many people feel that it is important to save old buildings, whenever possible, because they are important links to history. Buildings can be historic even if they are as old as the pyramids in Egypt or Stonehenge in England. A railroad depot, place of worship, or house near where you live might be important to the history of your community.

There are many reasons for preserving architecture from the past. Some buildings should be preserved because their appearance sets a historic trend, like the Robie House in Chicago, Illinois, or the Empire State Building in New York City. Some buildings should be preserved because they link us to the past, like Independence Hall in Philadelphia, Pennsylvania, or the Alamo in San Antonio, Texas. Finally, some buildings should be preserved because they can be used for another purpose. For example, a railroad depot might become a restaurant, or a warehouse might become loft apartments.

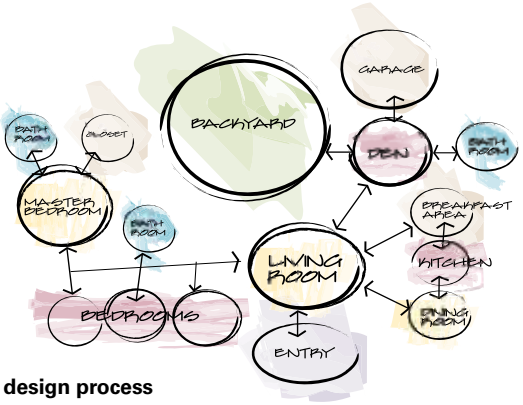
Remodeling older buildings for another use is called *adaptive reuse.* Think of it as the ultimate in recycling, saving materials and craftsmanship that might be impossible to replace today. Many times, buildings that have been preserved and remodeled for another use make the most interesting places to live and work.

How Architecture Happens

The process of designing and constructing an architectural project may take a few months or a few years, depending on the size of the project. Throughout the design process, the architect works closely with his or her client. The client might be the owner of the project or someone who represents the interests of the owner. The architect also will work with many other people during the project, including engineers, government officials, builders (sometimes called general contractors), and manufacturers of building materials.

Often, architects must present their project plans to city councils or planning and zoning commissions to gain approval to build the project.

Scale model of Globe Life Park in Arlington, Texas; Harwood K. Smith Inc. with David M. Schwarz, architects



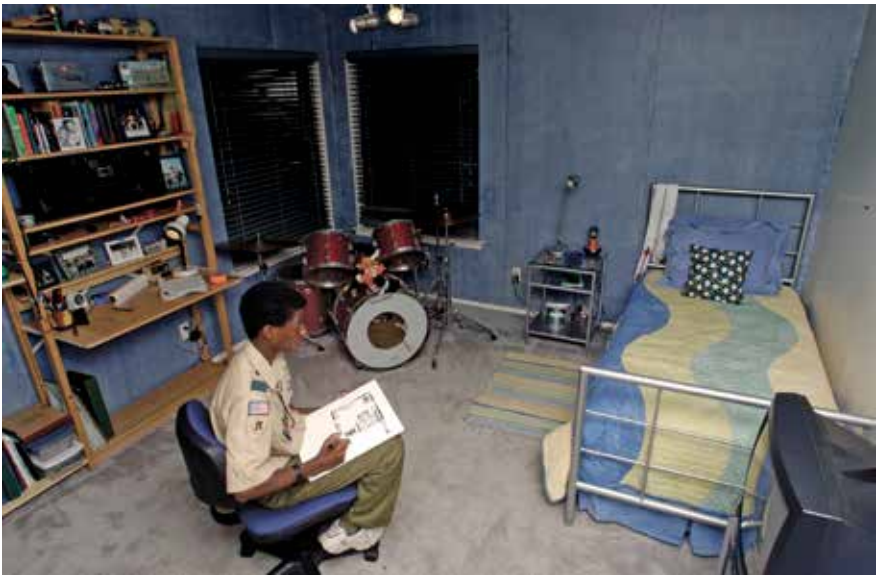
The design process

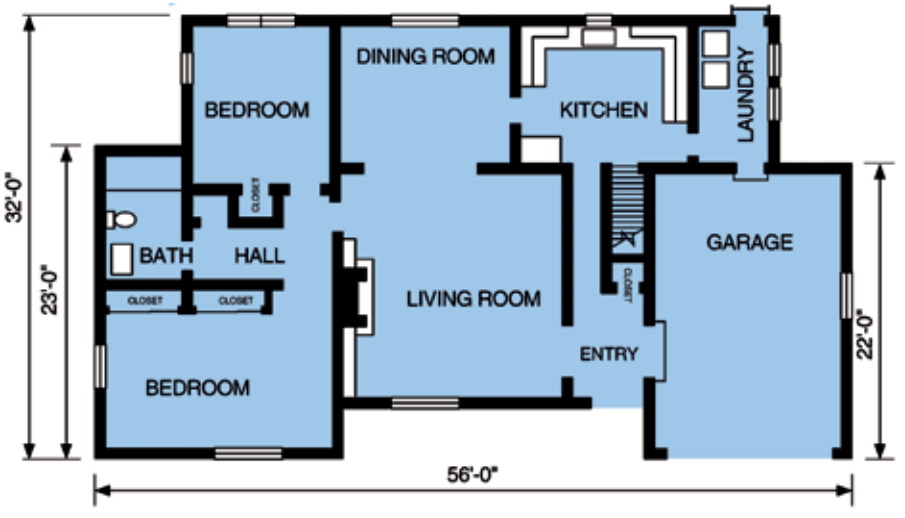
To arrive at a design solution for a project, architects use a problem-solving process that follows several steps, or design phases. Each design phase divides the work effort into small parts so that the architect can consider all the issues that will lead to a successful conclusion. The consistent use of design phases makes it less likely that the architect will forget an important part of the project.

Programming Phase

The first step in the design of a project is to develop a list of requirements for the project, called a *program.* The program describes all of the functions that the building and its surrounding site must accommodate, including the relationships of the functions to one another, the needs of each function, and specific goals the project must achieve. The program must address the level of quality and the number of facilities needed by the client. The final form of the program usually is a written document that contains descriptions and diagrams showing important relationships between certain functions, and lists of rooms or spaces and their required sizes. The diagrams sometimes are called "bubble diagrams" because they use round or oval shapes to signify the spaces.

The architect must work closely with the client during the programming phase to understand the client's expectations for the project. The programming phase defines the problem that the architect must solve, and the success of the project can be determined by the quality of work performed in this first step.





For requirement 4, you will need to create a floor plan of a room where you live or where your troop meets. This floor plan shows an entire house.

Schematic Design Phase

Some architects use computers to create renderings of the completed project.

The project's design begins to take shape in this phase. Using the program as a guide, the architect develops general ideas, or *concepts,* to solve the problem of the overall building and site layout. Usually, the architect develops several conceptual plans to find the best solution to the problem. The architect then presents the conceptual plans to the client for review and approval. After analyzing the pros and cons, the architect and client agree to a concept. Then, the architect draws detailed floor plans and site plans based on the final design concept. The architect may meet with the client many times as the design develops.

The architect also begins to design the exterior and interior during this phase. When the schematic design phase is complete, the architect will prepare drawings that show these ideas. Usually, the *schematic design package* includes drawings for a site plan, floor plans, exterior elevations (what the building will look like from all sides), and possibly a three-dimensional, realistic drawing of the building so the client can see how the completed project will look. This perspective view is called a *rendering.* It is a work of art in pencil, ink, oil paints, watercolors, or computer-aided design and drafting (CADD), created by the architect or a commercial artist who specializes in rendering.

Design Development Phase

The architect continues to develop the design concept in greater detail, finalizing interior spaces and refining the exterior appearance. The architect investigates and selects the important materials needed for the exterior and interior construction and determines the systems that will make the building useful to its future occupants, such as air-conditioning, heating, electrical power, lighting, and their supporting structures. All of these systems require space. The architect must make sure that all of the parts fit within the building and within the overall design concept and the owner's budget.

Contract Documents Phase

To make it possible for someone to build the project, the architect prepares instructions for how to construct it. The architect makes detailed drawings of each part of the project so the builder can see how each part fits together. The architect also writes a book of requirements, called *specifications,* that includes the exact materials, systems, and components that will be used in construction. Except for the construction phase, this usually is the longest phase of the design process. It is called the contract documents phase because the plans that the architect prepares will become part of the contract between the project owner and the builder.

The construction phase is an exciting time for the owner, builder, and architect. For architects, it is the phase during which their ideas and concepts become reality.

Negotiation, or Bidding Phase

Once the plans and specifications have been completed, the project owner "offers" the project to one or more builders, called general contractors; each of them determines a cost for building the project. The cost that each builder submits to the project owner for consideration is called a *bid.* The architect frequently assists the client in evaluating the bids and selecting a general contractor. When the architect's client selects a contractor, and that contractor agrees to construct the project, it is called an *award,* and the builder is said to have been *awarded* the contract.

Construction Phase

Once the owner and the builder agree on the cost and sign a contract, construction can finally begin. While the project is under construction, the architect answers the contractor's questions, visits the site to observe the progress of the work, checks to see if the specified materials and systems are being installed, and helps solve problems that arise. When construction is complete, the project owner moves in and the architect's services come to an end.

Parkway Hills Baptist Church, Plano, Texas, phase 3 of construction; Rogers-O'Brien Construction Company, contractor; Leo A. Daly, architect

Sustainable Architecture

Many of today's architects recognize the desire of their clients to create more earth- and eco-friendly structures. They use a variety of methods to incorporate **sustainable architecture** (sometimes called *green architecture*) in their projects. The trick is to strike the right balance between environmental and ecological considerations, budgetary limitations, and community needs.

Experts say that buildings burn up about 40 percent of the total energy consumed in this country and around 70 percent of the electricity used. Architects who design sustainable buildings understand how using alternative methods can result in tremendous energy and cost savings. Among the practices they incorporate are the use of more durable materials for greater longevity, the use of local materials (to support local businesses and cut down on shipping costs) and renewable resources, and conservative use of space, energy, and water.

Renewable resources are those that recover faster than the demand for products they are used to make. Examples include bamboo that can be used for fencing, flooring made from cork, or agricultural waste products that are pressed into fiberboard and used for some cabinetry.

Sustainable architecture has become increasingly important to the building industry and to clients—from homeowners to companies, government offices, and other businesses. They want the completed structure to work together with the surrounding environment, to efficiently fulfill the needs of the users and occupants, and to be conservative with natural resources. Here are some examples of sustainable architecture.

Artists for Humanity EpiCenter, Boston, Mass.; architect/engineer: Arrowstreet Inc. This 23,500-square-foot building uses natural ventilation, ceiling fans, daylighting (a combination of natural and artificial lighting), and is superinsulated. Architects added a heat recovery system that utilizes warm exhaust air exiting the building, and a night cooling system that uses ventilation to lower the temperature in the facility. Solar panels mounted on the roof convert

sunlight into electrical energy for building use. These and other energy-saving techniques have helped Artists for Humanity recapture approximately 100 percent of the building's bottom-line energy costs.

Capitol Area East End Complex, Block 225, Sacramento, Calif.; architect/engineer: Fentress Bradburn Architects. This building has more than 5,500 photovoltaic panels, which produce up to 160 kilowatts of pollution-free energy, resulting in a cooling-cost reduction of up to 40 percent. Architects incorporated an underfloor air system for more efficient distribution of cooled air throughout the building. Its "cool roof," constructed of materials made to reflect the sun's heat, can reduce the surface temperature of the roof up to 100 degrees Fahrenheit, further reducing energy costs.

Clackamas High School, Clackamas, Ore.; architect/engineer: BOORA Architects Inc. Its multiple sustainable features help this high school use about 40 percent less energy than a building of similar scope. The well-insulated building utilizes natural ventilation (which utilizes the distribution of air pressure surrounding a building to enhance the flow of air around doors and windows), daylighting, high-efficiency boilers for heating, and other energy-saving methods.

Energy Resource Center, Downey, Calif.; architect/engineer: WLC Architects Inc. Among the many sustainable features of this building are its cool roof and an evaporative cooling system that operates according to the humidity of the air in the building. The center also generates energy using microturbines, very small turbines that produce electricity. Its windows have low e-glazing, a very thin coating that reduces the transfer of the sun's heat through the glass. The daylighting techniques and efficient lighting used throughout the facility reduce its electric lighting consumption by 40 percent.

Erie Ellington Homes Project, Boston, Mass.; architect/engineer: Elton + Hampton Architects. These homes feature daylighting, are superinsulated, and have high-efficiency glazing on the windows, among other resource-saving methods. Construction costs in 2003 amounted to $92 per square foot, compared with $115 per square foot for the average cost of affordable housing at the time. To help this project fit the needs of residents, Energy Star appliances were installed in every home. (Energy Star is a program administered by the Environmental Protection Agency to identify and promote energy-saving appliances and practices.) Residents save about 50 percent on heating, electricity, and water expenses.

Occupational Safety and Health Administration, Salt Lake Technical Center, Sandy, Utah; architect/engineer: Architectural Nexus. Its high-efficiency chillers, daylighting, cool roof, low-use water fixtures and appliances, and many other sustainable elements allow this building to reduce its energy consumption by 50 percent when compared with buildings of similar scope. The facility is well insulated and also boasts a heat recovery system, efficient lighting, and high-efficiency glazing on the windows.

Rio Grande Conservatory, Albuquerque, N.M.; architect/engineer: Mazria Inc. Among the building's energy-saving features are its mechanical and natural ventilation systems, use of daylighting and other efficient lighting methods, and highly engineered glazing on windows. In designing the conservatory, the architect applied proper building orientation and window sizing and placement, natural heat convection and radiation, and other energy-saving applications. The facility uses only about 5 to 10 percent of the energy normally consumed by a building of similar structure.

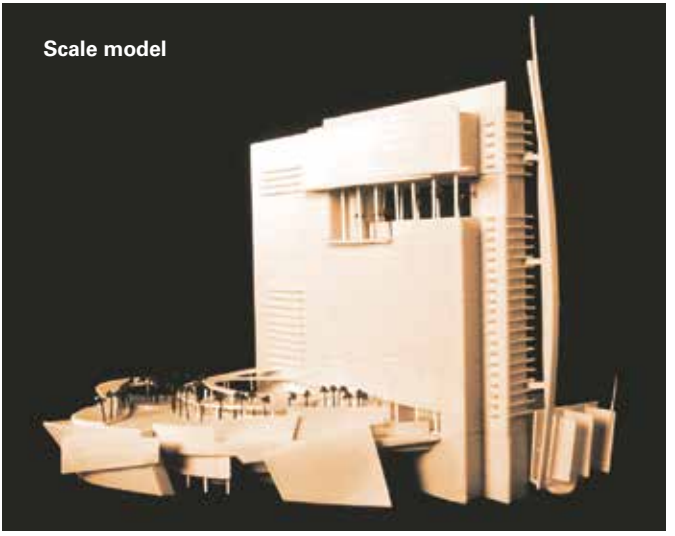
Tools That Architects Use

Just as sports teams must use the proper equipment to play a game, an architect's team must use the right equipment to make architecture happen. Architects use drawings to show how an idea for a project can look and how it can be constructed. An architect's first ideas about a building's design often are expressed through quick freehand sketches made with a pen or pencil on a sketchpad.

As the design of a project becomes more detailed, the architect prepares drawings that have the exact proportions as the real building, only smaller. These are called *scale drawings,* and they are prepared by hand on a drawing table or electronically on a computer. When using a drawing table, the architect draws on a durable paper called vellum, which has a plastic-like texture, and uses drafting instruments to accurately measure and draw the design. Drafting instruments include parallel bars, triangles, a compass, and a ruler that is called a *scale.*

Architects also prepare drawings using computer-aided design and drafting (CADD) software. An architect skilled in CADD can use a computer to draw a building design quickly and accurately. Computers also can be used to prepare three-dimensional drawings and renderings of a project to show the client how the building will look from different views, inside and out. Some architects use computers to create realistic animated images of the building from the point of view of a person walking through it.

Architects use the computer to "build" a building by modeling each of its components and locating all of the parts and pieces in relation to one another through what is called *building information modeling*. BIM software allows designers to produce a digital model of the building in multiple dimensions, with views from all angles. The software extends beyond geometry and allows designers to include aspects of the building such as utilities, electronics, security, space, light, cost estimates, objects in relation to other objects, and more.


Scale model

An architect's studio also is a business office, and it needs all of the tools found in one, such as computers for accounting and writing letters and reports, telephones, a copier, and a fax machine for sending letters and documents over telephone lines.

Another tool architects use to explain their designs to others is a *scale model*. Models can be built of inexpensive materials such as cardboard or polystyrene plastic. Architects use rough study models to explore various design ideas and to imagine the building's final form. Sometimes, after a design has been completed, an architect will make a very realistic and often very expensive model that shows the client and the public how the building will look.

Information that an architect must know and use in building design constantly changes. New ideas develop, new building materials become available, and styles and tastes change. The architect's library includes books and magazines that show how many types of buildings were designed. The library also includes technical books that show how to construct and use building materials and components.

Copies of the various building laws always are found in an architect's library or online. Known as building codes and standards, these laws explain the minimum requirements for building design. Accessibility Guidelines, often referred to as Americans with Disabilities Act (ADA) guidelines, are also an important guide to designing accessible public and commercial facilities. Architects also keep samples of building materials to use in selecting the finishes and colors that will create the visual affects required by the design concept.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Education and Career Opportunities in Architecture

The education and career opportunities of an architect are varied and unlimited. Because of this, people with artistic talent and people with strong analytical and problem-solving abilities can find a place in the architectural profession.

Education

To be able to design safe, useful spaces for many different uses, an architect must have a broad, well-rounded education and must understand many things about how people live and work. An architecture degree takes five or six years to complete and includes courses in art, science, mathematics, history, and humanities (the study of human thought and relationships) as well as literature, writing, and business administration. An architect's education also includes artistic training, such as freehand drawing, mechanical drawing, and model building. Many universities in the United States and other countries house schools of architecture.

Internship

Upon graduation with a professional degree in architecture, the student planning to become an architect must work for a specific period of time in an architect's studio to learn more about architecture as well as construction methods and materials. This is called an *internship,* and like graduates

from medical school, graduates from architecture school are called *interns.* Depending on the college degree and the state in which the candidate is employed, the length of the internship can be three or more years. Generally, the more education a person has, the shorter the internship. Once a candidate has met the educational requirements and completed an internship, he or she is eligible to take the licensing examination.

Registration

Because an architect's work affects the health, safety, and welfare of the public, architects must be registered or licensed. Every state has similar, but not always identical, eligibility requirements. Each state requires some combination of education and experience before an architect is eligible to take that state's licensing exam. Architectural interns who successfully complete the examination are registered and granted a license to practice architecture in that state. Some of the differences in state requirements are exactly what you would expect. For example, California requires special technical knowledge about designing for earthquakes, while Florida requires specialized knowledge about designing for hurricanes.

Every state recognizes professional degrees from colleges that have an accredited architectural program leading to a bachelor of architecture degree (a five-year program) or a master of architecture degree (a one- or two-year program in addition to a four-year undergraduate degree in a subject related to architecture). In most master's degree programs, students select building design, urban design, city planning, interior architecture, or another specialized field. Many times, the four-year undergraduate degree for those pursuing a master's degree is a bachelor of arts or a bachelor of environmental design.

Career Opportunities

Architects have a lot of different career options. Historically, the architect was seen as an individual practicing alone. Today, single, or private, practices exist, but other interesting opportunities for architects exist as well. Some architectural firms are very large and handle very large projects. Some architects specialize in a particular building type, while others take on a variety of projects. Some large architectural firms may have construction and/or real estate divisions.

Architects are especially qualified for city planning and urban design work for local governments, such as townships, cities, and counties. State and federal governments also hire architects to design and plan government facilities, such as a state capitol building. Architects also work in related professions, such as real estate, construction law, politics, or public service. Any task that involves problem solving is appropriate for a person with an education in architecture.

Architectural training, with its emphasis on history, art, humanities, and problem solving, prepares architects to meet a wide variety of challenges, with benefits for all of society.

Star City Casino, Sydney, Australia; The Hillier Group, architect

How to Learn More About Architecture

If your activities toward earning the Architecture merit badge have stirred your interest, here are other ways you can learn more about architects and architecture.

Visit your local library. Whether large or small, the library likely will have a section on architecture and architectural history. The library also will have biographies about well-known architects and probably books with drawings and photographs of notable buildings.

Notable Architects

Renaissance

Leon Alberti (1404–72; Italy)
Geovanni Bernini (1598–1680; Italy)
Donato Bramante (1444–1514; Italy)
Filippo Brunelleschi (1377–1446; Italy)
Michelangelo Buonarroti (1475–1564; Italy)
Inigo Jones (1573–1652; England)
Andrea Palladio (1508–80; Italy)

Baroque

Jose Churriguera (1665–1725; Spain)
Nicholas Hawksmoor (1661–1736; England)

Neo-Classical

Charles Bulfinch (1763–1844; America)
Thomas Hastings (1860–1929; America)
Claude-Nicolas Ledoux (1736–1806; France)
Sir John Soane (1753–1837; England)
Stanford White (1853–1906; America)

Pre-Modern

Gustave Eiffel (1832–1923; France)
Sir Joseph Paxton (1803–65; England)

Early Modern

Henry Bacon (1866–1924; America)
Antonio Gaudi (1852–1926; Spain)
Marion Mahony Griffin (1871–1961; America)
Walter Gropius (1883–1969; Germany)
Le Corbusier (1887–1965; Switzerland/France)
Charles Rennie Mackintosh (1868–1928; Scotland)
Erich Mendelsohn (1887–1953; Germany)
Ludwig Mies van der Rohe (1886–1969; Germany/America)
Louis Sullivan (1856–1924; America)
Paul Williams (1894–1980; America)
Frank Lloyd Wright (1867–1959; America)

Mid-Modern

Alvar Aalto (1898–1976; Finland)
Denise Scott Brown (1931– ; America)
Michael Graves (1934– 2015; America)
Eileen Gray (1878–1976; Ireland)
Philip Johnson (1906–2005; America)
E. Fay Jones (1921–2004; America)
Louis Kahn (1901–74; America)
Richard Meier (1934– ; America)
Richard Neutra (1892–1970; Austria)

Late Modern

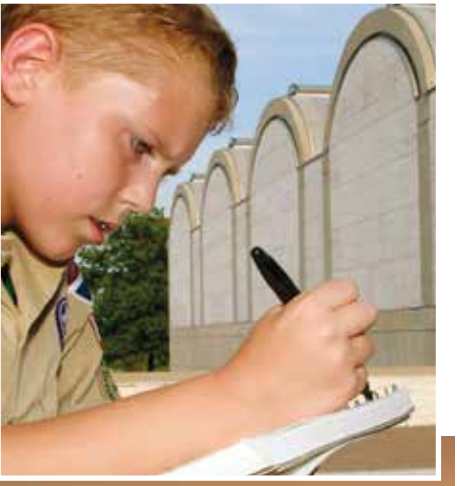
Frank Gehry (1929– ; Canada/America)
Kohn Pederson Fox (Firm in America, China, and England)
I. M. Pei (1917– ; America)
César Pelli (1926– ; Argentina/America)
Edward Durell Stone (1902–78; America)
Kenzo Tange (1913–2005; Japan)
Bernard Tschumi (1944– ; Switzerland)
Brooks + Scarpa (Firm in America)

Arts and Crafts Movement

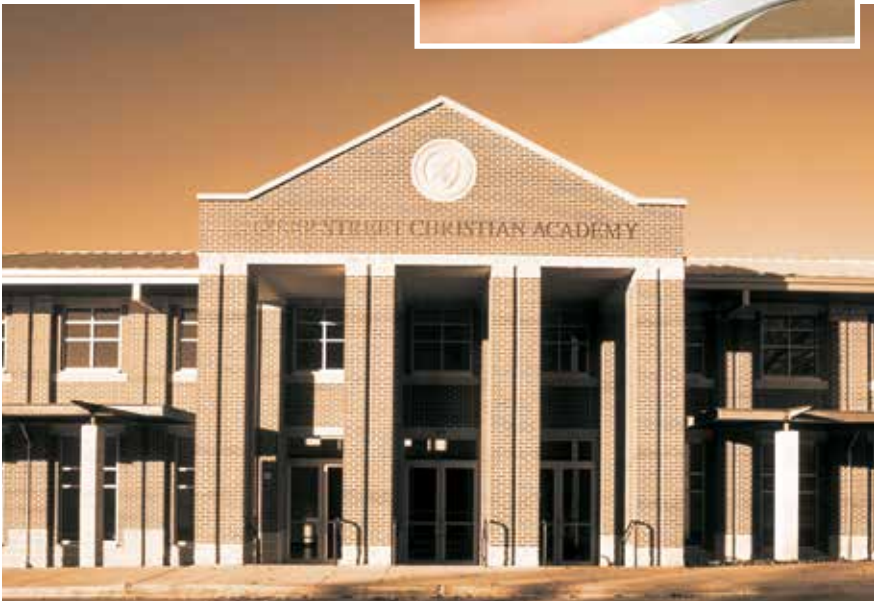
Charles (1868–1957; America) and Henry Greene (1870–1954; America)
Bernard Maybeck (1882–1957; America)
H. H. Richardson (1838–86; America)

If you are interested in a career in architecture, look for opportunities at school to develop skills that will be useful to you as an architect. Consider courses in art, science, mathematics, history, and computer and hand drafting. Try to recognize the principles taught in these classes that will be useful to you as an architect. Also, an architect must be a good leader and team player. The teamwork and leadership skills you learn as a Scout will help prepare you to lead a design team as an architect.

Start carrying a sketchbook. You can get one at most stores that sell art or school supplies. Each day, you can add a sketch of a building or landscape scene that you see and add notes about the people and activities you find there. This activity will sharpen your ability to observe and visualize, and it will help develop your skill in design. If you would rather photograph the buildings you see, you can keep a photo album of the interesting places you visit. Or, make a scrapbook of pictures or articles about interesting buildings, gardens, and landscapes that you find in newspapers and magazines.



Another good way to learn more about what architects do would be to approach a local architect about summer or after-school employment.



Tyler Street Christian Academy, Dallas, Texas; The Beck Group, architect

Glossary of Architectural Terms

arcade. A series of arches carried on columns.

atrium. An open courtyard surrounded by a building, or a covered entrance hall.

building information modeling (BIM). The process of using a computer program to "build" a digital model of all systems and components that make up the building.

buttress. A masonry or brickwork projection that strengthens a building.

clerestory. The part of a building that rises above the roofs of the other parts.

computer-aided design and drafting (CADD). Computer programs architects use to make drawings and visualize a building.

cornice. A decorative projection along the top of wall.

cupola. The element placed at the roof ridge to provide light or ventilation; common to barns.

dimension. A scaled measurement of building elements shown on a drawing.

dormer. A window placed vertically in a sloping roof.

façade. The side of a building emphasized architecturally, usually the front of a building.

fall. A building's principal room, or sometimes the principal building in a complex.

flute, or fluting. Vertical channeling, roughly semicircular in cross section and used principally on columns.

footing. The bottom element that anchors a wall or column to the ground.

head. The top of a door, window, or other opening.

jamb. The side of a door, window, or other opening.

joist. A timber stretched from wall-to-wall to support a floor above.

keystone. The central, uppermost element in an arch.

Leadership in Energy-Efficient Design (LEED). A certification system that rates buildings' energy efficiency.

loggia. A covered space or building open on one or more sides with arcades or colonnades.

molding. In architecture, a continuous, narrow surface designed to break up a wider surface as an accent or decoration.

pillar. A column.

pitch. The slope of a ramp or roof.

plotter. A printer used to print drawings on large sheets of paper.

portico. A covered entrance to a building.

rafter. The beams that form the support for a roof.

rendering. A detailed artistic drawing that shows the anticipated final appearance of a building.

rose window. The large, circular window with tracery and stained glass that is frequently used in the façades of Gothic churches.

rotunda. A round building, or a large round room.

scale. A reduced-size proportion used with drawings and models to represent the true size of a building or design (for example: $^1/_4$" = 1', 1' = 20', etc.).

sustainable architecture. Architecture that includes environmentally conscious design techniques.

tracing. A way to duplicate a drawing by following lines seen through a transparent medium such as paper vellum.

truss. A framework of beams attached in a manner to brace each other and to form a single structural element.

vellum. A durable, high-quality paper used for drawing and printing.

Loggia at a monastery in Catalonia, Spain

Architecture Resources

Scouting Resources

Art, Computers, Drafting, Engineering, Model Design and Building, Photography, Surveying, and *Sustainability* merit badge pamphlets

With your parent or guardian's permission, visit Scouting America's official retail site, **scoutshop.org**, for a complete list of merit badge pamphlets and other helpful Scouting materials and supplies.

Books

ARCHITECTURAL DESIGN, HISTORY, AND NOTABLE BUILDINGS

Ching, Francis D.K. *Architecture: Form, Space, & Order,* 4th ed. John Wiley and Sons, 2014.

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Getty Center, Los Angeles, California; Richard Meier, architect

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Salvadori, Mario. *The Art of Construction,* 3rd ed. Chicago Review Press, 2000.

Werner, Megan. *Model Making.* Princeton Architectural Press, 2011.

Organizations and Websites

American Architectural Foundation
202-787-1001
archfoundation.org

The American Institute of Architects
1735 New York Ave. NW
Washington, DC 20006-5292
800-242-3837
aia.org

The American Institute of Architecture Students
202-808-0075
aias.org

Association of Collegiate Schools of Architecture
1735 New York Ave. NW
Washington, DC 20006-5292
202-785-2324
acsa-arch.org

Association of Licensed Architects
847-382-0630
alatoday.org

National Council of Architectural Registration Boards
202-879-0520
ncarb.org

National Organization of Minority Architects
noma.net

Society of American Registered Architects
888-385-7272
sara-national.org

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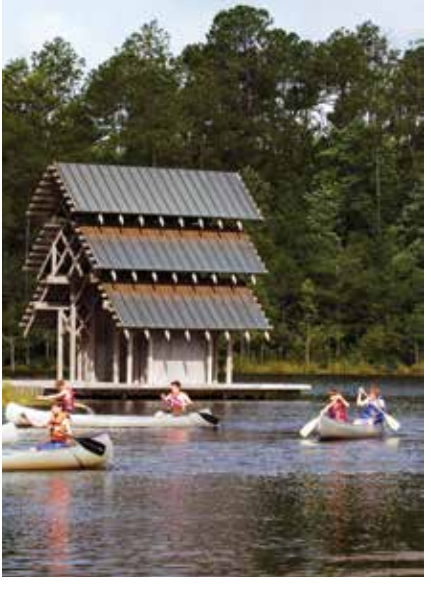

Pine Eagle Chapel, Camp Tiak Scout Camp, near Wiggins, Mississippi; Fay Jones + Maurice Jennings Architects

Harwood K. Smith Inc., courtesy—pages 23 and 33

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Dan Bryant—pages 40 and 41 *(Scout drawing)*

Webb Bridge Park Master Plan

SOCCER FIELDS
Construct 3 (220' x 300') sodded, irrigated fields with a restroom/concession building (1000sf). Parking east and west of the fields will provide 60 spaces/field. The lower field will feature a sand profile drainage system. An optional feature includes construction of embankment seating and lighting at the lower field.

WEST VALLEY TRAIL LOOP
Selectively clear for the gravel trail alignment and minimize ground disturbance by using a special aggregate base technique.

WEST VALLEY NATURAL AREA
Restore the deeply incised watercourse. Develop interpretive wood chip trail with signage and benches.

MULTIUSE TRAIL
Develop 12' wide, 7500' length, ADA-accessible trail for pedestrians, cyclists, and wheelchair users. Provide grade-separated crossings of the park drive. Rest benches and emergency telephone to be included.

WHITE OAK PAVILION
Construct a rustic themed pavilion (approx. 1800sf) overlooking the valley from a promontory in a grove of live oaks. Develop several outdoor picnic stations in this vicinity. Include reforestation planting and arboricultural treatment as appropriate.

POST OAK PAVILION
Construct a rustic themed picnic pavilion (approx. 1600sf) situated in the post oak grove. Develop additional picnic stations and restore upland mesophytic forest community.

PARK ENTRANCE
Construct paved driveaway and deceleration lane with sidewalk. Entry sign and associated landscape development to include shrub layer and low-maintenance groundcover plantings. Ensure development of dense screen buffer.

Note: This master plan is referenced in the chapter "Landscape Architecture and Design."


EAST VALLEY NATURAL AREA
Complete the restoration of the creek banks. Develop interpretive signage and benches. Complete aquatic plantings at pond and restoration of upper valley.
UTILITIES
Extend fire protection and portable water to serve new facilities. Add parking and parkway lighting in concert with local electrical provider. Develop septic fields in sports fields to support restrooms.
POND
Permanent water feature to provide for all irrigation needs. Safety shelves with aquatic plantings are included.
TENNIS FACILITY
Construct four lighted courts in sets of 2. Develop previous concrete access drive and a 30-car gravel parking area, walkways and a rustic pavilion (900sf) overlooking the East Valley and Pond. Construct a masonry restroom/pro shop (900sf).
CHILDREN'S PLAY AREA
Construct 12,000sf play area to include static equipment and swings for a variety of age groups. Include ADA compliant features. Construct an adjacent rustic pavilion (900sf) together with picnic stations. Restore upland mesophytic forest community.
BASEBALL QUADPLEX
Construct four fields (2 @ 200', 2 @ 285') to include lighting, irrigation, sports turf, fences and backstops, masonry restroom/ concession (1000sf), 60 parking spaces/ field, sidewalks and spectator furnishings (bleachers, benches, picnic tables). Complete landscape development.
MAINTENANCE FACILITY
Construct a masonry storage/office building (2000sf) and gravel yard suitable for storage of maintenance vehicles and supplies. Complete screen planting as appropriate.
PREVIOUS CONCRETE DRIVEWAY
One-way, 18' wide, 4300' length, previous concrete driveway. Also open to cyclists.
FOX ROAD
KIMBALL BRIDGE ROAD
JONES BRIDGE
0
200
400

Landscape Architecture Requirements

Always check scouting.org for the latest requirements.

1. Go to a completed landscape project that a landscape architect has designed. Before you visit the site, obtain a plan of the design from the landscape architect if one is available.

2. After completing requirement 1, discuss the following with your counselor:

   (a) Tell whether the design had separate spaces, a defined point of entry, a clear path system, and sun and shade variety.

   (b) Discuss how any structures, the designated seating, eating, or parking areas suited the overall design.

   (c) Explain how the design reflected consideration for the comfort, shelter, and security of the users.

   (d) Discuss how the choice of trees, shrubs, and ground covers used in the project contributed to its appeal and function.

3. Identify five shrubs, five trees, and one ground cover, being sure that you select examples of different shapes, sizes, and textures. With the help of your counselor or a local nursery, choose plants that will grow in your area. Bring pictures of the different planting materials or, if possible, examples of their branches, leaves, or flowers to a group such as your troop or class at school. Be prepared to tell how you might use each in the design of a landscape and the maintenance that would follow.

4. After obtaining permission from the appropriate authority, look at and study a place of worship, school grounds, or a public building and identify where most people arrive by bus or car. Then do the following:

   (a) Using a measuring tape, measure and draw the main site entry and its nearby area. Define the scale of your drawing. Be sure to include the driveway and sidewalk or path that leads to the building's main entry. Indicate any sidewalks, structures, trees and plants, lights, drains, utilities, or other site furnishings within the study area. Make two copies of this plan to save the original, then do 4b and 4c using the copies.

   (b) On one copy of your site plan, use directional arrows to indicate where the water drains across the site, where ditches occur, and where water stands for a longer period of time.

   (c) Decide how you can make the place safer and more comfortable for those using it. Redesign the area on another copy of the plan. You may want to include new walks, covered waiting areas, benches, space-defining plantings of trees and shrubs, and drainage structures.

5. Identify three career opportunities that would use skills and knowledge in landscape architecture. Pick one and research the training, education, certification requirements, experience, and expenses associated with entering the field. Research the prospects for employment, starting salary, advancement opportunities, and career goals associated with this career. Discuss what you learned with your counselor and whether you might be interested in this career.

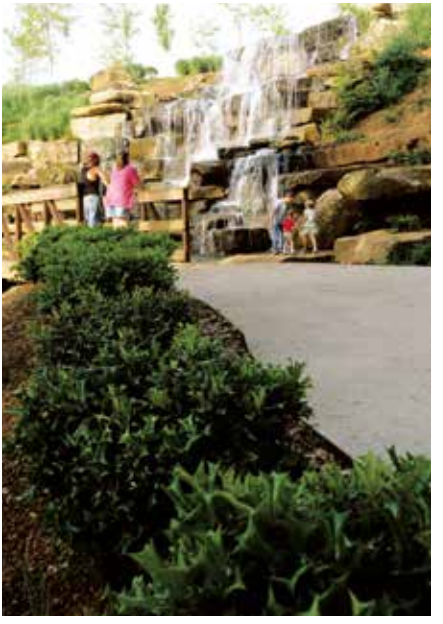
Landscape Architecture Contents

Introduction to Landscape Architecture

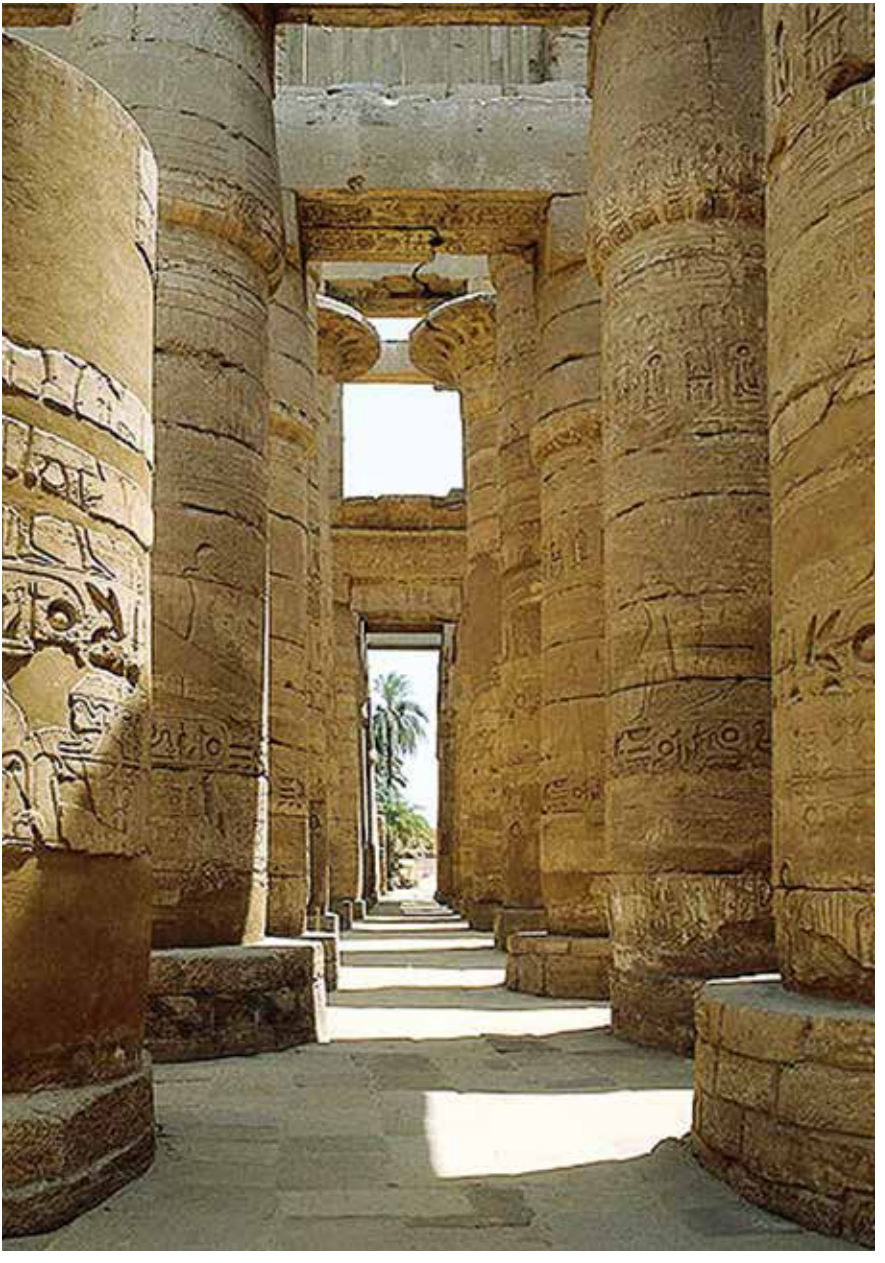
Your earliest experience of landscape architecture was probably in a sandbox, where you poured water into a moat around a castle you built using an overturned flowerpot. Then you jammed a few dandelions into the sand to create a garden near the castle. A few years later you did some site planning, choosing to build your snow fort on the north side of your house so the sun would not melt it too fast. After a season or so, you and a friend framed a tree house in an oak because the leaves would give plenty of privacy for most of the year.

What you have known since you were a toddler is that a landscape architect creates places that people care about and want to visit.

These outdoor places are living "rooms." The sky or leafy branches overhead make a ceiling, the ground or a body of water makes a floor, and hedges or fences make walls. Benches, light fixtures, and sculptures make the furnishings. Steps, paths, and trails link separate rooms such as gardens, golf course holes, and sports fields.



Look around at the outdoor rooms of your community. Notice neighborhood parks, soccer fields, school grounds, places of worship, office parks, shopping malls, cemeteries, and waterfront recreation areas. Who designs these places? Chances are that landscape architects were involved in the planning and design of all these outdoor spaces.



The Deep Roots of Landscape Architecture

The practice of landscape architecture is as old as the practice of architecture because the two fields originally were one. It was not until the middle of the 19th century, when city planners and architects recognized the need for public spaces designed specifically for public enjoyment, that landscape architecture became a separate vocation. As a profession, landscape architecture dates only to the 1850s, but as an art, it dates back thousands of years.

1400 B.C.–A.D. 1850: Gardens

Ancient Egyptians arranged their homes and grounds in a structured symmetrical design that kept out desert winds and wild animals, and provided shade, food, and pleasure. The walled gardens featured trees planted in rows to look like columns and reflecting pools that helped to balance the height of the trees. Straight paths or irrigation canals were laid along an axis, a line that divides space and connects two or more points. This linear plan shows up today in the layout of major cities.

During the fifth century B.C., the Greeks erected buildings and created outdoor spaces based on specific design principles that are still used today. The Greeks planned their cities in relation to the shape of the land. Rather than shaping the land and dividing it into linear spaces like the ancient Egyptians, the Greeks incorporated natural land contours and features into their city designs. They designated certain sites as sacred and made public places for parks and markets, and they laid out athletic fields for events such as the Olympic Games.

Cloister garden

During the first century B.C., the Romans put Greek knowledge and organizational ideas to use in their landscapes. They made beautiful cities that were functional. Homes had piped water, interior courtyards open to the sky, and covered walkways or vine-covered arbors that connected the house to the garden. Trees and shrubs were clipped into fanciful shapes, or topiaries.

The Middle Ages followed the fall of the Roman Empire in the fifth century. Within fortified walls, monasteries served as self-sufficient centers of intellectual and agricultural activities. Here, monks cultivated separate gardens for medicinal plants, vegetables and cooking herbs, and flowers grown for decoration in cathedrals and for festivals. These *cloister gardens* provided a quiet, secluded place for meditation. From a well or fountain at the center of the courtyard, four paths branched out to the north, east, south, and west, symbolizing the four rivers of Paradise radiating from the "living water," or spiritual center.

As the Middle Ages came to a close, Marco Polo of Venice returned in 1295 from a lengthy stay in China. Through his writings, the Western world learned about Oriental gardens. These asymmetrical planting arrangements had two visually balanced sides, but they did not mirror each other.

Chinese gardens focused on small parts of a larger composition and small moments, like the first plum blossom of the new season. Japanese gardens, strongly influenced by Chinese garden art, reflected a miniature version of nature. Strict rules of design required a symbolic meaning to be attached to every element in the garden. For example, a moss-covered rock surrounded by raked sand might represent an island in the sea.

As the threat of invasion declined, people in Europe extended their gardens beyond the walls of monasteries and castles. During the Renaissance in Italy, where the landscape was steep, designers created gardens as a series of outdoor rooms connected by terraces, staircases, and ramps. Skillful engineering produced spectacular fountains and waterfalls. These *villa gardens* combined formal shapes with the natural setting and panoramic views.

French garden designer André Le Nôtre turned classical garden design into a high art. He adapted the terraces and staircases of the Italian villa garden to the flat French landscape and allowed the long axis and distant view of the setting to add to the dramatic effect. At the world-renowned Versailles, Le Nôtre worked with architect Louis Le Vau to unify the buildings, gardens, and site.

Gardens on the Versailles grounds

For centuries, English gardens contained borrowed elements from medieval and Renaissance gardens. In the 1700s, Lancelot "Capability" Brown and other "place makers" influenced people to turn the formal gardens of country manors into natural landscapes. Deliberately staged winding paths, irregular lakes, and sweeping lawns replaced the straight axis, rectangular pools, and geometric gardens. In the next century, these changes led to the development of enormous parklike estates.

English country gardens

1850–1950: Cemeteries, Public Parks, and Suburbs

As American towns grew into cities, people feared that overcrowded graveyards threatened their health, and they waged campaigns to relocate burial grounds to rural areas. Mount Auburn, located in a suburb of Boston, was the first landscaped cemetery in the United States. The English natural landscape style influenced the design to create a hilly, wooded setting. When the cemetery opened to the public in 1831, city dwellers and tourists flocked to it. Rural cemeteries provided green sanctuaries away from bustling urban areas.

Frederick Law Olmsted, the first to call himself a landscape architect, understood the public's need for scenic open spaces. He traveled to Europe and England to study the great public grounds and gardens, and returned with the desire to create "people's parks" for all social classes. In the 1850s, Olmsted and Calvert Vaux, his architectural partner, designed Central Park in New York City. They composed a rural landscape that became the model for naturalistic parks throughout the United States. Olmsted also promoted a national forest park system and the preservation of natural wonders such as Niagara Falls.

In the late 1860s, Olmsted designed one of the nation's first residential subdivisions in a suburb outside Chicago. He planned curving streets, paved sidewalks, street-side tree plantings, and natural public spaces. Railroads and tree-lined parkways connected the suburb to the city. With the success of his projects, Olmsted pioneered city planning and beautification efforts, as well as landscape design intended more for the modern public than the affluent.

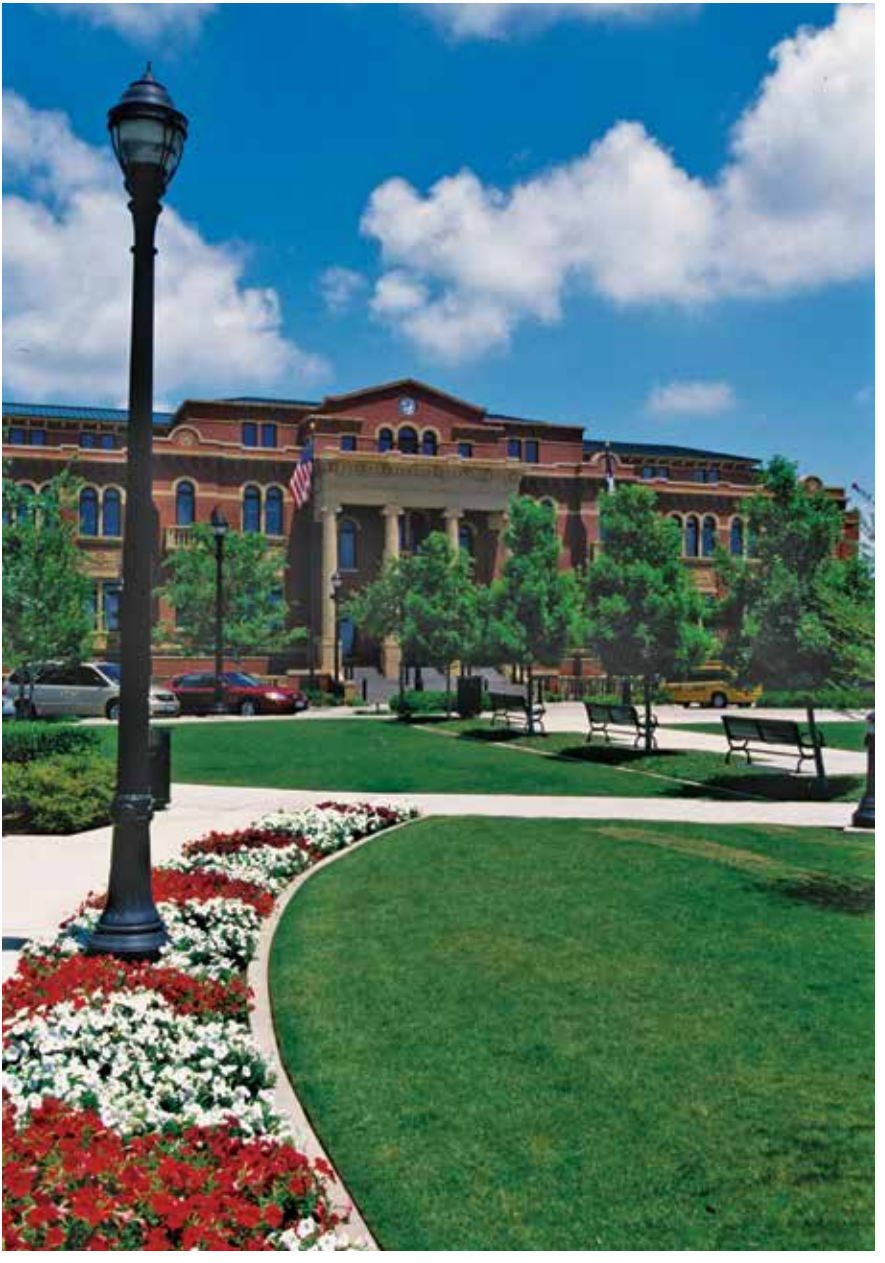
1950–21st Century: Land-Use Planning and Environmental Work

In the prosperous years after World War II, millions of Americans bought new cars and settled into new homes in new suburbs. The population boomed, and cities and towns sprawled farther into the countryside. In the ’60s and ’70s, malls sprang up to provide convenient shopping. In the ’80s, multiuse complexes such as office parks began to appear. The suburbs became not only places to live and shop, but also places to work. Landscape architects planned circulation routes for new roads and recreational trails, designed mega-mall and office park campuses, and created common outdoor spaces for planned residential communities.

People began to worry about using up our natural resources and polluting the environment. Landscape architects developed comprehensive plans to make the best use of large land areas while protecting or restoring resources. They also determined ways to redesign urban centers and preserve historic areas.

As visionaries, landscape architects have the opportunity to take a leading role in shaping our future. Their challenge is to balance the growth, health, and natural beauty of our communities with environmentally friendly design, technological advancements, and diminished resources. These are exciting times to be a landscape architect!

Landscape architects today are leaders in the area of sustainable, "green" designs.



The Field of Landscape Architecture

Landscape architecture addresses the complicated relationships between constructed and natural environments. It deals with the planning, design, and management of land not covered by buildings. Landscape architects create outdoor spaces that are more safe, healthy, environmentally resilient, pleasing, and workable than they would be without a design plan. The ultimate goal is to design a site that unifies the buildings, the beauty of the natural setting, and the site's intended use.

People often confuse landscape architecture with gardening and landscape maintenance. In general, landscape architecture is concerned with the methodical design of any outdoor space, whether it is a small front yard or a large public plaza. While some landscape architects choose to work on residential projects, most landscape architects focus their work on private developments and public spaces such as parks, urban plazas, parkways, retail areas, and school campuses. However, because landscape architects know how to design irrigation systems, solve drainage problems, and construct retaining walls and decks, some choose to design residential projects.

Landscape architecture covers a broad field of land development projects. The range of work includes land closely related to a single building, such as a front yard, and land around and between groups of buildings, such as the grounds of assisted-living communities, industrial complexes, and zoos. The work also includes land bordering transportation and utility corridors, such as areas along freeways, waterways, and power easements, as well as open-space land, such as parks and recreation areas.

Landscape architecture is an interdisciplinary profession that often features collaborative design teams. Training includes design, engineering, technical analysis, urban planning, historical preservation, natural resources, and the study of human behavior. Because of this diverse education, the landscape architect is a natural candidate to lead a team of design professionals, including architects and civil engineers, through a land development project.

Landscape architects participate at all levels of land-use decision making, from site-specific to comprehensive regional planning. One of the main goals of the profession is to guide changes in land use.

Site planning concentrates on an area that has already been designated for a specific use, such as a 26-acre office park. The plan brings natural features, pedestrian and auto circulation, building and facility locations, and landscaping into a cohesive design.

Land-use planning focuses on large-scale developments that are subdivided into several sites for different uses. For example, a 7,400-acre development for a new town would be subdivided into areas for single-family and multifamily housing, health care and educational facilities, commercial and industrial centers, and recreation.

Land-use planning deals with even larger land areas. It involves the comprehensive evaluation of land use, conservation, and restoration for a large area, such as a county or region. This level of planning considers economic, social, and environmental issues.

The profession of landscape architecture is committed to finding a balance between meeting the community's need for development and protecting the natural environment. The landscape architect stands between the client's interest and the public's interest, and has a responsibility to serve both.

The Branches of Landscape Architecture

As you know from reading about the history of landscape architecture, garden design and plant selection have long been the basis of this profession. Today, however, most of the business has shifted to the more complex issues of mixed-use developments, water quality, and regional planning and design. Projects range from private gardens to public recreation areas, planned communities, transportation systems, forest parks, and storm water management.

The field of landscape architecture offers opportunities to work on a variety of planning and design programs. Landscape architects can choose a broad practice or focus on specific areas. Below are descriptions of the most popular specialties.

Residential Landscape Design

Residential landscape design involves working with homeowners to design their landscapes to fit their specific needs. For new home construction, this specialty will sometimes include determining the best placement of the home on the building site. Front yards are designed differently from backyards. Front yard landscapes need to be welcoming, with plantings that complement the home, and an entry walkway designed to direct one's eye to the front door. Framing the home with trees is another key feature of a well-planned front yard. Backyard landscape designs will often include spaces for play, entertainment, and relaxation. Vegetable gardens, lawns, kids' play areas, patios, decks, swimming pools, ponds, kitchens and fireplaces are examples of such spaces. Trees and shrubs, often illuminated with landscape lights, are strategically located for visual interest and to provide buffers for sound and privacy.

Commercial Planning and Design

Commercial planning and design encompasses all the ways land is used by the public in suburban areas. Examples include office and business parks, retail areas, government offices, sports fields, and places of worship. The landscape architect determines the best sites for buildings, parking lots, walkways, and green spaces. Then he or she designs the landscape and hardscape features.

Community Planning and Design

The community planning and design specialty focuses on developing comprehensive plans for single-family and multi-family residential neighborhoods. The master plan includes street arrangements, open spaces, sidewalks, and recreation areas. The landscape architect also designs entry features, such as entry walls or gates, signage, lighting, and landscape, for these community developments.

Park and Recreation Planning and Design

Park and recreation design has evolved in the past two centuries. Activity parks used to be large open spaces with playground equipment and a ball field. Today's parks provide areas for various recreational activities such as skateboarding, cycling, and soccer. Landscape architects take care to separate pedestrian and vehicular traffic.

Some landscape architects work in public-sector agencies, such as the U.S. National Park Service and U.S. Forest Service.

Landscape architects plan and design not only parks as small as a city block, but also huge natural areas to create national forest parks and wildlife refuges. Designing something as large as a national park is quite a feat compared to remodeling a lawn; the landscape architect must be careful to protect the environment that already exists, including endangered species' habitats; wetland areas; natural light and sound sources; and trailheads, camping, and visitor facilities. All plans must follow specific National Park Service and governmental guidelines, such as the National Environmental Policy Act that stresses a "balance between use and preservation of natural and cultural resources."

Campus Planning and Design

Any site with two or more buildings accessible to the public is considered a campus. However, campus planning and design is most often associated with the grounds of universities and other educational institutions. The landscape architect creates a master plan based on the various functions of the campus. The plan includes outdoor living, learning, and recreational spaces; pedestrian and vehicular routes; and building sites for future expansion.

Urban Planning and Design

Urban planning and design focuses on city centers. Projects usually involve downtown redevelopment and often include historic restoration. The landscape architect must balance densely populated areas with the need for open space. Much of the design deals with hardscapes such as plazas, parks, and promenades. *Streetscaping* plans concern the improvement of the street environment. These plans include designs for paved surfaces, benches, light fixtures, trash receptacles, signs, and plant materials.

Resort Planning and Design

Resort planning and design specializes in vacation and resort facilities such as hotels, theme parks, golf courses, and beach resorts. The landscape architect works with the owner to create the desired effect of the resort. Whether for an amusement park, a links-style golf course, or a Caribbean development, ultimately, the project creates a place of pleasure, escape, and relaxation.

Historic Preservation

Landscape architects work on the preservation, commemoration, and restoration of historic sites and have built landscapes throughout the world. They must often strike a balance between contemporary use and preserving the historic legacy of a site.

Environmental Planning and Design

Environmental planning and design promotes the wise use and management of our natural resources. Plans might preserve woodland wildlife habitats and redwood forests, conserve water and solar energy, or reclaim wetlands. Because of today's concerns for balancing the care of the environment with the needs of the community, this is one of the fastest growing specialties of landscape architecture.

The Sinking City

Mexico City sits atop water, but the city must pump the water it uses across mountain ranges at outrageous costs. The water below the city is not from rivers, but from aquifers. Pumping water out of these underground lakes causes the land to subside, or sink. Today the center of Mexico City is 34 feet lower than when Montezuma II ruled the Aztecs in the 1500s.

Smart Landscape

There are arid regions throughout the United States that don't receive the rainfall necessary to sustain bountiful landscaping. Therefore, landscape architects use a type of landscaping called **xeriscaping** in which every effort is made to use water-conserving methods and avoid losing water to evaporation or run-off. Naturally, cactus is one of the plants used.

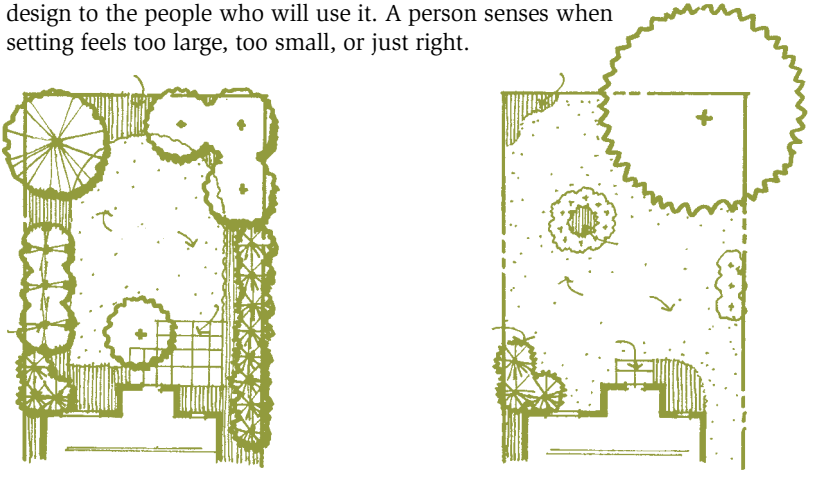
Landscape Architecture Basics

A good design plan does not just happen. It depends on the combination of artistic principles, appropriate materials, and scientific analysis. Yet, a dash of imagination guarantees that no two landscape architects or Scouts will develop the same plan for the same project.

Design Basics

The Greeks figured out more than 2,000 years ago that great design is based on certain principles and values. The application of the following design basics creates a cohesive and harmonious composition.

In landscape design planning, *scale* is the relationship of the design to the people who will use it. A person senses when the setting feels too large, too small, or just right.



The plan on the *left* is well-balanced; the elements in the plan are proportionate. The plan on the *right* has ill-placed elements that are out of proportion.

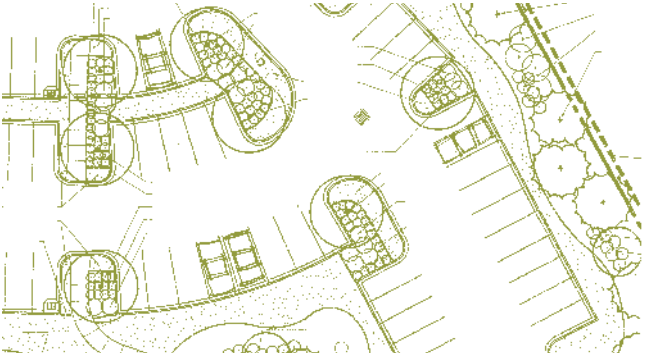
Sculpture serves as an accent to the landscape.

Proportion refers to the proper relationship of one part of the composition to another, and to the whole. The important question is, *does that element look correctly placed?*

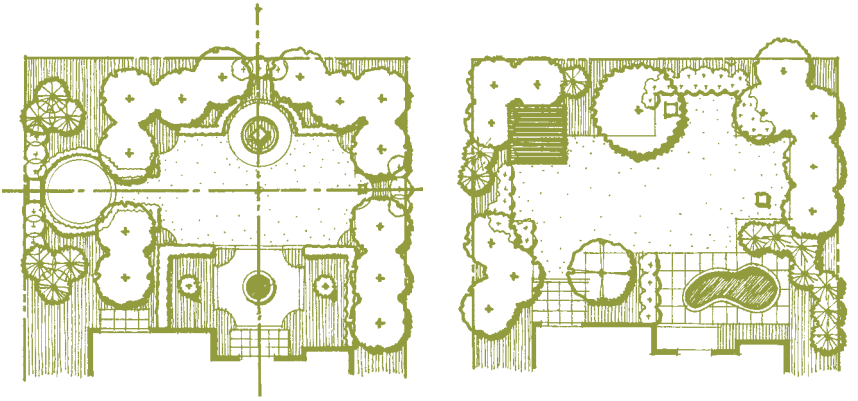
Emphasis, often called *accent,* is anything in the design that creates a spot of interest. The effect could be a contrast in color, like a tall green cypress tree against a vivid blue sky. It could also be a contrast in form or texture.

Repetition is the duplication of the same element several or many times.

Rhythm, often called *sequence,* breaks the monotony of repetition. It changes the routine by introducing, at regular intervals, one or two new elements into the series.



This plan for a parking lot shows how ornamental planters and flower beds use *rhythm* to help break up the monotony of the parking spaces.



The symmetrical plan, *left,* gives the area a more formal feeling. The asymmetrical design, *right,* gives the area a more relaxed feeling.

Balance is the visual stability of a composition. A symmetrical arrangement, with mirrored images on each side of an axis, gives a sense of formality. An asymmetrical design, with an irregular yet balanced arrangement of objects, gives a sense of informality.

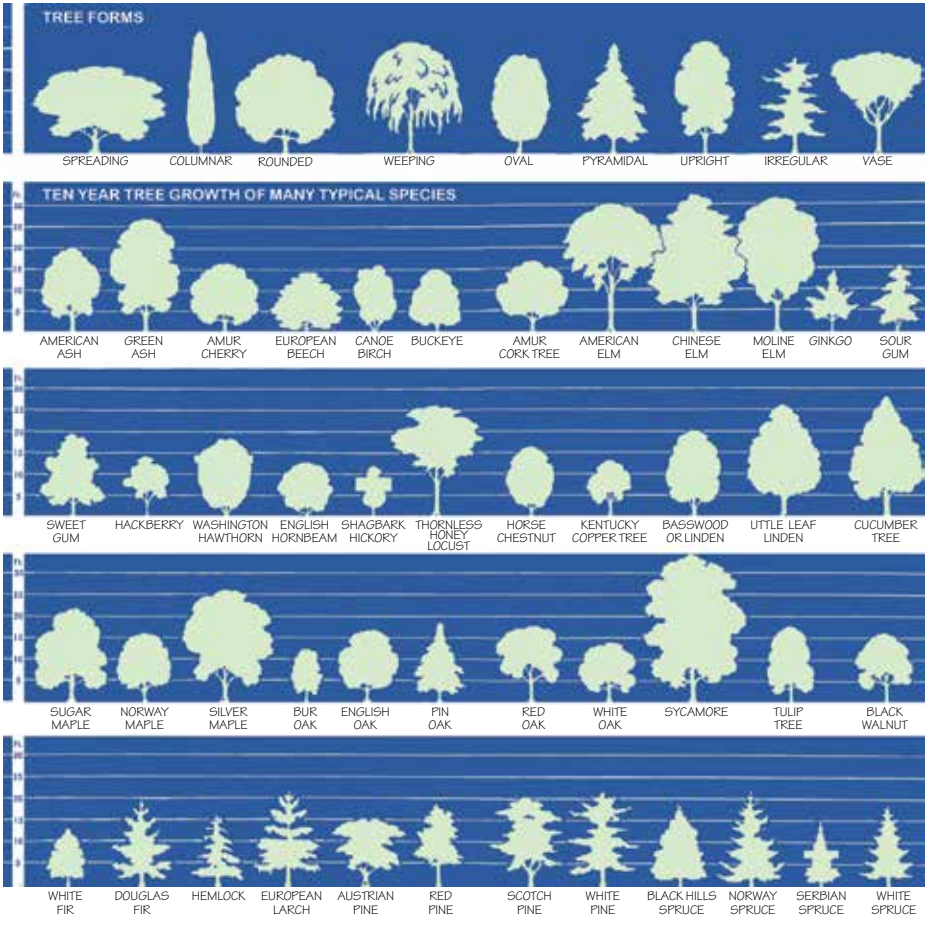
Unity is the quality of being complete—when the separate elements serve the whole and nothing seems out of place or added for decoration. When all elements come together convincingly, the goal of the overall design has been met.

Materials

A landscape design changes daily as the plants and trees grow, flower, and eventually die and materials weather. The landscape architect must keep in mind not only what the plants will look like after installation, but also what they will look like at full growth. The design professional selects trees, shrubs, and ground covers that will thrive in the particular soil and climatic conditions.

Landscape architects choose plant materials for their unique characteristics and contributions to the design plan.

Deciduous trees and shrubs often turn different colors and lose their leaves during fall and winter. They are important in the landscape because they block the sun's rays in the summer and allow light through in the winter.



This chart shows the shapes and sizes of trees, many of which you have probably seen at parks and other landscaped areas.

Evergreen trees and shrubs keep their foliage year-round. They stay "ever" green and can provide a barrier to sound and wind as well as a visual barrier. Within the evergreen category are two subcategories:

- *Coniferous* trees and shrubs, which bear cones and have narrow, needlelike leaves
- *Broad-leafed* evergreen trees and shrubs, which do not bear cones and have broad leaves that stay green year-round

Ground covers are low, wide-spreading plants that hug the earth. Like lawns, they form the floors of outdoor "living rooms." Landscape architects use ground covers where it is

too shady for grass to grow well or too steep to mow, or where the color and texture adds more to the design than grass would.

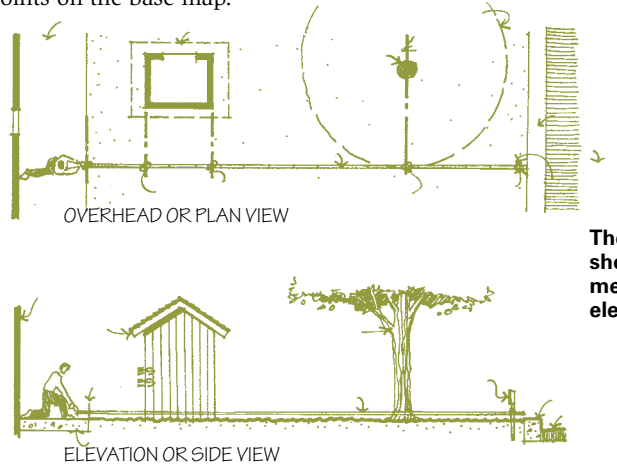
When choosing plant materials, the landscape architect considers size, form, texture, and color, and applies the basic design principles to the planting arrangement.

Although many people think of landscapes as planted green spaces on natural ground, landscapes also include nonliving materials and hard surfaces such as playgrounds, urban plazas, covered malls, roof gardens, arbors, and decks.

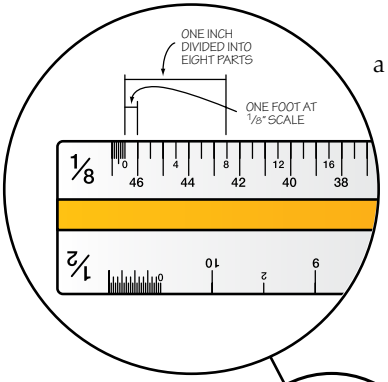
A *hardscape* is anything that is not soil or plant material. In terms of landscape design, that includes the materials for paved surfaces, steps, walls, fences, terraces, and water features. The landscape architect uses hardscape materials much like plant materials to create design effects. For example, pea gravel contrasts with flagstones just as delicate ferns contrast with large-leaved lilies. Most plans include both hardscape and landscape materials to give the design structure and distinction, or *relief*.

Tools

In the early stages of the design process, the landscape architect inventories the site and produces maps and diagrams. Hand drawing and computer-generated plans can be used for this initial part of the design process. Existing site elements, such as structures, sidewalks, and trees, must be accurately indicated on the drawing, which is also called a *base map.* To locate an object, such as a tree, measure in two directions from fixed points on the base map.



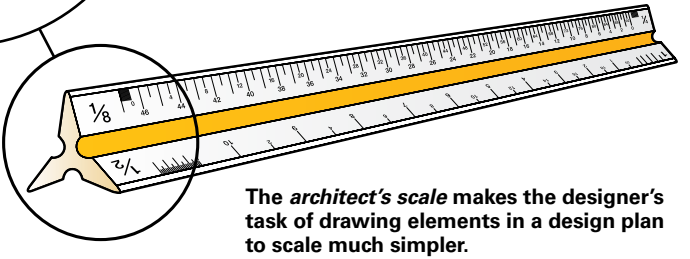
These two viewpoints show how to position and measure fixed and existing elements on the diagram.



ENLARGEMENT OF 1/8" SCALE

The architect draws the base map to scale using a triangular ruler called an *architect's scale.* This ruler has inches divided into different increments, with each increment representing different lengths. For example, on the side of the scale marked 1/8, one inch is divided into eight equal parts. Each part equals one foot, so six-eighths of an inch is equal to six feet.

TRIANGULAR ARCHITECT'S SCALE



The *architect's scale* makes the designer's task of drawing elements in a design plan to scale much simpler.

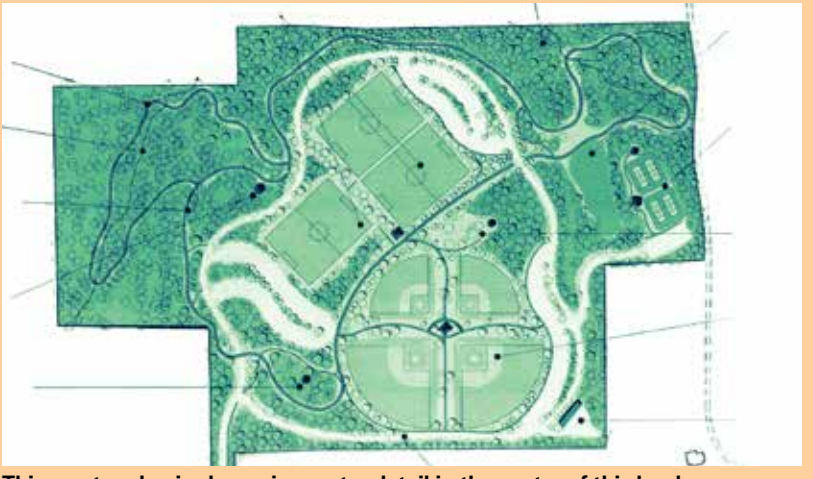
In the past, architects drew their own design plans based on information gathered from land surveys and topographic maps. Today they must know how to use computer-aided design and drafting (CADD) programs. The computer generates three-dimensional information, which can be analyzed in various ways, including applying animation to simulate possible future changes.

Architects sometimes work with *engineer's scales,* which have increments in 10s, 100s, and so on, instead of the fractions used in architectural scales *(shown here).* The engineer's scale is used most often for master plans and designs involving larger tracts of land.

While hand-drawn plans and sketches are still used in landscape architecture, the profession is turning more and more to computer-aided and digital representation. The two most common tools used in this type of landscape planning are computer-aided design and drafting (CADD) and geographic information system (GIS) programs. The centerfold spread shows how effective a CADD-based drawing can be for landscape architects as they share their proposal with others.

CADD software has been widely used by architects and engineers for years. Now, it also enables the landscape architect to "draw" a three-dimensional plan on a computer screen with lines, shapes, and points that represent anything from a row of trees or shrubs to water pipelines running underground. This image can be saved and edited and updated with image-editing software, if the landscape architect's—or the client's—ideas change.

While CADD programs can be used alone, they are often used along with GIS technology. GIS is a method of technology that links a map to a database of information, and it has become a very important tool for businesses, government agencies, and the military. With GIS, a large city can create a website that shows a street map complete with bus and subway stops. It is more a part of everyday life than you might think; for example, if you use the internet or a GPS system to find the locations of the movie theaters nearest your house or hotels in a city where you are planning a vacation, you are using GIS technology.



This master plan is shown in greater detail in the center of this book.

Landscape Architecture and Design

Design is the process of developing a physical solution to a planning decision. The landscape architect must understand the plan, its goals, and its limitations. Once the client signs a contract to hire the landscape architect, the design process begins. Below are the six progressive stages of design development, from determining the client's priorities and budget to constructing the project.

Program

In the first stage of the design process, the landscape architect and the client discuss what items make up the project. These items or uses for the site, as a whole, are called the *program*. For example, the client is a local city that wants to develop a park. This park, or program, should contain a certain number of baseball fields, parking areas, a skate park, a refreshment stand, and a trail system, and it has a specific budget for construction. The landscape architect must analyze all the program elements so that nothing is left out of the design.

At this stage, the landscape architect requests fundamental information to make a base map of the property. These facts include property boundaries, site topography, location of major trees and shrubs, and current zoning conditions for the property.

Site Inventory and Analysis

The site inventory provides a record of the project site's physical characteristics on one or more overlay sheets of the base map. Notes and ideas made on copies of the base map produce the foundation for future design. The landscape architect visits the site and identifies the key positive and negative features, such as the following:

- Soil conditions
- Sun and shade variety at different times of the day and year
- Wind direction in summer and winter
- Streams and drainage areas
- Views to and from the property
- Existing conditions
- Prominently positioned trees, called *specimen trees*
- Unique landforms

During the visit, the landscape architect takes photographs of the site to use as visual reminders back at the office.

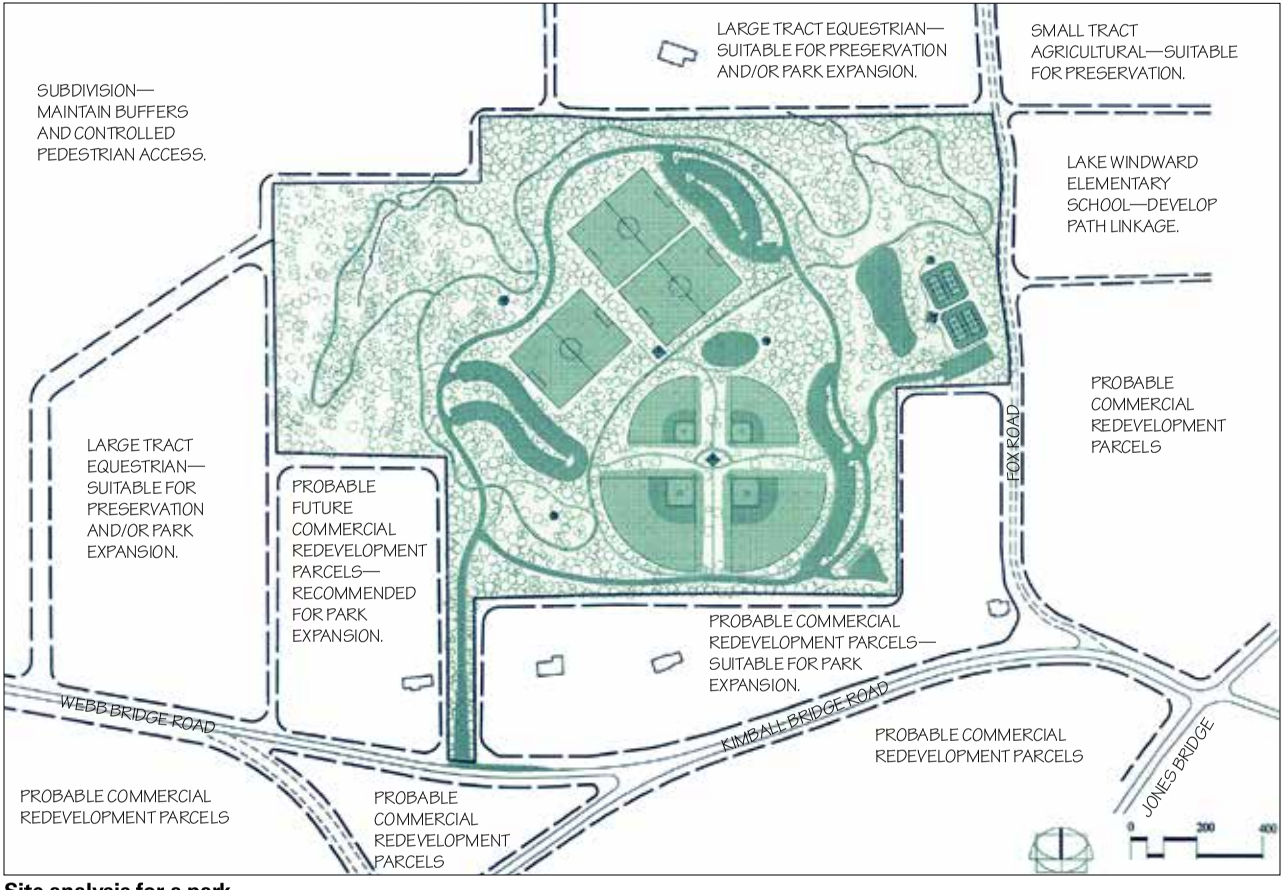
The site analysis uses the inventory information to determine positive and negative issues concerning the development of the project. For example, in the park project, the view from the baseball bleachers is a sewage treatment facility. The landscape architect would note on the site analysis that there is a negative view that requires screening.

The landscape architect uses diagrams and other graphic illustrations to indicate the directions of slopes, drainage, wind, sight lines, and other natural and cultural elements. North orientation and the drawing scale are always noted on maps and designs. Drawings and documents are produced by hand and computer for presentation purposes.

The site inventory and analysis, as well as the program information gathered from the client, become the basis for the project design.

Schematic Design

Early designs explore the program elements and their functional relationships. These loose drawings, or *schematics,* are based on the information collected in the previous stage. They allow the landscape architect to play with different arrangements to create the most desirable design.



Site analysis for a park

Design Development

During the design development stage, the landscape architect extends and tests alternative design ideas. Program elements such as buildings, parking, roads, sidewalks, and open spaces are drawn to scale. The landscape architect examines the topography of the site to make sure that the design will work on the land. Design elements such as sheltered seating and water features are detailed. The landscape architect selects hardscape materials like brick, stone, or asphalt paving, and plant materials like large shade trees or evergreen shrubs.

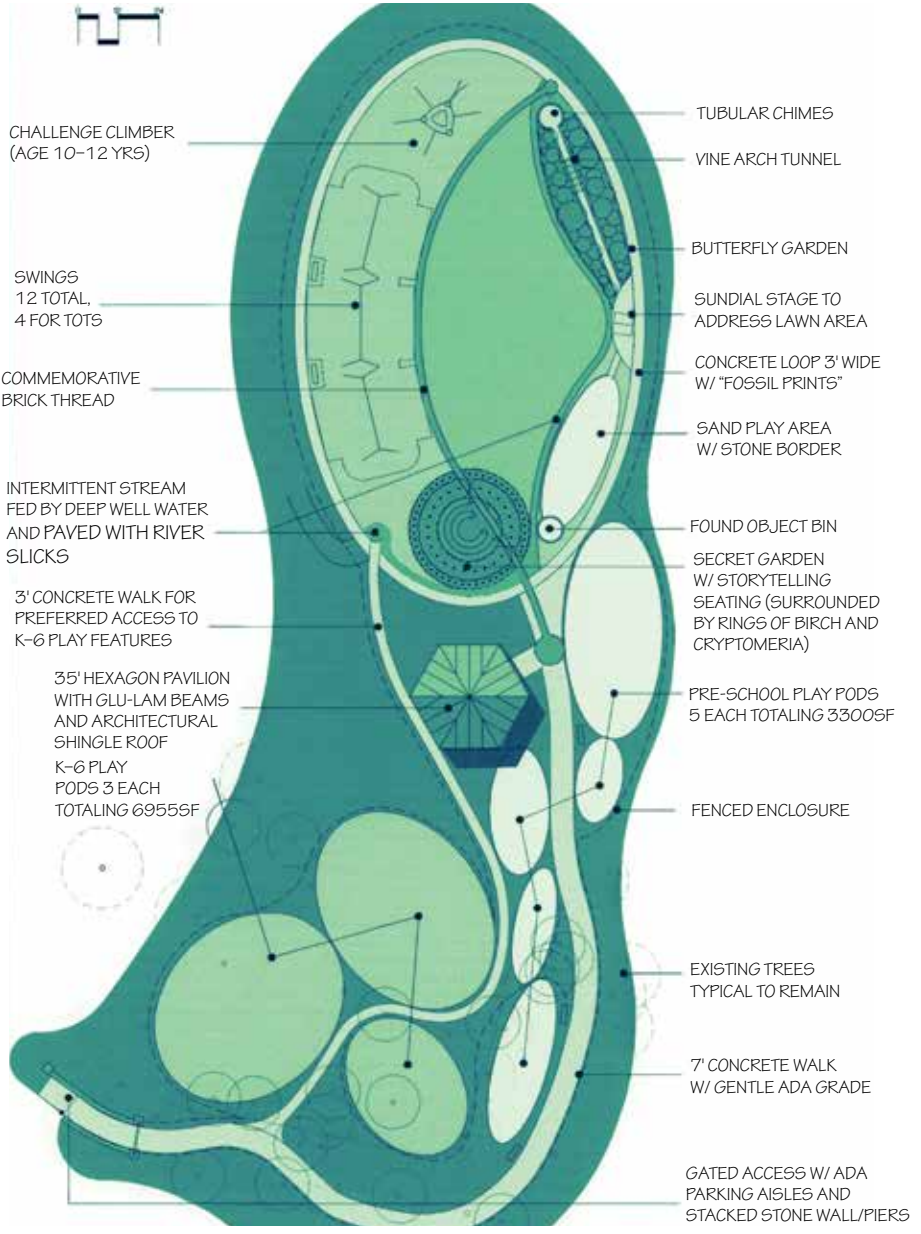
Specific plants and trees usually are not selected until the construction documents are prepared. It is important to remember that plant materials, unlike construction materials, will continue to grow. The plants' future size and growth habits will affect the design's ultimate success.

The design development drawings usually provide sufficient information for the client to obtain or confirm the cost of the project. If this were a major land-planning project, the landscape architect would create a comprehensive design and implementation strategy at this stage. This strategy, called the *master plan,* includes plans for individual projects that will be built in phases on the site. See the master plan featured on the center spread of this pamphlet.

Construction Documents

Once the design development drawings or master plan is approved, the landscape architect prepares the final construction documents. Today, construction, or contract, documents are almost always produced on the computer using CADD or other digital programs. The general contractor will use these documents to prepare a bid and build the design.

A set of contract documents usually consists of four plans and several sheets of construction details. The layout plan indicates the location, size, shape, dimensions, and materials of hardscape elements. It also includes underground and aboveground site utilities. A grading plan shows the new elevations of the proposed improvement and how they connect to the existing grades. This plan also tells the contractor how much dirt to move. The planting plan names all plants in the design, as well as their sizes, quantities, and exact locations. Finally, an irrigation plan shows all areas to be irrigated and the types and quantities of sprinkler heads to be used.



Plans for Webb Bridge Park community playground. The master plan for this park appears on the center spread of this pamphlet.

Contract Administration

When the contract documents are completed, either the landscape architect or the client puts the project out to bid to qualified contractors. If the client is a government agency, then that agency usually bids the documents and chooses the best contractor.

Once construction begins, the landscape architect visits the site periodically to make sure the project is being built as designed and to specifications.

Periodic visits by the landscape architect help ensure the construction is going as planned.

Landscape Architecture Education and Career Development

Education

If you are interested in pursuing a degree in landscape architecture, find out which colleges and universities offer accredited programs in this field. Landscape architecture may be a university department under the umbrella of the colleges of architecture, agriculture, or environmental design. Because landscape architecture is an interdisciplinary field, course requirements cover a range of subjects from design and drawing to art and history, planning and economics, construction techniques, and social and natural sciences. Four to five years of study typically lead to one of two undergraduate degrees: bachelor of landscape architecture (BLA) or bachelor of science in landscape architecture (BSLA).

There are typically three types of graduate degrees. A first-professional master of landscape architecture (MLA) is for people who hold an undergraduate degree in a different field and wish to practice as a landscape architect. This degree typically requires three years of full-time study or teaching. A second-professional degree (MLA) is for those who hold an undergraduate degree in landscape architecture or a related discipline. This degree requires two years or less of study. A master's of art, master's of science, or doctorate degree in landscape architecture is for those who want to do research or teach in the discipline but do not wish to be a licensed, practicing landscape architect.

Log on to the American Society of Landscape Architects' website at ASLA.org to find out more about the landscape architecture profession and schools that educate landscape architects.

Their knowledge of a variety of related fields gives landscape architects the expertise necessary to collaborate with professionals such as the ones below to help ensure the design of the outdoor space meets its intended function.

Architects are licensed professionals who have studied the art and science of building design in order to construct buildings that are safe, economical, functional, and aesthetically pleasing. Their work involves a variety of skills, from mathematics and engineering to communication and supervision. They may design a simple structure such as a home or place of worship, or they may work with others to plan and coordinate large-scale structures such as a college campus or an airport terminal.

Civil engineers are trained in the design and construction of public works structures such as roads, tunnels, bridges, and water supply and sewage systems. Often, civil engineers work at construction sites and may hold an administrative or supervisory position there. Civil engineers who offer their services directly to the public must be licensed.

Horticulturists study the science and art of growing flowers, fruits, plants, and vegetables. They use their knowledge of genetics, biology, engineering, economics, and sociology to produce crops with better human nutritional value and to enhance the physical beauty of our environment. Horticulturists may work in greenhouses or with farm agencies as producers, marketers, or inspectors, or in research or landscape design at a zoo or park.

Landscape contractors assist in landscape design, installation, and maintenance. With knowledge of carpentry, masonry, gardening, plumbing, and electricity, they prepare a plot of land for its landscape design. Some landscape contractors work only with the hardscape aspects of a project, while others may collaborate with horticulturists and landscape architects in the placement of trees, shrubs, flowers, etc.

Urban planners work with local governments to formulate plans for the short- and long-term growth and renewal of urban and suburban communities. They study economic, environmental, and social trends and problems to determine the best use of land and resources. In developing their plan for a community, such as schools and retail areas, urban planners must consider issues such as air pollution, traffic congestion, legislation, and zoning codes.

Licensure

All states require landscape architects to be licensed. In states that have a licensing provision called a *title act,* you cannot call yourself a "landscape architect" unless you are licensed. You can do some of the same work a landscape architect does by using another title, such as landscape designer.

Under another provision called a *practice act,* you must have a license to work as a landscape architect. This is an important difference because landscape architects have formal training in critical areas such as structural construction, drainage, and irrigation, which many landscape designers lack.

Candidates for licensure must pass a national test called the Landscape Architect Registration Examination (LARE). Often, landscape architects in-training must serve internships first or work for a certain period of time under the supervision of a licensed landscape architect before taking this exam.

Landscape architects often hold a record with an organization called the Council of Landscape Architectural Registration Boards. CLARB assists landscape architects in maintaining an accurate record of their work and education experiences, and assists with obtaining a license in different states or countries. Landscape architects can also be required to continue their education in order to maintain their license.

Each state sets its own requirements for licensure, but in most states practice acts are the standard.

Career Opportunities

As a landscape architect, you can find work in the private or public sectors, or in the academic world. Many people work for themselves as residential landscape architects. Others join private landscape architecture firms or companies that employ teams of design professionals from different fields. Government agencies involved with larger scale land planning, development, and resource management employ landscape architects. At colleges and universities, you can conduct research or educate the next wave of landscape architects.

Because they have a working knowledge of architecture, civil engineering, urban planning, and environmental impact design, landscape architects can take advantage of many career opportunities. Consider this exciting field for your own career!

Landscape Architecture Resources

Scouting Literature

Environmental Science, Forestry, Gardening, Plant Science, Soil and Water Conservation, and *Sustainability* merit badge pamphlets

With your parent or guardian's permission, visit Scouting America's official retail site, **scoutshop.org**, for a complete list of merit badge pamphlets and other helpful Scouting materials and supplies.

Books

Bertauski, Tony. *Plan Graphics for the Landscape Designer,* 3rd ed. Waveland Press, 2018.

Blake, Peter. *God's Own Junkyard: The Planned Deterioration of America's Landscape.* Holt, Rinehart and Winston, 1979.

Booth, Norman K., FASLA, and James E. Hiss. *Residential Landscape Architecture: Design Process for the Private Residence,* 7th ed. Pearson, 2017.

Church, Thomas D., Grace Hall, and Michael Laurie. *Gardens Are for People,* 3rd ed. University of California Press, 1995.

Dee, Catherine. *Form and Fabric in Landscape Architecture: A Visual Introduction.* Taylor & Francis, 2001.

Douglas, William Lake, et al. *Garden Design: History, Principles, Elements, Practice.* Smithmark, 1994.

Foster, Kelleann, RLA, ASLA. *Becoming a Landscape Architect: A Guide to Careers in Design.* Wiley, 2009.

Grant, Reid, ASLA. *Landscape Graphics.* Watson-Guptill, 2002.

Marsh, William M. *Landscape Planning: Environmental Applications,* 5th ed. Wiley, 2010.

McHarg, Ian L. *Design with Nature.* John Wiley and Sons, 1995.

Rybczynski, Witold. *A Clearing in the Distance: Frederick Law Olmsted and America in the Nineteenth Century.* Scribner, 2000.

Starke, Barry, and John Ormsbee Simonds. *Landscape Architecture: A Manual of Environmental Planning and Design,* 5th ed. McGraw Hill, 2013.

Magazines

Garden Design
855-624-5110
gardendesign.com

Landscape Architecture
636 Eye St., NW
Washington, DC 20001-3736
202-898-2444
landscapearchitecturemagazine.org

Organizations and Websites

American Society of Landscape Architects (ASLA)
636 Eye St., NW
Washington, DC 20001-3736
202-898-2444
asla.org

The ASLA is a national organization of landscape architects. Its goal is to promote the profession, educational programs, and the careful planning of natural environments.

Council of Educators in Landscape Architecture (CELA)
919-674-4185
thecela.org

An organization of educational programs in the United States and Canada, the CELA promotes quality and professionalism in landscape architecture education and publishes new research in the field.

Council of Landscape Architectural Registration Boards (CLARB)
571-432-0332
clarb.org

CLARB prepares and scores the exams for students and professionals seeking licensure in landscape architecture. The organization provides services to landscape architects and students to help them obtain certification.

Landscape Architecture Foundation (LAF)
02-331-7070
lafoundation.org

The foundation offers scholarships and internships to students who wish to study landscape architecture.

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