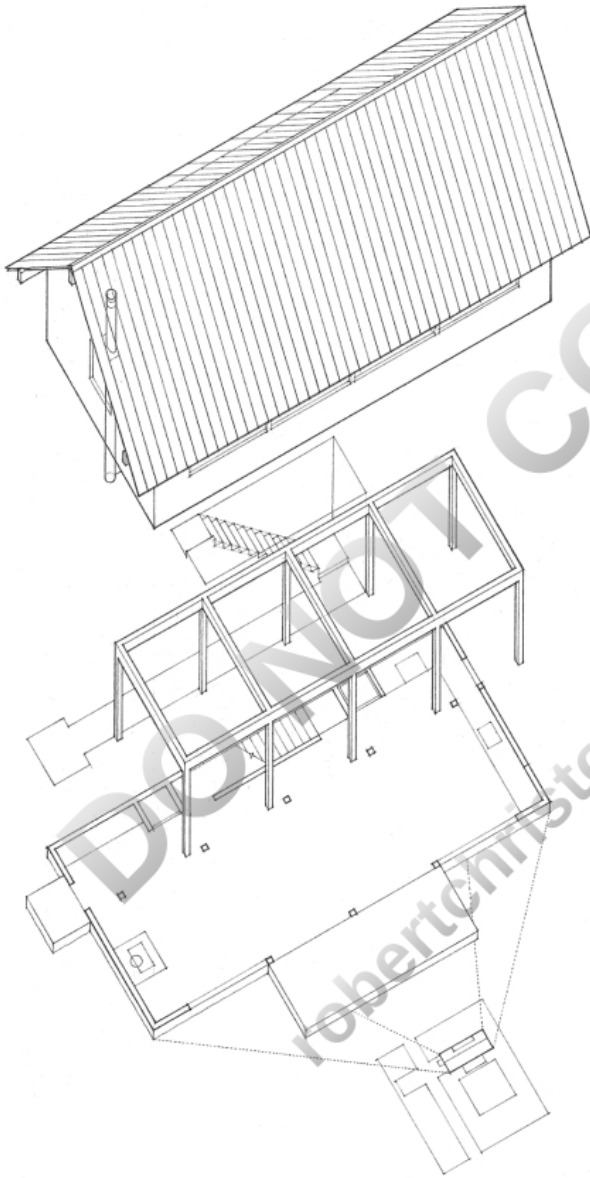


## 2.02 THE BUILDING



Architecture and building construction are not necessarily one and the same thing. An understanding of the methods for assembling various materials, elements, and components is necessary during both the design and the construction of a building. This understanding, however, while it enables one to build architecture, does not guarantee it. A working knowledge of building construction is only one of several critical factors in the execution of architecture. When we speak of architecture as the art of building, we should consider the following conceptual systems of order in addition to the physical ones of construction:

- The definition, scale, proportion, and organization of the interior spaces of a building
- The ordering of human activities by their scale and dimension
- The functional zoning of the spaces of a building according to purpose and use
- Access to the horizontal and vertical paths of movement through the interior of a building
- The sensible qualities of a building: form, space, light, color, texture, and pattern
- The building as an integrated component within the natural and built environment

Of primary interest to us in this book are the physical systems that define, organize, and reinforce the perceptual and conceptual ordering of a building.

A system can be defined as an assembly of interrelated or interdependent parts forming a more complex and unified whole and serving a common purpose. A building can be understood to be the physical embodiment of a number of systems and subsystems that must necessarily be related, coordinated, and integrated with each other as well as with the three-dimensional form and spatial organization of the building as a whole.

**BUILDING SYSTEMS 2.03**

**Structural System**

The structural system of a building is designed and constructed to support and transmit applied gravity and lateral loads safely to the ground without exceeding the allowable stresses in its members.

- The superstructure is the vertical extension of a building above the foundation.
- Columns, beams, and loadbearing walls support floor and roof structures.
- The substructure is the underlying structure forming the foundation of a building.

**Enclosure System**

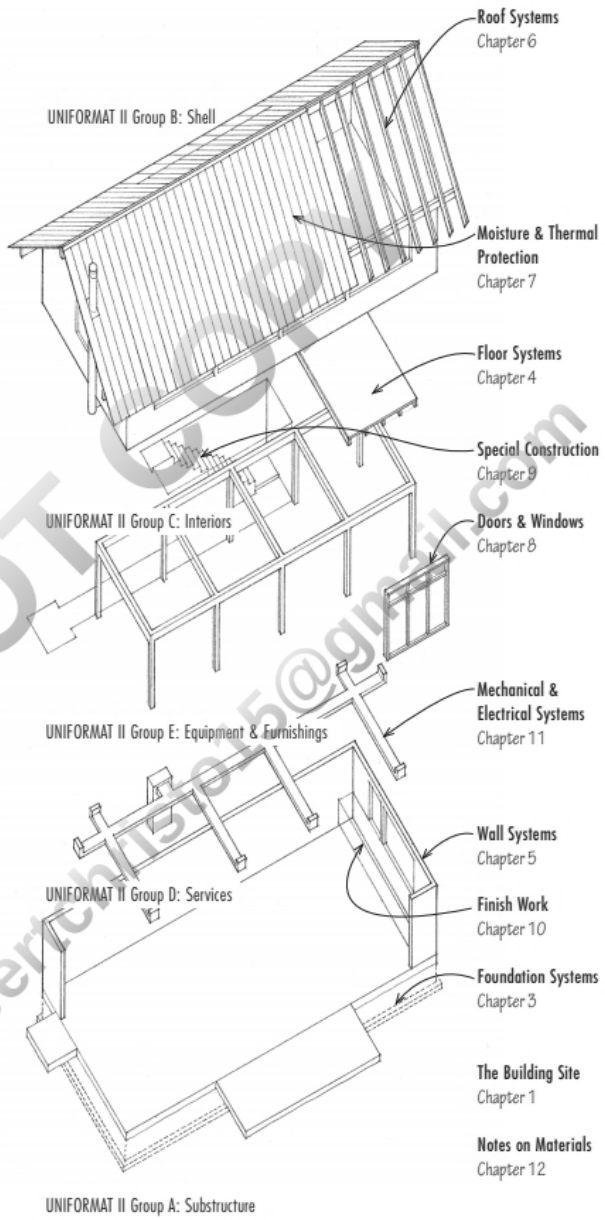
The enclosure system is the shell or envelope of a building, consisting of the roof, exterior walls, windows, and doors.

- The roof and exterior walls shelter interior spaces from inclement weather and control moisture, heat, and air flow through the layering of construction assemblies.
- Exterior walls and roofs also dampen noise and provide security and privacy for the occupants of a building.
- Doors provide physical access.
- Windows provide access to light, air, and views.
- Interior walls and partitions subdivide the interior of a building into spatial units.

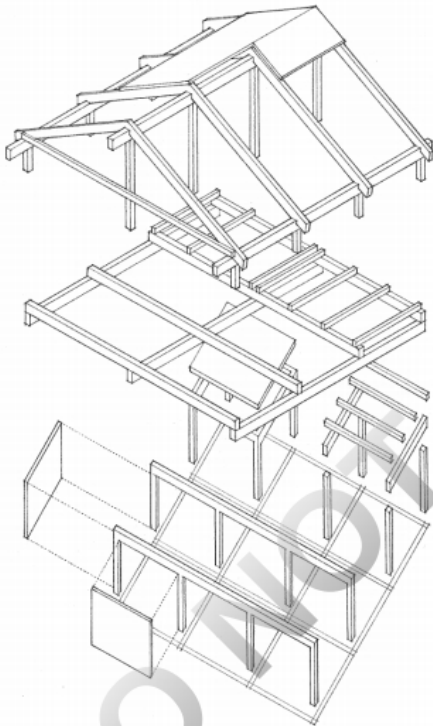
**Mechanical Systems**

The mechanical systems of a building provide essential services to a building.

- The water supply system provides potable water for human consumption and sanitation.
- The sewage disposal system removes fluid waste and organic matter from a building.
- Heating, ventilating, and air-conditioning systems condition the interior spaces of a building for the environmental comfort of the occupants.
- The electrical system controls, meters, and protects the electric power supply to a building, and distributes it in a safe manner for power, lighting, security, and communication systems.
- Vertical transportation systems carry people and goods from one level to another in medium- and high-rise buildings.
- Firefighting systems detect and extinguish fires.
- Structures may also require waste disposal and recycling systems.



## 2.04 BUILDING SYSTEMS



• The U.S. Occupational Health and Safety Administration (OSHA) regulates the design of workplaces and sets safety standards under which a building must be constructed.

The manner in which we select, assemble, and integrate the various building systems in construction should take into account the following factors:

### Performance Requirements

- Structural compatibility, integration, and safety
- Fire resistance, prevention, and safety
- Allowable or desirable thickness of construction assemblies
- Control of heat and air flow through building assemblies
- Control of migration and condensation of water vapor
- Accommodation of building movement due to settlement, structural deflection, and expansion or contraction with changes in temperature and humidity
- Noise reduction, sound isolation, and acoustical privacy
- Resistance to wear, corrosion, and weathering
- Finish, cleanliness, and maintenance requirements
- Safety in use

### Aesthetic Qualities

- Desired relationship of building to its site, adjacent properties, and neighborhood
- Preferred qualities of form, massing, color, pattern, texture, and detail

### Regulatory Constraints

- Compliance with zoning ordinances and building codes

### Economic Considerations

- Initial cost comprising material, transportation, equipment, and labor costs
- Life-cycle costs, which include not only initial cost, but also maintenance and operating costs, energy consumption, useful lifetime, demolition and replacement costs, and interest on invested money

### Environmental Impact

- Conservation of energy and resources through siting and building design
- Energy efficiency of mechanical systems
- Use of resource-efficient and nontoxic materials
- See 1.03–1.08.

### Construction Practices

- Safety requirements
- Allowable tolerances and appropriate fit
- Conformance to industry standards and assurance
- Division of work between the shop and the field
- Division of labor and coordination of building trades
- Budget constraints
- Construction equipment required
- Erection time required
- Provisions for inclement weather