THE AMERICAN LANDSCAPE has changed dramatically over the past 200 years. As technology and construction methods have evolved, so have the size and shape of buildings. In this unit, you will learn about the basic evolution of American farm buildings, building code functions and enforcement, construction safety principles, and common careers in agricultural construction.

Objective:

Identify and describe advances in agricultural structures, the development and enforcement of building codes, the role of safety in agricultural construction, and some common agricultural construction careers.

Key Terms:

- building codes
- International Fire Code
- National Electrical Code
- National Fuel Gas Code
- Uniform Mechanical Code
- Uniform Plumbing Code

Building Codes in Agricultural Construction

Urban areas typically require adherence to strict construction procedures outlined in building codes. Conversely, rural areas have often not been required to follow many of the building codes that urban areas have had to follow. However, as farmers become more innovative and technologically savvy, many rural communities are enforcing building codes more strictly as agricultural structures are erected.
ADVANCES IN AGRICULTURAL STRUCTURES

Visit a living farm museum, and you will find life on a farm was once much different from the way it is now. The American farm has evolved through time in the same way the rest of our culture has. Today, the farmer runs a very technologically advanced business.

Colonial Farms

During colonial times, farm structures were simple and small. Farm houses and buildings were large enough for what was needed. Most buildings housed small numbers of animals and animal-drawn equipment. The American landscape glowed at night from candles and lanterns, as electricity was still a mystery with which scientists were only experimenting.

Farms During the Industrial Revolution

The industrial revolution brought about many changes to American farms. As the country became mechanized, farms transitioned from animal-drawn equipment to equipment powered by steam and internal-combustion engines. As farms increased in size, so did the farm buildings. The great American barn characterized the countryside landscape as farms raised more animals. Machine sheds replaced tool sheds and grew in size as more farm implements became available.

Toward the end of the industrial revolution, cities and towns were beginning to see electrical distribution systems built to power light and appliances in homes and businesses, while windmills were used on farms. Windmills were mostly used for pumping water from wells, but they were also used to power generators that operated electric motors on equipment such as cotton gins.

Modern Farms

Today’s farms are larger than ever before. As a result, the great American barn is now a symbol of times past. Large machine sheds and cattle barns house today’s equipment and animals. Advances made in technology in the early twentieth century helped begin the modernization process of the American farm. In 1935, only about 10 percent of farms received electrical service, because for most farms, it was either unavailable or unaffordable. As a result, President Franklin Roosevelt created the Rural Electric Administration (REA) by executive order that same year. REA was created to bring electricity to rural areas, its goal being to pro-
vide farms with inexpensive electric power. To make this possible, the REA provided loans to rural cooperatives that wanted to build their own electrical distribution systems.

Today, that infrastructure from the REA-based rural cooperatives is in place, and the American farm sits on the cutting edge of technological advancement. Buildings are often constructed with the latest technology. Computerized ventilation and production systems regulate the environment and nutritional needs for animal production. Farm machine buildings are often constructed for efficiency and employ geothermal heating and cooling systems.

**TYPES AND FUNCTIONS OF BUILDING CODES**

As buildings have become larger and more sophisticated, building codes have been developed to ensure that structures are built with integrity. Buildings must provide many years of service and be able to adapt to the ever-changing life style of our time.

**Building Codes and the ICC**

According to the Federal Emergency Management Agency (FEMA), “building codes are sets of regulations governing the design, construction, alteration and maintenance of structures. They specify the minimum requirements to adequately safeguard the health, safety and welfare of building occupants” (https://www.fema.gov/building-codes). There is no way for state and local governments to ensure the expertise of a builder. Therefore, many local governments require an inspection by a certified building inspector once each phase of a construction project is complete to ensure building codes and standards were followed. Many state and local governments adopt the building codes developed by the International Code Council (ICC) rather than creating and updating their own codes.

The ICC develops and maintains three types of codes: the International Building Code (IBC), the International Residential Code (IRC), and the International Existing Building Code (IEBC). The IBC directs how most new buildings should be constructed. The IRC directs how new one- and two-family homes should be constructed. The IRC is for homes of three stories or less. The IEBC directs how to make additions, alterations, or repairs to existing structures. The ICC releases new editions of the International Codes with updated requirements every three years.
Types of Building Codes

Building codes are developed to ensure that systems in a building meet specific equipment and installation requirements. For example, the National Electrical Code, standards for the safe installation of electrical wiring and its related hardware and equipment, has been adopted by all 50 states. It is not a law in and of itself, but states will often require adherence to the code through their own laws.

The International Fire Code, a set of fire safety requirements for buildings, sets the standards for fire prevention, protection, life safety, and the safe storage of hazardous materials in new and existing buildings. A new edition is published every three years.

The Uniform Plumbing Code is a set of requirements and standards for the installation, repair, and change of plumbing systems. It covers work done on drinking water, sewer, or toilet systems in homes, commercial buildings, schools, and all other types of buildings. The code is also updated every three years.

The Uniform Mechanical Code is a set of requirements and standards for heating, ventilating, air-conditioning, and refrigeration (HVAC/R) systems. It addresses the design, construction, installation, operation, and maintenance of HVAC/R equipment.

The National Fuel Gas Code is a set of minimum safety requirements for fuel gas systems in homes and other buildings, as well as for items that contain or operate on natural gas and propane. The code sets standards for installing and operating fuel gas systems, appliances, and equipment. It is updated as needed, usually every three to five years.

STATE AND LOCAL GOVERNMENT CODE ADHERENCE

As areas become more populated or urban, governments tend to adopt and more thoroughly enforce building codes. Sometimes codes are enacted to promote building renovation or improvement within a community.

State and Local Building Codes

State building codes are used at different levels. Often, a municipality will have building codes only for residential buildings. In such an instance, state building codes will be adopted and applied to the commercial buildings in the municipality.
Most local governments adopt and enforce the International Residential Building Code. When updates are made to this code, local governments may find the changes irrelevant or controversial and choose to stay with an older version. A local government may also have additional building codes. These codes can often be accessed through links on the local government’s website.

**SAFETY PRECAUTIONS**

Whether the construction business is a small local company or a large corporation, safety procedures are important to keeping costs down and workers safe. A company may lose profit from an injury on a job site, but the worker has the most to lose. Depending on the severity of the injury, the worker’s quality of life could be greatly impacted through permanent disability, or the worker could even die.

*Personal and Job Site Safety*

To promote a culture of safety during the construction process, each person must adopt a safety mind-set. Steps can be taken to ensure that this happens. These steps include providing safety training for each person on the project, regularly reviewing the job site for potential hazards, and obtaining input from those working on the project. Additionally, have one person on the project be in charge of managing safety risks. When a safety risk has been identified, this person should assign another worker to take the steps needed to remove the hazard.

**AGRICULTURAL CONSTRUCTION CAREERS**

Some agricultural construction careers are within the skilled trades. Others are in engineering and architecture.

*Skilled Trades*

Some common agricultural construction careers within the skilled trades are agricultural construction worker, agricultural HVAC/R technician, agricultural plumber, construction equipment salesperson, land surveyor, landscape contractor, and welder. Often, these careers require extensive on-the-job training, apprenticeships, or continued education from a technical school.
**Engineering and Architecture**

Some common agricultural construction careers in engineering and architecture are agricultural construction engineer, agricultural construction project manager, and landscape architect. Most positions in engineering and architecture require a bachelor’s or master’s degree in a specific area.

**Summary:**

The American farm has evolved from small, simple buildings to large, complex structures that utilize the technology of today. Work that was once done with manual labor is now done with machinery and electricity. As buildings have evolved, so have the rules and regulations in their construction. Today, communities enforce several building codes to ensure that structures are built with integrity and can withstand ever-changing technological advancements. Many careers exist in the agricultural construction industry. Whether you are an architect or a construction laborer, adopting a safety mind-set is of the utmost importance.

**Checking Your Knowledge:**

1. How do modern farms utilize today’s technology?
2. Why do communities require building codes to be followed?
3. Why do local governments require inspectors to verify that building codes were followed?
4. Where should you look to find what building codes your community follows?
5. Why does the worker have the most to lose when it comes to safety?

**Expanding Your Knowledge:**

Job shadow a building inspector. Be prepared to ask questions related to the construction of buildings. Question topics might include education, inspection process, and career outlook.

**Web Links:**

**Introduction to Building Codes**

**Growing a Nation: The Story of American Agriculture**
https://www.agclassroom.org/gan/timeline/farmers_land.htm

**Agricultural Career Profiles**
http://www.mycaert.com/career-profiles/