

# Foundations of Real Estate Management™

## Module 3: Building Operations I

### Session 1: Heating, Ventilating, and Cooling the Building (120 minutes)

#### Objectives:

- List the three components of the HVAC system.
- List the three tasks of the ventilation system.
- Explain why it is important to balance outside air and exhaust air pressures, and tell what happens in a commercial building if the pressures are uneven.
- Trace the flow of air through the ductwork distribution system.
- Describe how electric reheat coils in a VAC box provide heat
- Describe how baseboard heating systems provide heat.
- Describe the refrigeration cycle.
- Describe the chilled water cycle.
- Describe the condenser water cycle.
- List at least five methods to improve the efficiency of the heating and cooling functions.

#### HVAC

- Heating (H)
- Ventilation (V)
- Air Conditioning (AC)

#### Ventilation

- Outside air
  - Rooftop unit
  - Ductwork
  - Dampers
  - Variable frequency drive (VFD)
  - Energy management system (EMS)
  - Energy efficiency
  - Free cooling
- Exhaust
  - Powered exhaust system
  - Return plenum
  - Demising wall
  - Fire dampers
- Humidity
- Pressure
  - Over pressurization
  - Under pressurization
  - Emergency management system (EMS)
- Filtration
  - High Efficiency Particulate Air (HEPA) filters
- Ductwork Distribution
  - Air handler
  - Emergency management system (EMS)

- Trunk line
- Branch ducts
- Zones
  - Function/use
  - Location
  - Terminal unit or variable air volume (VAV)
- Thermostat
  - Direct digital control (DDC)
  - Pneumatic
- Return Air
  - Plenum return system

## Heating

- Fuel sources
  - Electricity
  - Natural gas
  - Heating oil
- Central heating
- Load heating
- Heating perimeter offices
  - Electric reheat coils
  - Baseboard heating
    - Electrical resistance
    - Hot water or steam
    - Interlock

## Cooling Systems

- The refrigeration cycle
  - Refrigerant
  - Compressor
  - Condenser
    - Air-cooled
    - Water-cooled
  - Expansion valve
  - Evaporator
  - Closed-loop system
- Coils and bundles
  - Chilled water loop
  - Condenser loop
  - Condenser water loop
    - Cooling tower
- Common types of cooling systems
  - Chillers
  - Self-contained units
  - Rooftop units
  - Split system
  - Heat pump

## **Piped Systems**

- Two-pipe systems
- Four-pipe systems

## **Free Cooling**

## **Managing the HVAC Process**

- Building Automation System (BAS)
- Controlling costs
  - Optimize energy management system
  - Use free cooling
  - Plan ahead for weather/temperature changes
  - Double-check building temperatures
  - Don't allow tenants to adjust temperatures
  - Water treatment
  - Equipment and systems maintenance

# Foundations of Real Estate Management™

## Module 3: Building Operations I

### Session 2: Domestic Water (30 minutes)

#### Objectives:

- Describe the components of the domestic water supply system.
- Describe the components of the wastewater return system.
- List the three “rules” of plumbing.

#### How Buildings Use Water

- Fire suppression
- Irrigation
- Drinking
- Hand washing
- Cleaning
- Cooling tower

#### Three Rules of Plumbing

- Hot is always left
- Cold is always right
- Sewage does not flow uphill

#### Types of Water Systems

- Public water system
- Well water

#### Public Water System

- Supply side
  - Water meter
  - Domestic water pump
  - Riser system, to mains, to plumbing fixtures
    - Faucets
    - Toilets
      - Low-flush
      - Dual-flush
    - Urinals
      - Waterless
    - Hose bibs
    - Water fountains
  - Hot water heater
    - Single tank
    - Tanks on each floor
    - Tanks at each point of use
    - Sacrificial anode
    - Instant hot water heaters

- Cogeneration
- Valves
  - Sillcock
  - Ball valve
  - Outside stem and yoke (OS&Y)
- Wastewater
  - Black water
    - From toilets and urinals
  - Gray water
    - From sinks, dishwashers, clothes washers, etc.
  - Gravity fed
    - Trap
    - Cleanout
    - Sewage ejector
  - Managing wastewater
    - Water management facility
    - Septic system

# Foundations of Real Estate Management™

## Module 3: Building Operations I

### Session 3: Electrical Distribution (75 minutes)

#### Objectives:

- Describe voltage, resistance, current, and electrical power, and tell the unit measurement for each.
- Describe the three levels of power used in a typical commercial building.
- Trace the flow of electricity through a typical commercial building.
- List at least 10 practices to control or reduce electricity costs at a typical commercial building.

#### What is Electricity?

- Flow of electrons along a conductor
- Terms
  - Voltage measured in volts
  - Resistance measured in ohms
  - Current measured in amps
  - Electrical power measured in watts

#### Measuring Electricity

- Kilowatts and kilowatt hours

#### Understanding Your Electric Bill

- Interval meter
  - Time-of-use billing
    - Peak
    - Semi-peak
    - Off-peak
- Demand
  - Peak demand
  - Brownouts and blackouts
- Billing period
- Charges
  - Supply charge
  - Distribution charge
  - Taxes, fees, tariffs
- Utilizing load profile graphs
  - Degree day conversions

#### Purchasing Power

- Regulated
- Deregulated
  - Distribution charge
  - Generation charge

## **Controlling Electricity Costs**

- Use natural daylight
- Reduce weekend hours
- Skylights in interior spaces
- Occupancy sensors
- Re-retrofit of fluorescent tubes
- Control HVAC
- Reward team for conservation efforts
- Photovoltaic solar panels
- Measure electricity costs
  - ENERGY STAR® Portfolio Manager
- Education
  - BOMA Energy Efficiency Program (BEEP®)

## **Electricity in Your Building**

- Power
  - Direct current (DC)
  - Alternating current (AC)
- Levels of power
  - Control voltage
  - Low voltage
  - High voltage
- Transformer
  - Step-down transformer
  - Step-up transformer

## **Components of the Electrical Distribution System**

- Electrical service
- Main switchgear
- Circuit breakers, fuses, and disconnects
- Main electrical meter
- Tenant meters
- Public service meters
- Sub-meters
- Electrical risers
  - Bus ducts
  - Cabling
- Preventive maintenance

## **Circuits and Switches**

- Dedicated circuits
- Circuit breakers
- Ground fault circuit interrupter (GFCI)
- Arc fault circuit interrupter (AFCI)

## **Lighting**

- Incandescent lighting
- Fluorescent
- High intensity discharge (HID)
- Light emitting diode (LED)

## **Back-up Generators**

- Types and uses
- Transfer switch
- Uninterrupted power system (UPS)
- Redundant electric feeds

## **Control-Voltage Cabling**

- Fire alarm and life safety cabling
- Security cabling
- Building automation system (BAS) cabling
- Phone (voice) cabling
- Internet cabling
- Types of cables
  - Coaxial
  - Fiber-optic
  - Voice and data

## **Emergency Circuits**

- Emergency electric sign system
- Emergency lighting system

## **Abandoned Cable**

- National Electric Code (NEC)



# Foundations of Real Estate Management™

## Module 3: Building Operations I

### Session 4: Work Orders (30 minutes)

#### Objectives:

- Compare and contrast the paper-based and electronic work order systems.
- Describe at least five best practices for the professional management of after-hours service calls.

#### Work Order/Service Call Systems

- Assign service calls
- Meet or exceed tenant's expectations
- Close the loop
- Provide feedback
- Include process to escalate call
- Enable review
- Allow for reporting
- Prioritize service calls
- Reduce processing time, paperwork

#### Paper-Based System

- Involves human interaction
- Creates paper work order ticket
- Inefficient
- Other disadvantages

#### Electronic System

- Web-based system
- Paperless
- Efficient
- Other advantages

#### After-Hours Service Calls

- Answering service
  - Information and instructions
  - Call lists
  - Emergency numbers
- Best practices

## **Foundations of Real Estate Management™**

### **Module 3: Building Operations I**

#### **Session 5T: Property Tour (90 minutes)**

##### **Objective:**

- This property tour gives you the opportunity to explore the mechanical and engineering areas of a commercial building.

##### **Tour Highlights**

- Ventilation
- Heating
- Air conditioning
- Domestic water
- Electrical distribution
- Work orders