

# RDA NEWS

Romualdi, Davidson & Associates, Inc.

Volume 6 Issue 1

www.rdaweb.com

March 2006

## Building Systems/Building Performance



performance and system failures and/or to identify remedial actions necessary to correct the problem(s).

stucco, masonry, and precast concrete facades occur when materials are improperly specified and/or constructed. Snow and wind loadings associated with storms can fail or damage structural components. Building fires can weaken or distort structural systems or individual components. Engineering evaluations are often required to determine the cause of the structural damage and to determine the magnitude of damages and the scope of repairs.

The performance of a residential, commercial or industrial building over its service life is dependent upon careful planning, proper design, and the craftsmanship of its construction. The building must be structurally sound and built of construction materials that are long-wearing, attractive, and suitable for their intended purpose. The expectations of owners and occupants are that the building will provide a functional and healthy living and/or working environment. This requirement depends on the proper integration of the various building system components and systems; architectural, structural, mechanical, electrical, plumbing, fire suppression, and other ancillary systems. Should any one of these systems fail, the overall performance of the building will be affected and the working/living environment adversely impacted. In addition, the failure of mechanical, electrical, plumbing or fire suppression systems can result in costly damage to the building and/or its contents or displacement of its residents or businesses. Engineering investigations are often required to identify the cause(s) of substandard

### Foundation and Structural System

The structural integrity of a building is dependent upon the proper design and construction of its foundation and structural support systems. Excessive foundation settlement can result in distortion and cracking of floors, walls, and ceilings. Mine subsidence and earth movements can cause loss of foundation support and severe structural damage to residential, commercial or industrial buildings. The use of expansive backfill materials around walls and beneath floor slabs can lead to heave that often results in severe cracking of floors or even structural distress. The failure of foundation drains and dewatering systems can cause cracking and bowing of basement walls as a result of excessive earth and water pressures or may cause damp wall conditions in basements that promote the growth of mold and damage building materials.

Structural systems must be designed in accordance with existing codes for residential, commercial and industrial buildings. Exterior building materials must be resistant to weather, sunlight and temperature extremes. Systemic cracking of



### Mechanical Systems

Mechanical building systems include air conditioning, ventilation, and heating systems. These systems are responsible for providing a healthy and comfortable living or working environment within a building. In industrial buildings, ventilation systems must be capable of removing harmful gases and air-borne particles generated by manufacturing activities within the building. Adequate air circulation

*(Continued on page 2)*

must be provided in office buildings, schools, residential buildings, and commercial buildings to achieve and maintain air quality requirements. Climate control systems must maintain air temperature and humidity within comfortable limits. Improperly sized or poorly maintained furnaces and boilers can result in poor or dangerous air quality, excessive humidity, poor temperature control, fires, and boiler explosions. Inadequate ventilation in industrial and commercial buildings can lead to excessive levels of carbon monoxide, carbon dioxide, or other harmful gases. Often, water vapor is brought into buildings by the HVAC systems, and the inability of the HVAC system to dehumidify a structure is often the cause of mold formation.

**Electrical and Plumbing Systems**

Improperly designed or maintained electrical systems can result in damage to electronic hardware and service interruptions. Many fires that occur in residential and commercial buildings have electrical origins. In industrial buildings, improper wiring

and defects in machinery or other equipment can result in costly damage to electronic equipment or costly fire damage. Interior lighting systems must provide sufficient illumination for working environments and exterior lighting is needed for pedestrian safety.

Plumbing leaks or failures can result in expensive losses in equipment, materials and merchandise. Accidental activation of fire suppression (sprinkler) systems can cause costly water losses in merchandise, materials and equipment. Conversely, a delay in the activation of a sprinkler system can result in extensive fire damage to building content and structure.



**RDA Staff**

Romualdi, Davidson & Associates, Inc., offers a comprehensive range of expertise in building systems. Dr. Bert Davis has extensive experience in the design of heating, ventilation and air conditioning (HVAC) systems, plumbing systems, and electrical systems. He has conducted numerous investigations related to indoor air quality, life safety systems, fire suppression systems, HVAC systems, furnace and boiler fires and explosions, and construction/design claims. Dr. Davis manages a mechanical/electrical fire protection building systems design company and is a registered professional engineer (in a number of states), a certified fire and explosion investigator, and is registered in the City of Pittsburgh as an electrical and mechanical contractor. Dr. Richard Bragg and Dr. Hugh Davidson have broad experience in design and analysis of foundation systems. Dr. Irving Oppenheim offers expertise in structural engineering, materials, and design. Mr. Steve Lee offers expertise in architectural design, materials and construction.

**Romualdi, Davidson & Associates, Inc.**

385 East Waterfront Drive  
Homestead, PA 15120-5005

