Fire Escapes: Counterbalanced Stairways
Article and photos by Gregory Havel
August 24, 2009

Although some fire escapes have a bottom stair section that is fixed and that leads directly to ground level, they are uncommon. Most fire escapes have a bottom section that is normally raised to keep out unwanted visitors; building occupants can lower it to the ground from the bottom balcony in case of fire. These swinging or counterbalanced stairways are discussed in detail in National Fire Protection Association (NFPA) 101, Life Safety Code, 2009 edition, in Chapter 7.2.8.7 (Means of Egress: Components: Fire Escape Stairs: Swinging Stairs).

The counterbalanced stairway is a common method used to protect building occupants from unwanted visitors coming up the fire escape. Photo 1 shows the most common variety. The balconies for each floor are attached to the wall. The stairway between floors is connected to the balconies. The counterbalanced stairway is attached by a pivot to a short section of stairway below the lowest balcony, with counterweights attached to extensions of the stairway stringers above the pivot. When it is used, the weight of a person several steps down the counterbalanced stairway tips the stairway down until the bottom rests on the sidewalk. When the last person steps off, the stairway will swing back up to its normal position, unless it is equipped with a latch to hold it in the lowered position. If the stairway does not latch in the lowered position, the rising stairway may strike and injure the last person who descended, as well as bystanders.

Photo 1 also shows two common obstructions on fire escapes: potted plants and air conditioners in the windows.
Photo 2 shows another type of counterbalanced stairway. Instead of counterweights attached to the stairway stringers above the pivot, the counterweight is attached to a cable which runs up over a pair of pulleys on a bracket high on the wall, and down to a yoke that should be connected to the bottom of the stairway. In photo 2, the counterweight and its cable are visible against the wall just below the bottom of the raised stairway; and the yoke is visible above but disconnected from the bottom of the stairway. As originally built, it would work in the same manner as the stairway shown in photo 1. However, this stairway has had the white cable added, running from the bottom of the stairway and over the edge of the roof, crushing the rain gutter. It is inoperable in this condition, and will give building occupants a false sense of security.

The type of stairway shown in photo 2, with cable and counterweight, is no longer permitted by NFPA 101—2009, 7.2.8.7.7; although some of this type are still in place. This type of stairway has too many moving parts, such as the long steel cables, that can rust and fail.

The addition of a counterbalanced stairway adds critical items to the fire escape maintenance schedule. The counterweights and their connections, either to the stringers of the stairway or by cable and sheave to the bottom of the stairway and the top of the wall, must be maintained. The most critical item on one of these stairways is the pair of pivots at the top. They must be kept free of rust, and some must be greased regularly so that the pivot bearings will not seize. If the stairway is used while the pivot bearings are seized, either the stairway will not work at all, or the stairway may break at its seized pivots and collapse to the sidewalk.

Maintenance of fire escapes on the buildings in our response areas should be an item on the checklist for company-level and bureau-level fire inspections; and their condition should be noted on prefire plans for each building.

Storage below a counterbalanced stairway such as bicycle racks, garbage cans, dumpsters, or recycling bins creates additional hazards. If the stairway cannot be lowered completely to the sidewalk, building occupants may have to jump off; and occupants may slip and fall from the stairway since the stair treads will be level only if the stairway is lowered completely. These are in addition to the obvious hazard of combustibles stored below a fire escape.

For detailed information on hazards to firefighters using fire escapes, see Chapter 15, “The Dangers of Fire Escapes” in Chief Vincent Dunn’s *Safety and Survival on the Fireground* (Fire Engineering Books, 1992).
Gregory Havel is a member of the Burlington (WI) Fire Department; a retired deputy chief and training officer; and a 30-year veteran of the fire service. He is a Wisconsin-certified fire instructor II and fire officer II, an adjunct instructor in fire service programs at Gateway Technical College, and safety director for Scherrer Construction Co., Inc. Havel has a bachelor’s degree from St. Norbert College; has more than 30 years of experience in facilities management and building construction; and has presented classes at FDIC.

- CLICK HERE for more 'Construction Concerns' articles!