

Guidance Document Fall Prevention during Design For Engineers and Architects

Falls from height are a major cause of work related injuries and fatalities. Engineers, architects, designers and planners are responsible for designing safe buildings, facilities, structures and equipment. They should strive to eliminate, minimize or prevent the hazards of falling at work places. During construction, potential hazards should be identified and preventive measures should be incorporated in the design to assist contractors with building the project in a safe manner. Post construction, the facility should protect personnel during normal work operations and help maintenance personnel conduct their work safely and without exposing them to fall hazards.

Fall prevention philosophy for designing new buildings and facilities:

Fall hazards should be designed out of new buildings, facilities or structures. When fall hazards cannot be eliminated or prevented, designers should provide alternative remedies such as installation of anchorage points.

Any location or part of a building, structure, facility or equipment will one day require, either maintenance, remodeling, modification or replacement work. Engineers and architects should design new buildings with this idea in mind.

Preventive considerations for selective listing of design issues and examples:

- If possible, design buildings or facilities with minimum slope rather than steep slope roofs. Try to minimize the slope of the roof as much as possible. Although it is desirable at high snow regions to have steep sloped roofs to shed the weight associated with accumulation.
- Always incorporate edge protection (i.e. standard guardrails or 48 inches high parapets) around all open sided floors or openings.
- If the design includes installation of fall arrest system or horizontal lifeline, always have the understanding and knowledge of other equipment operating in the same area (i.e. interference between the use of fall arrest system or horizontal lifeline with the crane operation such as inside hangars or other buildings).
- When designing flat roofs incorporate guardrails or 48-inch high parapets around perimeter of the roof.
- Specify strong roofing material like plywood. Do not specify particleboard on roofs as wood planks. Such material can hold moisture and collapses under weight.

- Locate equipment (i.e. HVAC) away from the edge of the roof or provide standard guardrails around it.
- Use lighting fixtures that can be replaced or maintained without exposing the personnel to the hazard of fall. As an example in a gym use lighting fixtures that can be lowered to the ground for changing light bulbs; or provide catwalk or platform to access such fixtures.
- When providing operable windows, consider inward operating sash's so that window washing can be facilitated from the inside of the facility.
- Locate water valves, meters and other equipment and instrumentation at a location the employee can service without being exposed to a fall hazard.
- If the design of buildings and facilities does not allow for using conventional methods of fall prevention such as the use of guardrails or other methods, identify anchor points that can withstand a force of 5,000 pounds per person wherever there is a location within a building that exposes a person to a fall from height.
- Refrain from designing and installing ladders that are over 20 feet high for accessing a location at a building or structure. Design staircases instead.
- Always provide safe access to service equipment, instrumentation and other amenities within the building or facility.
- Design guardrails or specify covers for utility holes, even if these holes are only a few feet deep. Falling in a shallow utility hole such as steam or electrical lines might expose the person to other hazards like burning or electrocution.
- Always think how any equipment, fixture or part of a building or facility can be maintained in the future. Can such fixtures and equipment be safely accessed without exposing the user to the hazard of falling from heights?
- Understanding the work of the maintenance workers will help eliminate or minimize the hazard of falling.
- It is of the utmost importance for design engineers to understand and know how a contractor will build or construct a building or facility. Knowledge of construction operations will help the engineer or architect design safer buildings and specify the proper material and equipment. This will help contractors during construction operations.
- Always have knowledge and understanding of building and facility operations.
- Provide safe access and egress to every location inside or outside of buildings or facilities.
- Understand work practices for the building or facility being designed.

- Understand the governing safety regulations and standards.
- In addition to the design knowledge, the design engineer should be familiar with construction operations of how to build such facility, have the knowledge of the logistical operations during occupancy and any maintenance work required afterwards.
- Minimize the width of parapets or short walls, or provide steeply sloped cap flashing. Some Occupants of buildings have the tendency of sitting on such wide parapets and exposing themselves to fall hazard.
- When selecting fixtures, equipment or other amenities to be installed on roofs, such as projectors, flagpoles, surveillance cameras, always have in mind how to maintain such equipment or fixtures. As an example install cameras or light fixtures on tracks that can be pulled away from the edge of the roof for maintenance or service.
- Be knowledgeable, understand and identify the delivery of material or equipment procedures during construction operations. This will help in siting the building and access roads for the vehicles or equipment to deliver such material in a safe manner.
- Try to eliminate any blind spots in the design.
- All hatches and openings shall be protected either with a cover or railing and the access ladder shall extend above the hatch.
- Provide adequate lighting for locations within a building that will require maintenance work, which is near or within close proximity of a fall hazard.
- If there is a chance of falling in water like working from a pier, consider incorporating fall protection method in the design.
- When designing elevated pier light poles, place the utility covers on the inside (safer location, so that the person performing maintenance service on the pole will not be exposed to a fall hazard).
- When designing skylights either incorporate guardrail around the perimeter of the skylight or build the skylight at least 42 inches above the roof level.
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