

# BUILDING CODE OCCUPANCY GROUPS:

## Challenges for the Building Envelope Professional

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**B**uildings come in all shapes and sizes, are utilized for just about every conceivable purpose, and have several different types of occupancies. For the building envelope professional who is asked to evaluate, investigate, develop repairs, or observe repairs, certain occupancy classifications can sometimes be more challenging than others. What may be challenging for one occupancy type, however, may not even be an issue for another type. This article will review the different types of occupancies classified by the building code and discuss some of the operational and managerial challenges and difficulties encountered by the authors when undertaking building envelope investigations and repairs.

Chapter Three of the International Building Code (IBC) defines occupancy classifications. The IBC identifies ten occupancy groups:

1. **Assembly:** Groups A-1, A-2, A-3, A-4, and A-5
2. **Business:** Group B
3. **Educational:** Group E
4. **Factory and Industrial:** Groups F-1 and F-2
5. **High Hazard:** Groups H-1, H-2, H-3, H-4, and H-5
6. **Institutional:** Groups I-1, I-2, I-3, and I-4
7. **Mercantile:** Group M
8. **Residential:** Groups R-1, R-2, R-3, and R-4

9. **Storage:** Groups S-1 and S-2
10. **Utility and Miscellaneous:** Group U

Within each occupancy group, there may be several subgroups. The IBC provides definitions for and several examples of what type of occupancy may be within each group. For example, Group A-1 is defined as a structure or portion thereof that usually has fixed seating; intended for the production and viewing of the performing arts or motion pictures; including, but not limited to, motion picture theaters, symphony and concert halls, television and radio studios admitting an audience, and theaters.

The occupancy group is used to determine the requirements that are applicable for a number of other building code criteria and requirements. These include the construction type; building area and height limitations; egress requirements; the maximum number of occupants in an area or space; the fire ratings for floors, walls, and roof assemblies; and many other items covered by and defined in the code.

When working on occupied structures, the building envelope professional should be aware of who the client is and the type of occupancy, how the occupancy will be impacted by project site restrictions or restrictions to various areas of the building needed to implement the repair, the anticipated schedule, and other requirements of the building code.

### HOSPITALS AND HEALTHCARE FACILITIES: INSTITUTIONAL GROUPS I-1 AND I-2

Occupied and operational hospitals and healthcare facilities can often provide unique and challenging environments for building envelope professionals. These facilities need to function around the clock, 24 hours a day, seven days a week. These facilities often have several entities with which the building envelope professional may need to interface and communicate. These may include the hospital engineering staff, the hospital operational staff, contractors and subcontractors, program managers, architects and engineers, material suppliers, or even attorneys. One advantage to working in this particular occupancy group is that no matter who may retain the building envelope professional, the various parties involved are often generally fluent in the various construction methods and activities of the hospital, and typically provide whatever assistance is needed to ensure the project(s) proceeds as smoothly as possible.

The building envelope professional may be retained by any one of the entities mentioned above. Typically, we have found that it is best when a single-person point of contact is established as the client representative with whom the building professional communicates. This is because communication can become unclear and problematic if the project is set-up so there is no clear line of communication and hierarchy among the project team. We have been involved



*Figure 1 – Intensive care room with damaged interior gypsum finishes completely removed to address issues with the exterior wall cladding.*

## PRISONS AND PENITENTIARIES: INSTITUTIONAL GROUP I-3

Prisons and penitentiaries pose a very unique set of challenges to the building envelope professional. With this occupancy group, it is the occupants who make working in the environment the most challenging. As a result, security rules and procedures for the facility need to be followed by all those performing work. These rules and procedures vary greatly from the local county lockup to a federal super maximum-security (“supermax”) prison. At the smaller local prisons, a single guard may be appointed to escort and watch over the building envelope professional or construction team members, provided no one

in instances where the building envelope professional is retained through a program manager who invoices to the hospital, but the invoices for the building envelope professional’s services must first be approved by the hospital board so that payment for services may flow backwards through this process. As a result, it should be anticipated that the payment process for work performed could be delayed from what may normally be expected.

Depending on the nature of the work being performed, access to interior spaces may be required. This is the case if interior demolition or renovation work is to take place—for example, in response to repairing damage caused by leakage (*Figure 1*). One of the biggest challenges is shutting down the rooms, floors, or sections of the hospital to facilitate the interior work. Depending on the nature of hospital operations, this may be very difficult—for example, if the affected area happens to be the emergency department or if reroofing is to take place over the operating or surgery rooms. In some cases, there may be no way to physically shut down an area of the hospital. We have had experiences where repair work was to take place in or around a trauma heliport

located on a roof. In these cases, complete evacuation of the work area with only 10 or 15 minutes’ notice may be required.

Depending on the length of time a particular space is shut down, the cost associated with the room shutdown can exceed the cost of the envelope repairs ten or twentyfold, or even more. As a result, the scheduling demands often placed on a project can be complex and very difficult to deal with, whether during an investigation or during the actual construction. Anticipate that the work will need to be performed in a flexible manner to accommodate the building operations, but also as quickly as possible. Often, certain investigation activities must be performed at night or during off-hours. Repairs usually require close and extensive coordination with the hospital operational staff—for instance, if noise will be created during reroofing or exterior façade repairs, or if materials need to be delivered through the interior. When work is occurring on the interior, anticipate the possibility of using life-safety features such as special air locks, access controls, and air purifying equipment to isolate the work area from the other areas of the hospital that are to remain operational.

leaves sight of the guard. For maximum-security prisons, we have experienced one heavily armed guard required for each person who is performing work at the facility.

For the more secure facilities, access to and from the work areas can be a rigorous and time-consuming experience. Access and security procedures often involve first reporting to the public entrance and waiting for the appropriate escort. From this public entrance, the escort will take the team to a separate gate where a series of guards will document and record all the tools, materials, and supplies that are being brought into the facility for each person. Often there may be two perimeter security checkpoints. No one can proceed to the next checkpoint until all members of the team or crew are through the first checkpoint.

Individual guards might be provided for each member, and the caravan is escorted to the investigation or work area. If it is necessary to access the cellblock living areas or open areas where inmates are free to move about, anticipate some harassment or comments from inmates. The guards usually instruct the team not to make eye contact or talk when passing through the facility. Rest assured, the guards are specifically trained



*Figure 2 – Project team being successfully released from a supermax prison at the end of the workday.*

for these situations. Upon leaving for the day, the same check-in process is repeated in reverse for checkout. All of the tools, materials, and supplies are verified and had better be accounted for. Do not leave anything behind, or it will take a very long time to resolve the issue and for you to get home; otherwise, you can plan on spending the night in a cell (*Figure 2*).

The entry and exiting process can take a significant amount of time and therefore limit the amount of actual work time. Construction schedules are often stretched out, and it takes longer to complete even the simplest of repair projects. We have experienced simple check-in and out of the more secure facilities in excess of three hours. Don't plan on going out to lunch; the chow line can be a real experience.

**FOOD PROCESSING PLANTS: FACTORY INDUSTRIAL GROUPS F-1 AND F-2**

We are fortunate in the United States and Canada to have good government regulation, oversight, and inspection of matters concerning the health and safety of the

foods that we consume. The regulations and oversight are a major reason why consumers can purchase food and drink and be reasonably assured that it has been checked and approved, from a health and safety standpoint, for distribution and sale to suppliers, grocery stores, and restaurants.

Our experience with food processing plants has been

at chicken, turkey, snack and candy, beverage, cheese processing, and vegetable/salad plants. These facilities represent a unique and special building use because their operations are regulated and overseen by the United States Food and Drug Administration (FDA) and need to meet safe food quality (SFQ) certifications. The equivalent Canadian agency is the Canadian Food

Inspection Agency (CFIA).

With this occupancy group, we have found that there are company-specific health, safety, and security procedures that must be strictly followed for working both inside and outside of the building(s). Contamination of food is the primary concern, and company, FDA, and CFIA inspectors have the serious job of checking that the food being processed is safe for consumption by the public. As such, the inspectors have the power and authority to potentially stop or even shut down plant operations if there is a breach in health or safety or a contamination of the food-processing operation. Because of that, leaks into the building or debris falling from the ceiling and onto the processing operations cannot be tolerated. In our experience, there is usually a person assigned to accompany and watch the personnel working inside and outside the building. Good and frequent daily communication with the designated plant person(s) in charge of working on plant property is essential to achieving a successful project outcome.

Food processing plants often function in 24/7 mode, in three shifts: two work shifts and one shift dedicated to clean-



*Figure 3 – The roof insulation at cold storage or freezer buildings can be extremely thick.*

ing and repair and/or maintenance. As such, working on the inside to perform inspection or to provide protection against falling debris from ceilings may require wearing special clothes and shoes, a hairnet, and safety goggles.

Most food plants have a cold storage or freezer area, and this will likely have a major impact on investigation and construction activities. The cold storage or freezer area may be a separate, self-contained, stand-alone, pre-engineered enclosure within the building envelope, or may be contained within the walls and roof of the structure. Ascertaining which of these building enclosure systems is in place must be established early on so that the proper design and construction considerations can be made.

Proper clothing is necessary when working in cold storage areas, and a jacket, hat, and gloves come in handy. Inspection openings are useful and can help identify the as-built roofing assembly, number of roofing layers, method(s) of attachment, etc. We have found that rigid board insulation in compact roofs above cold storage areas can be 12 inches or more in overall thickness (Figure 3). Also, during active operations, the top surface of the roof deck is relatively cold, and condensation may form on the roof deck surface when the roof deck is exposed to the environment after tear-off. This can present a significant challenge when installing a replacement roof system. These facilities often have very congested rooftops with numerous types of mechanical equipment and penetrations that complicate the investigative and roof replacement processes (Figure 4).

to be the property manager. The manager has responsibility for managing the building and grounds, and this usually includes repairs and maintenance of the building enclosure and common elements. Work performed to any component of the building enclosure impacts all of the residents. Therefore, it is very important that each of them be notified, in writing, through the property manager, of any work activities to be done. The manager reviews and helps coordinate work activities to minimize the impact to the residents. A few examples of major impacts that can occur are the use of elevators, use of parking, designated access and staging areas at both the exterior and the interior, noise and work hours, and odor control (Figure 5). It is a good practice to post signs notifying occupants that work is taking place.

#### CONDOMINIUMS AND MULTIFAMILY STRUCTURES: RESIDENTIAL GROUPS R-1, R-2, R-3, AND R-4

Condominiums and multifamily buildings are usually managed by an independent company retained by the homeowners' association to be their representative. One or more persons are assigned responsibility

that regulate the hours that work can take place, as well as safety requirements, such as use of propane torches and hot materials. If the interior needs to be accessed—whether daily or infrequently—it will be necessary to protect floor and wall surfaces and

Many municipalities have ordinances



Figure 4 – Congested roof over a freezer building. The roof will be difficult to efficiently remove and replace.

### SOME TIPS FOR DEALING WITH CHALLENGING OCCUPANCIES

#### Be aware of:

- Odor-control requirements
- Hazardous materials handling and use requirements
- Noise-control requirements
- Restrictions for use of flame/torch
- Security procedures

#### Be familiar with:

- Emergency procedures and contact information for key people
- Fall-protection and safety requirements
- Use of hydraulic lifts
- Insurance requirements

#### Be prepared to include:

- Identification and badging
- Background checks
- Waivers, releases, and sign-off forms
- Hard hats, safety glasses, and other personal protective equipment (PPE)
- Safety cones, caution tape, and other safety procedures
- Compatible radios and communication devices



Figure 5 – Façade access equipment installed on a condominium roof where swing stages will pass directly in front of the unit windows.

finishes, travel paths, and routes. We have seen this taken to extreme requirements, such as removal of the temporary protection on a daily basis and reinstalling it daily so that it would appear in the evening hours as though no traffic took place that day at all. Protection of landscaping and grounds and repairs after the work is completed is another major consideration that can be a huge issue, depending on the circumstances and type of property.


Each condominium and multifamily property is different and will have unique requirements for that individual property. Learning and understanding all of the rules and regulations for the property helps make the property manager look good in his/her job, produce a satisfied customer, and promote repeat business.

#### SUMMARY

Depending on the circumstances, any occupancy group can result in an extremely challenging environment for the building envelope professional. Whenever a major construction activity is undertaken, such as a roof replacement, window replacement, or façade repair, these are infrequent activities from the perspective of the building users and occupants. Therefore, it is necessary to inform and educate the client and the occupants about the construction process and

to plan the repair in a collaborative manner. We have learned that constant, clear communication is key. This is critical when dealing with any occupancy, but when the occupancy creates additional challenges, the communication will likely require greater attention to detail and focus with the construction team, building manager, and project operations personnel who are involved.

Following the project-specific rules and

regulations for safety and security are essential for a smooth-running and successful outcome. Let your client, the building users, and the affected parties know, on a very frequent basis, what is going to happen, when it will happen, and how it is going to impact their roles and duties. If handled properly, work on the most challenging occupancies can often be some of the most professionally rewarding experiences. 



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