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Journal

Rehabilitation and Restoration at Secure Facilities

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The average age of a typical commercial building in the United States is 50 years. Whether masonry, wood, or steel, building materials have a lifespan and, at some point in time, restoration of aging components is necessary. Age and material degradation are two factors that make rehabilitation of existing buildings a common phenomenon.

With the right planning, building envelope deterioration can be addressed at any facility, even those with the highest level of security.

Rehabilitation efforts on existing buildings are frequently implemented when the structure is occupied. In many cases, it is the responsibility of the design team to phase the work around the owner's daily activities. These responsibilities, however, greatly increase when working at secure facilities.

Secure facilities encompass many building types. Museums, schools, airports, prisons, data centers, police and fire stations, and municipal buildings are all considered to be secure facilities. These buildings contain systems, personnel, and protocols to prevent access to all or part of the facility by those without clearance to enter. These security measures are enforced 24/7 and cannot be interrupted. However, regardless of a facility's security protocols, aging windows fail, facades fall into disrepair, and roofs leak. So, how then are these buildings to be rehabilitated? Whose responsibility is it to determine how a design and construction team are granted access? Moreover, how does construction progress, without disrupting essential activities?

Different Spaces, Different Considerations

While secure facilities are defined by restricted access, they are diverse in what each is designed to protect. Understanding who is permitted entry and when, and to which areas, is of vital importance to developing a project strategy. Some facilities contain critical systems or irreplaceable artwork that must be protected from unauthorized access, while others house sensitive populations, such as schoolchildren or prison inmates, who must be prevented from exiting the property and sheltered from intruders.

Museums and galleries. At a museum, visitors are granted access to galleries that are protected by security personnel. The contents of the

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museum, collections of priceless art and artifacts, are protected from theft. Not only does the physical building enclosure need to be secure from a loss prevention standpoint, but also it must be water- and air-tight, the indoor environment maintained at controlled temperature and humidity levels. Rehabilitation work, therefore, must consider both security and stability of the indoor environment.

Landmark structures. The public is allowed to enter a tourist site or a national landmark, but these structures also require protection from theft and vandalism. Construction work must maintain security and must also safeguard visitors, workers, and the landmark itself from terrorism, fire, and natural disasters.

Educational institutions. School security, over the last decade, has become an important consideration when planning for renovation and rehabilitation of aging building elements. The facility must be designed or retrofitted to protect students, faculty, and staff from forced or unauthorized entry yet must also be welcoming to all.

Correctional facilities. Prisons, of course, are always occupied. While forced entry and unauthorized access are certainly considerations when designing rehabilitation projects at prisons, escape prevention is of the utmost importance. Construction activities at these facilities pose significant challenges, including construction segregation from the prison population (tools, equipment, and workers), considerations for securing temporary constructions, protocols for emergencies, maintaining building egress, and sustaining functionality of essential operations at all times (dining, healthcare, administration, etc.).

Data centers. Storing and processing secure digital information for large companies, such as financial institutions and insurance carriers, data centers house expensive electronic equipment that requires an air- and water-tight building envelope. To protect sensitive information, ingress and egress of building personnel is heavily regulated. Robust physical barriers and security systems protect the world's digital data not only from cyber-attack, but also from weather events that could compromise equipment and the data center's around-the-clock essential activity.

Police and fire precinct buildings. Considered essential facilities, first responder stations must be continuously

Historic and Secure

Rehabilitation of historic and landmark buildings requires the design professional to understand traditional building materials and practices, appropriate replacement materials, and regulations and guidelines pertaining to historic preservation. Secure facilities within historic structures are often federal or municipal buildings such as courthouses, city halls, and governmental buildings. Construction at these types of facilities requires careful design decisions.

At this historic courthouse, maintaining security during restoration was a key concern.

Temporary ramps provided controlled access while the stairs were reconstructed.

At one superior courthouse, the aging monumental stair at the main entrance was severely deteriorated and needed to be reconstructed. Disassembly of the stair revealed a compromised substructure, necessitating replacement of the entire assembly, including the foundation. Historic materials, in good condition, were catalogued and stored for reuse, and the defective assemblies were demolished.

During the construction process, the courthouse remained open daily. Since the main entrance to the building could not be relocated, temporary access ramps were constructed over the excavated monumental stair to allow access to the building, through the security checkpoint. During construction, the temporary access ramp was relocated twice to allow work to be completed at the original ramp location.

Maintaining continuous access through a secure entry point provided an additional challenge to the historic restoration work, and the project approach needed to incorporate designs not only for the sensitive rehabilitation of a local landmark on the National Register of Historic Places, but also for the temporary structures that would allow controlled entry and egress safely through the construction zone. ■

operational. Many of these departments operate within historic municipal buildings that require regular maintenance. Controlled access to these facilities is paramount, as is controlled egress. These are facilities that welcome the public but also detain citizens when laws are broken.

Government buildings. Courthouses, legislative offices, judicial chambers, assembly spaces, government centers, town halls, and other seats of government are secure facilities, and many are also local or national landmarks with historic significance. Granting access to the public while keeping secure select areas within the building, these essential facilities are occupied continuously by government employees.

Balancing controlled access to the building for occupants, staff, and the public with considerations for weather protection and historic restoration presents a compound challenge for restoration projects at secure facilities. Given the specific set of parameters governed by building use, site conditions, setting, type of construction, and the nature and extent of deterioration, the design team must take care in evaluating the full range of factors that contribute to the logistics of the project.

Occupied and Secure: Planning the Project

Let's face it: building materials don't last forever. Rehabilitation of existing components is imminent within every structure's lifespan. At a secure facility, restoration or rehabilitation projects don't have to mean temporary relocation of building users, equipment, or collections, provided that the design professional is versed in construction phasing. Phasing design can be included in the contract documents for the project. To design an effective phasing scenario, the following exigencies must first be considered.

Clearly Understand Daily Activities at the Facility

The design professional should interview staff to understand how the facility operates and how and when people move from location to location within the building.

Are main corridors busy during the lunch hour or at shift changes? If so, ***off-hour construction*** may be the solution. Is movement within the building always busy? In that case, ***third-shift construction,*** from late evening to early morning, may be considered. Is the building at or near capacity at certain times of the year or certain times of the month? Many tourist sites experience increases in traffic seasonally. For example, national landmark buildings in Washington DC are busiest during cherry blossom season in the spring. Knowing this, the project team can schedule ***construction in the off-season.***

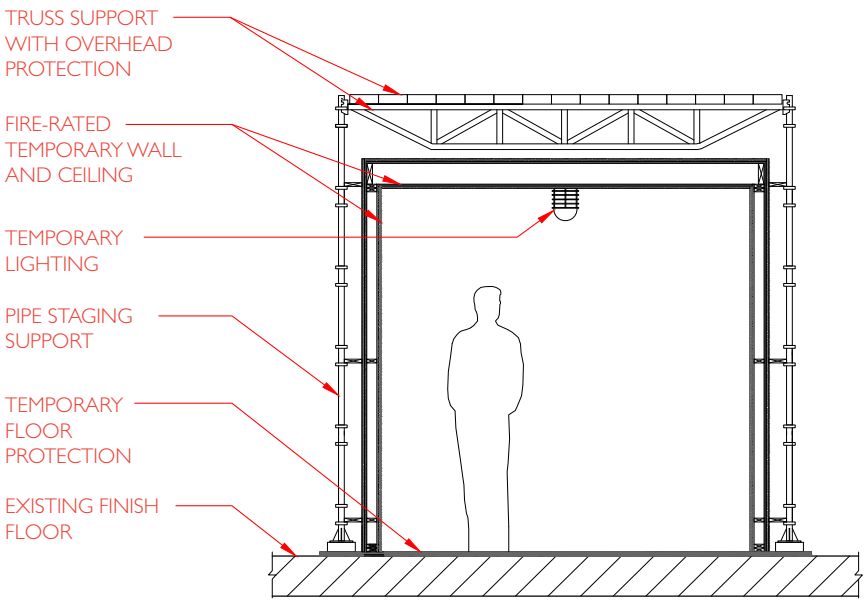
Meetings and interviews with building owners, tenants, employees, and facilities staff provide invaluable insight into how a facility operates on an hourly, daily, and seasonal basis and when best to implement (or not implement) a rehabilitation project.

Anticipate Construction Logistics

Construction logistics generally involve the movement of labor, materials, and equipment through and around a facility. To effectively understand logistical challenges, the design professional must consider the topography of the site, the distance of travel from the staging area to the work area, existing barriers on the site and within the building, and the levels of security that construction labor and materials must pass through to get to the work zone.

For example, if a window replacement project requires elevated access via aerial lift, the architect or engineer may need to ascertain: Can the lift be brought into the secure site? If so, can

EXAMPLE: **Temporary Pedestrian Tunnel**



By providing a clear, safe path for traversing construction zones, temporary constructions like tunnels and partitions protect building users and secure the work area.

the lift traverse the existing topography? Are there secure barricades within the site that will prevent the lift from reaching the work zone? Finally, can the lift remain in the work zone for the duration of the construction, or must it be moved back to the staging area at the end of each shift?

If new window units are to move through the building to their respective locations, the design professional must consider their size and weight. Will a new curtain wall component fit in a building elevator? Is the unit wider than the entryway into the room where the unit will be installed? Rather, is it more efficient to transport the component to its intended location outside, via a pre-determined road or path?

At the United States Capitol, planning for every conceivable contingency was essential. A detailed system was developed should a dignitary pass away and need to lie in state in the Capitol rotunda, including provisions for removal of temporary barriers that might detract from the gravitas of the setting, movement of visitors through the space to pay last respects, and security to protect legislators and guests from ill-intentioned outsiders. None of this plan was ever implemented, but it needed to be laid out in advance, with every detail mapped out, so it could be deployed at a moment's notice should the need arise.

Extreme weather events are always a concern for construction sites, but they require even more planning at a secure facility. With massive scaffolding in place at the U.S. Capitol, covering the entire 288-foot-tall Dome, the sudden arrival of a hurricane could lead to devastating consequences. Again, the design team prepared exacting plans and specifications for hypothetical events that never came to pass, here indicating which portions of the scaffolding would have to be quickly removed to retain stability while reducing mass and wind resistance. Such contingencies must be anticipated should the integrity of a secure facility be maintained.

For restricted-access jobsites, planning for construction logistics involves more than just the physical setting. Checking workers in and out of the construction zone can take an extra hour or more at the start and end of the workday, as identification is verified, and equipment is searched and inventoried. Sometimes, design and construction personnel must pass through security multiple times: at the periphery of the facility, within a given substructure, and again at the boundary of the construction zone. Advance security clearance and background checks may be required at some facilities before workers even arrive onsite. Anticipating these hurdles and incorporating them into the phasing design and project timeline is essential to stay on schedule and under budget.

By envisioning the logistics of each step in the construction process, the design professional can collaborate with the owner and building users to establish a plan that minimizes unexpected delays and disruptions, while protecting the integrity of secure areas.

Discuss Locations and Design of Temporary Constructions

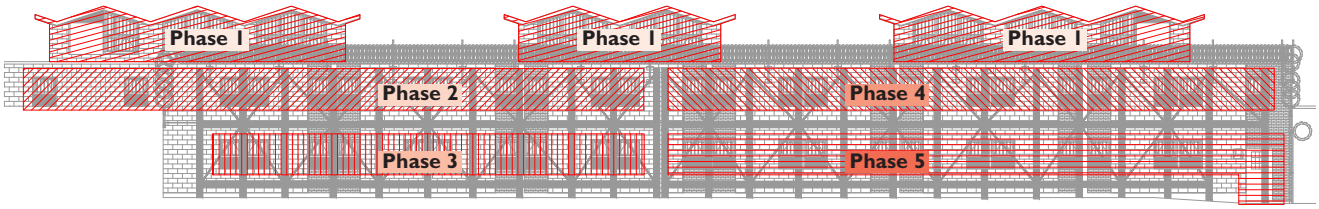
Temporary constructions are generally required at secure facilities and should be included as part of the design. They consist of walls, fences, gates, doors, roofs, etc. that are erected or installed prior to the commencement of construction activities, and they are disassembled (and sometimes reused or incorporated into the permanent structure) at the conclusion of construction operations. These barriers segregate the design and construction team, as well as the construction work, from the occupied building. Designed to be barriers to noise, fume, or odors; critical barriers for ***hazardous materials abatement;*** and/or secure physical barriers to prevent building occupants from entering the work zone, temporary constructions can even be configured to prevent water or air infiltration during the construction process.

For example, at a financial services building, moveable partitions were installed to separate the staff from the construction operations. These

Where the job site is difficult to access, equipment may need to be lifted by crane.

Hazardous materials abatement requires critical barriers and appropriate phasing.

EXAMPLE: Construction Phasing Strategy for a Correctional Facility



Organizing construction in a top-down approach allows scaffolding to be erected at each section of the facade sequentially. By enabling adjacent prison blocks to remain fully operational, the phased program minimizes areas that must be taken offline at any one time.

modular wall systems, complete with lockable doors, were erected six feet from the exterior wall and extended approximately one-third of the total building length. At the exterior, scaffold access was provided to masons who were tasked with a sealant joint replacement project. Not only was the sealant removal noisy, the old caulk contained hazardous materials. At window perimeters, a critical barrier prevented dust particles from entering the building. The temporary, modular wall system tempered construction noise, allowed for construction workers at the building interior without disturbing occupants, safely contained hazardous materials during abatement, and obscured construction from view.

Why is a visual barrier important? When dealing with hazardous materials abatement, workers generally don hazmat suits, which can look intimidating to the lay public. Despite abiding by all regulatory requirements, hazardous materials abatement generally sparks fear within those who do not understand the process.

For instance, at a historic courthouse, rehabilitation involved removal of asbestos-containing materials, which were placed into thick black contractor bags and labelled in full compliance with regulations. However, failure to erect a visual barrier led to a concerned passerby filing a complaint, because she spotted bags marked, "asbestos." She saw what she thought was a health hazard and dutifully reported it, even though the site was safe and no risk to the public. Had a visual barrier been in place, blocking her view of the collection bags, the building user would not have worried unduly, and the owner and project team would not have been subjected to the complaint.

Sometimes, temporary walls or tunnels are needed to allow building occupants to traverse the construction zone. This is often the case at airports, transit stations, or federal buildings, where a large centralized atrium connects wings of a building together. Barriers must be erected to include temporary lighting, electrical, and HVAC systems. They also must be designed to withstand falling debris, prevent odor and fume migration, and allow for emergency egress and ADA accessibility.

A plaster ceiling restoration project at a historic train station was to be completed while the terminal was active. Pedestrian tunnels, constructed with pipe staging, were erected at the interior of the building. The tunnels were illuminated, heated and cooled. The roof of the tunnel was reinforced for protection from falling debris and provided a base for the construction scaffolding to access the ceiling. These barriers allowed for the passage of travelers and commuters without disrupting their daily schedules, and they accommodated the plaster ceiling restoration project.

Details of the attachment of temporary barriers to the existing building must be carefully contemplated. How is the temporary wall attached to the plaster ceiling, suspended ceiling, or carpeted floor? When the temporary wall is removed, will there be damage to existing finishes, and, if so, how is this damage to be repaired? Will the existing drywall require patching and repainting – and how much repainting (corner to corner, or entire room)?

Temporary roofing is often used to protect a building during a re-roofing project. Installation of a temporary roof at a data center allows for the old roofing materials to be removed, and the building to be maintained watertight and fully operational throughout the construction process. In many cases, temporary roofing membranes can be designed as a layer within the new roofing system and therefore remain in place as a permanent feature in the overall project.

Too often considered only as an afterthought, temporary walls, roof coverings, partitions, and walkways can make the difference between a project that safely and effectively maintains regular building operation, and one that yields disruption and anxiety. Not only do temporary barriers safeguard

Temporary interior partitions provide both a physical and a visual barrier, maintaining building operation until construction is completed.

building occupants and passersby, they protect workers, maintain the integrity of the interior space, and provide those moving through the construction area with the peace of mind that their security has been thoughtfully considered.

Construction Phasing: Organizing the Work

After planning for temporary partitions, identifying potential logistical challenges in the movement of labor and materials, and consulting building users and facility managers about variations in occupancy based on seasonal and daily routines, the architect or engineer is ready to develop a construction phasing strategy. The design professional should evaluate factors specific to the building type, site conditions, and usage to determine how a construction project can be divided so that an entire facility is not taken offline at any one time.

With these considerations, the design professional prepares phasing documents that may consist of floor plans, elevations, sections, details, and product specifications that illustrate how construction activities will progress through the secure facility.

For example, at a prison, the inmate population prevents an entire housing block from being shut down. So, with corrections staff input, the design professional divides the work within this building into smaller, more manageable chunks. Barricades are put in place prior to the first phase of construction, separating the prison population from the workers and the work area. Then, equipment is mobilized within the construction zone, the rehabilitation is implemented, temporary constructions are removed, existing finishes are restored, and the area is reintegrated into the active prison complex. Subsequently, the project moves to the next phase and is completed in the same sequence.

Hazardous materials abatement often necessitates phasing design. The design professional works closely with the environmental engineer to determine the extent of the abatement, the required critical barriers, and the estimated duration of the abatement process. Hazardous material removal often comes first in the construction process and may leave the building with breaches through the building envelope, in the form of open seams, holes, or large cavities. Therefore, a clear understanding of what is being removed and what needs to be accomplished to secure the building, either on a temporary or permanent basis, must be portrayed in the project documents.

Phasing should be designed so that each phase can be treated as a mini project. Using this methodology, the design professional prepares phasing plans that do not necessarily have to be constructed in sequence. Keeping each section of the work independent allows for flexibility during the project to accommodate seasonal and daily routines of building personnel. Exterior work during cold months, with materials that are temperature-dependent, can be minimized to create an efficient total project duration.

Rehabilitation Is the Easy Part

For secure facilities, designing and implementing repair and rehabilitation work is the same as at any other type of building – but getting there is 90% of the battle. Before a single window can be replaced, a parapet repaired, or joints repointed, the design professional and owner must confer on how best to organize construction work to maintain security of the building, occupants, and contents at all times throughout the project. Site conditions and patterns of building usage must inform the phasing approach, and the

Air Force bases and other military installations demand high-level security, along with rigorous building rehabilitation design standards.

(continued on page 8)

representative projects

Secure Environments

At some point, all structures, even high-security ones, succumb to the ravages of time and weather. To address deterioration at a secure facility demands not only expertise in exterior envelope design, but also experience navigating the challenges specific to buildings with restricted access. Hoffmann Architects has provided building enclosure solutions for many institutions that demand discretion, security, complex logistics, and continuous operation, including:

United States Capitol
Washington, District of Columbia
Dome Restoration, West Terrace Reconstruction

Osborn Correctional Institution
Somers, Connecticut
Window and Exterior Door Replacements

Bluestone Data Center
Connecticut
Facade/Fireproofing Consultation, Reroofing

Defense Intelligence Agency Headquarters, Bolling Air Force Base
Washington, District of Columbia
Roof Replacement

14th Regiment Armory
Brooklyn, New York
Roof and Masonry Repairs

Northampton Police Department
Northampton, Massachusetts
Water Infiltration Remediation

York Correctional Institution
Niantic, Connecticut
Reconstruction of 21 Building Facades

PHOTO: MIKEY VASQUEZ, SVIGALS + PARTNERS

Sandy Hook Elementary School, Newtown, Connecticut, *Exterior Envelope Consultation.*

New York City Police Department
New York, New York
Window Replacements at Four Precincts, Parking Deck Reconstruction

Lexington Armory
New York, New York
Facade Rehabilitation and Window Replacements

Cannon House Office Building U.S. House of Representatives
Washington, District of Columbia
Plaza Reconstruction

Bridgeport Correctional Center
Bridgeport, Connecticut
Roof Replacement

Camp Nett Army National Guard Training Site
Niantic, Connecticut
Campus-Wide Roof Replacements

Albion Correctional Facility
Albion, New York
Water Infiltration Consultation

Philadelphia Navy Yard
Philadelphia, Pennsylvania
Skylight Study and Repair Design

Social Security Administration, National Computer Center, Woodland, Maryland, *Facade Repairs.*

New Haven County Courthouse
New Haven, Connecticut
Exterior Restoration

Aetna Data Center
Middletown, Connecticut
Sealant Replacement and Facade Consultation

Sullivan Correctional Facility
Fallsburg, New York
Facade, Door, and Window Rehabilitation

Queens County Courthouse
Kew Gardens, New York
Facade Restoration/Rehabilitation

National Museum of the American Indian, Cultural Resources Center, Smithsonian Institution
Suitland, Maryland
Roof Replacement

Wastewater Decontamination Plant Department of Homeland Security
Plum Island, New York
Building Envelope Consultation

Stratford Aviation School
Stratford, Connecticut
Roof Replacement and Upgrades

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(continued from page 6)

At jobsites where security is paramount, including prisons, construction projects must negotiate logistical challenges, from restricted access and advance clearance to continuous operation.

architect or engineer should develop detailed plans for modifying the construction area quickly should the need arise. At secure facilities, temporary barriers are even more critical than at standard work sites, as these provide not only protection from construction debris and hazardous materials, but also controlled avenues of transit around and through construction zones and into building checkpoints.

A construction plan that is flexible and in sync with the comings and goings of building occupants allows restoration and rehabilitation projects at secure facilities to adapt to site conditions and protection requirements. Whether preserving irreplaceable artwork or data, safeguarding schoolchildren, protecting government officials, or maintaining the security of a correctional institution, construction projects at secure, occupied facilities must attend to more than just the appropriate design and execution of the rehabilitation work; they must uphold the integrity of the site. ■

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