National Institute of BUILDING SCIENCES™

GSA

Design Guide for Operational Excellence: Applying lessons learned through post occupancy evaluation

GSA Public Buildings Service, Office of Facilities Management

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For Internal Use

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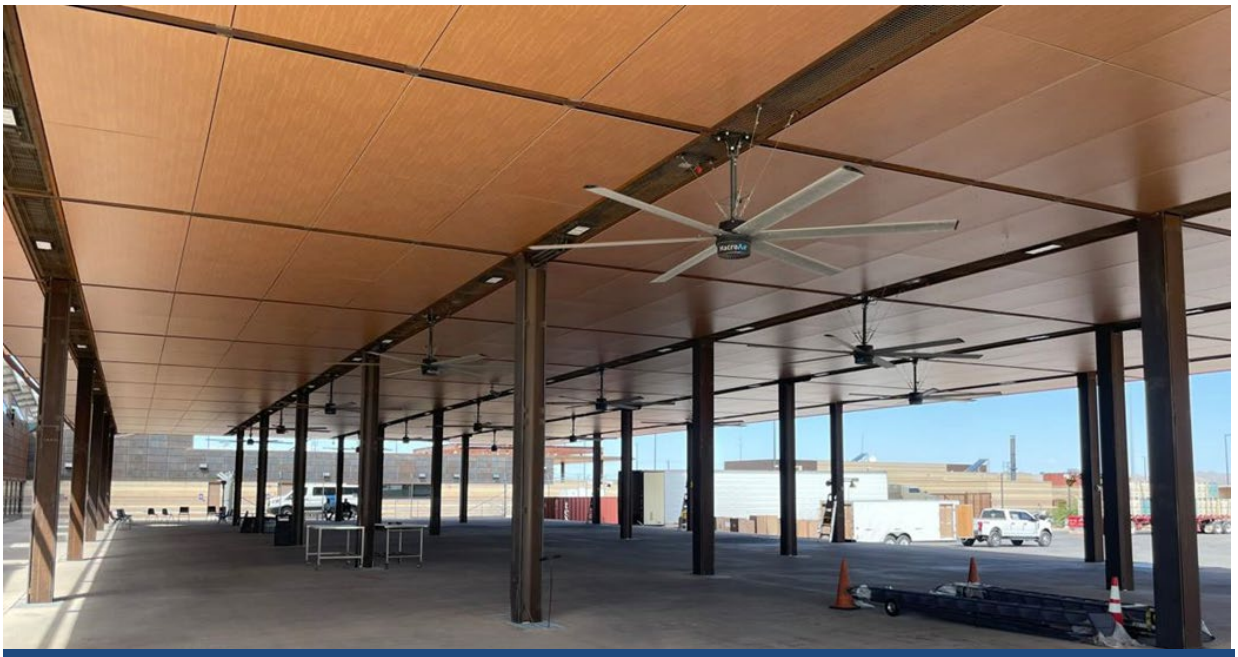
Introduction

This document updates the original GSA Design Guide for Operational Excellence, published in 2018, with Lessons Learned from the 25 Federal buildings for which Post Occupancy Evaluations were conducted from 2019 -2023. The initial Guide told us that "the lessons should change continually, as we incorporate old lessons into an ever-improving professional practice, and identify new, more nuanced lessons to add." This version with its updated list of Lessons Learned bears this out, as the importance of designing for operational excellence moves toward a rightful place of importance in the total life-cycle-cost schema for Federal buildings. We share these lessons to turn them into successful practices that result in affordable, durable, and higher-performing buildings.

This document identifies lessons to effect a positive change in design outcomes. The National Institute of Building Sciences conducted the FY2019 – FY2023 Post Occupancy Evaluation (POE) Program for the U.S. General Services Administration under the direction of Patrick Fee, Director of Facilities Operations, and Michael Malane, Facilities Management Specialist, Office of Facilities Management, Public Buildings Service, whose foresight and hands-on guidance made this project a reality. Each POE included a three-day site visit, during which the team observed and evaluated the facility's spaces and systems from an O&M standpoint. Prior to the site visit, the team reviewed project documentation and questionnaires completed by facility staff and tenants. The team reviewed construction documentation and conducted interviews with GSA staff, operations and maintenance contractors, janitorial contractors, food service vendors, and building tenants.

Each year, the team compiled findings from each building into its own report, then condensed the six reports for that year into a "Lessons Learned" report for GSA use. The team then synopsized the 25 buildings' worth of "Lessons Learned" over this five-year period into this document, designed specifically for use by GSA clients and contractors.



High speed, low velocity fans under land ports of entry canopies have proven to be an effective cooling strategy.

Over the years, the POE program has identified a number of design principles important to the functionality and ultimate success of the building, based on the most important operations-oriented successes and issues identified after the buildings had been occupied for several years. Over the last five years, the POE team has broadened its sight lines to give clear focus to what works well in the target buildings. The buildings evaluated in the POE program each offer great examples of design excellence, and identifying their O&M issues should not detract from that fact. It is our intention to offer common operations issues balanced with presentation of "what works well" in the spirit of moving the Lessons Learned forward.

That said, we all must do our part to continue to embrace the opportunities and avoid the problems that these Guides make foreseeable. Every Lesson Learned can be a success replicated, or a mistake avoided—before the very next building is built.

Servicing lights in this space is an accessibility challenge, as lifts are required that can damage floor finishes.

Operational Fundamentals

As the Lessons Learned evolve, it may be universally useful to consider building spaces and systems in terms of four major fundamentals:

- Accessibility
- Durability
- Reliability
- Maintainability/Cleanability.

Accessibility

For operations and maintenance, accessibility usually pertains to building elements, heights, and clearances, often implemented to address the specific needs of people with disabilities. In terms of operations excellence, accessibility should be considered in terms of easily operating, servicing, and cleaning the exterior and interior of the building, as well as its systems and equipment—for installation, maintenance, and removal. Recognize the added burdens and maintenance costs of locating controls and distribution devices in places with difficult access or where normal schedules of users need to be interrupted. The lighting system is another system where accessibility is of prime concern: Luminaires located in high ceilings, especially atrium spaces, can prove difficult or impossible to re-lamp. O&M staff must be able to access the components *within as well as external to* the luminaire, so consider both aperture size and disconnect locations of drivers, ballasts, and light sources.

Durability

When considering durability, remember that these structures are with us for 50, 75, or even 100 years. Start at the top: Improper roof design, material selection, and construction can cause significant leaks, resulting in long-term maintenance and repair costs, potential health concerns, and mission disruption. From procurement, checking product availability and manufacturer reliability in the local market can reduce increased replacement costs. For instance, the POEs found that custom-designed and –installed building entry canopies can become a source of major repair/replacement costs due to their customized design and installation. On the interior, properly selected and installed interior finishes can prevent significant maintenance, repair and replacement time and costs. Take care with the mechanicals, too; motors should not be driven into their service factor tolerances to meet loads.

Reliability

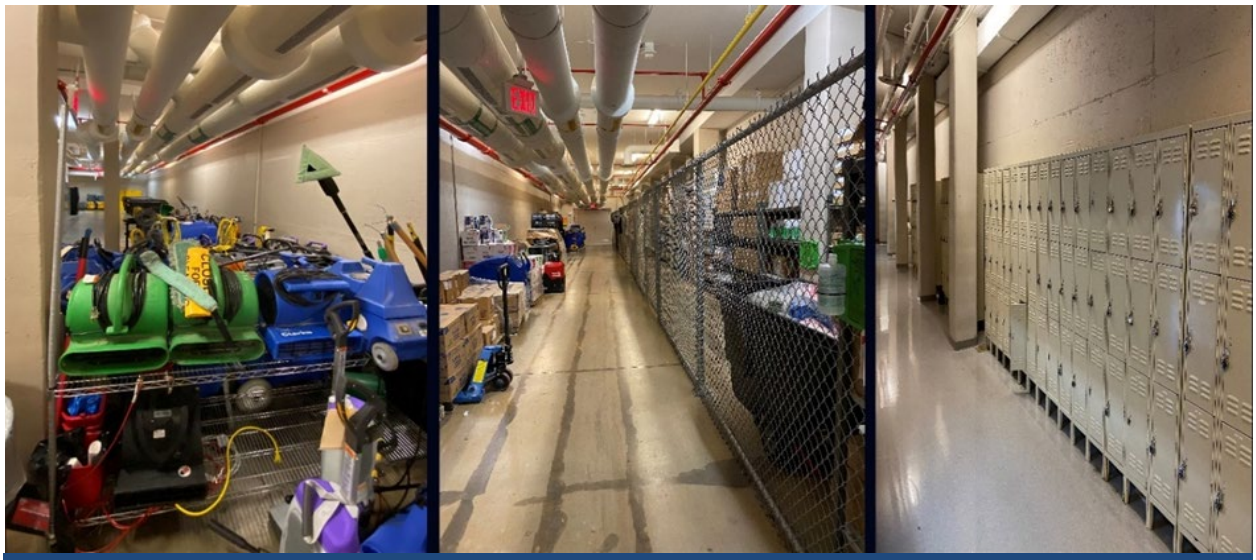
Reliability pertains to functional programming—spatial needs and requirements, system performance as well as durability and efficient maintenance of building elements. First, use reputable manufacturers that engineer quality products. Review industry standard test data for projected life of light source, driver, and/or ballast. Provide mock-ups and perform testing on relatively new engineered products, such as LED luminaires, which are constantly evolving. Reduce system designs and their various modes of controls to a simple baseline to streamline operations and decrease the optimization period (of energy consumption and occupant comfort), which can be years for today's buildings. Finally, educate the operators. Simplified systems encourage proper and more complete training of operators, and put an ultimate goal of delivering consistent building performance year-after- year within reach. Operator training should cover all aspects that affect equipment reliability and longevity, as well as setpoints, operating patterns, and schedules for occupant comfort.

Maintainability/Cleanability

The first rule of maintainability/cleanability is to consider the surfaces and finishes, both interior and exterior. Inside, avoiding white and light color finishes and floor tiles with numerous light-colored joints (which show dirt more easily and require more cleaning than dark-colored joints) can be an easy way to cut down on maintenance in areas that accumulate fingerprints or footprints. The costs and benefits of carpeting, in terms of maintenance, also should be carefully weighed. Glass and steel finishes for walls and rails also present a challenge for cleaning. Additionally, be generous in allocating storage space. Many of the facilities evaluated during this POE cycle show limited or poorly located O&M storage, which can increase O&M staff time and costs for getting parts and supplies. Housekeeping closets on each floor typically are often too small to hold stock materials, requiring increased janitorial time to restock supplies.

Other Universal Considerations

While O&M concerns can be characterized universally as attributes of accessibility, durability, reliability, and maintainability/cleanability, design of high-performance buildings also requires consideration of O&M in terms of:



In this large office building, centralized custodial storage and staff lockers are accommodated in makeshift space in the basement corridor.

- **Energy and sustainability**. For almost 50 years, reducing the amount of energy consumed in Federal buildings has been a direct tactic in reducing the costs of long-term operations. It is also important for government facilities to demonstrate prudent energy stewardship and promote regional, national, and global community and environmental benefits.
- **Wayfinding.** Limited wayfinding, through architectural clues and signage can reduce occupant and visitor satisfaction. In general, greater consideration for presenting clear, familiar, and recognizable destinations from the entry lobby that carefully considers arrival and departure paths should be a priority for any public building lobby with a high volume of visitors.
- **Circulation.** Inadequate and ineffective circulation patterns can reduce the efficiency of the facility's mission and decrease occupant and visitor satisfaction. For instance, when employing a large central atrium, carefully consider the location of the vertical circulation and restrooms or consider placing them in more than one location.
- **Safety.** Safety concerns can increase the time and costs to alleviate a hazard, in addition to dramatically increasing liability. For instance, atrium guardrails should not be of a height low enough to tempt people to set down drinks, phones, or even heavy boxes, even if the ledge cants inward to discourage seating.
- **Occupant satisfaction.** Increases in occupant satisfaction levels provide beneficial returns of increased worker productivity and promote customer satisfaction. ASHRAE Standard 55 on thermal comfort continues to provide guidance on managing the numerous contributing factors that promote customer satisfaction. Designers should demonstrate in the project Basis of Design documents that they understand the needs and characteristics of the space occupants for whom they are selecting systems, and that informed occupants with a means to

affect some control of their environments (air speed, air temperature, surface temperature, direct sunlight, glare and contrast) are generally more satisfied.

Summary: The Lessons

The following 20 Lessons, updated from the 2018 *Guide*, represent the most commonly noted areas and systems where increased attention to O&M concerns during the planning and design processes show the greatest potential to save operations and maintenance time, labor, and costs, as well as increase user satisfaction and productivity.

For Site/Landscape O&M, consider the

1. Landscaping
2. Irrigation Systems
3. Hardscape
4. Access Gates and Barriers

For Envelope/Structure O&M, consider the

5. Exterior Facade
6. Exterior Glazing and Shading
7. Entrances and Canopies

For Architecture/Interiors O&M, consider the

8. Wayfinding and Signage
9. Interior Finishes
10. Atriums, Lobbies, and Vestibules
11. Loading Docks, Garages and Mailrooms
12. Building Storage

For Mechanical/Plumbing Systems O&M, consider the

13. O&M Contractor Skill Level
14. Thermal Comfort and Control
15. Equipment Accessibility
16. Plumbing and Restroom Fixtures

For Lighting/Electrical Systems O&M, consider the

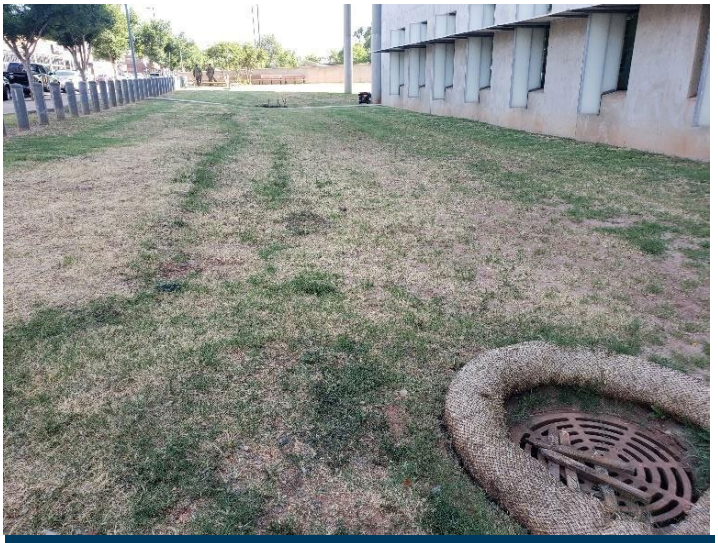
17. Artificial Lighting Levels
18. Daylighting and Shades
19. Lighting Equipment Accessibility
20. Lighting Optimization and Controls

Lesson 1. Landscaping

Site landscaping can vary widely with geographic region, facility mission, and site context. Typically, however, successful installations require selection of native vegetation requiring minimal maintenance.

When selecting and designing landscaping:

DO:



Failed landscaping

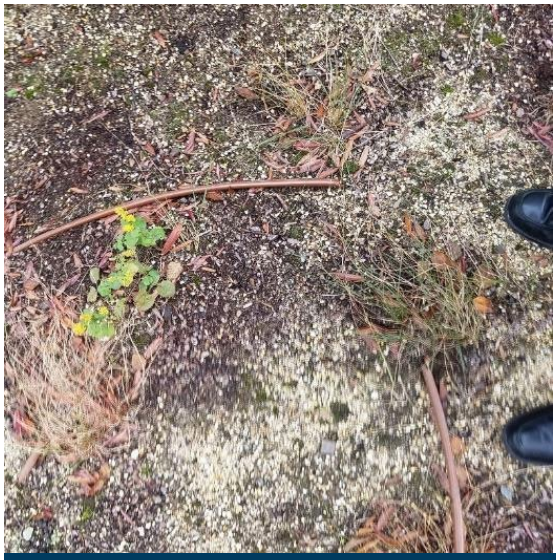
- **Select appropriate plants.** Inappropriate landscaping can cause long-term maintenance and replacement expenses. Select plantings that are appropriate for the region and for the building site. Consider anticipated heat island effects and glare from the buildings.
- **Account for maintenance.** Consider water demands and maintenance requirements, such as trimming and weeding. Also consider the durability of plants to foot traffic, particularly at urban sites where protests or social gatherings may occur.
- **Plan ahead.** Design landscaping based on the size of plantings at maturity to avoid premature replacement or the need for severe pruning.

AVOID:

- **Choosing high-maintenance plantings.** Do not choose lawns or other high maintenance ground covers. Also, avoid highly sculpted plants and hedges that require frequent maintenance and are prone to damage.
- **Blocking the flow.** Do not choose landscaping that can adversely impact pedestrian traffic flow at entrances and critical circulation points.
- **Compromising security.** Do not choose plants that reduce security by providing concealment opportunities or limiting visibility of security personnel.
- **Allowing mulch to migrate.** Make sure that mulch is contained in its designated area to avoid its washing onto sidewalks or into drains.

Lesson 2. Irrigation Systems

Exterior irrigation systems have a history of becoming inoperative or dysfunctional at GSA facilities. The use of retention ponds to store stormwater for absorption or irrigation can be problematic if not well designed and maintained. In addition, drip irrigation systems show a high failure rate due to broken pipe sections.



Broken drip irrigation pipe

When selecting and designing irrigation systems:

DO:

- **Keep it simple.** If not designed, installed, and commissioned correctly, irrigation systems can cause long-term operational, maintenance, and repair expenses.
- **Provide training.** Include provisions for adequate training when using automated or BAS-driven irrigation systems, including training and documentation for landscape contractors.
- **Provide adequate soil cover.** Inadequate soil cover can expose irrigation piping, allowing pipe sections to be broken or severed.
- **Ensure proper installation of irrigation systems.** Provide appropriate robustness for expected site conditions to avoid in-line breakage, and to minimize maintenance of near-surface lines.
- **Prepare routine maintenance plans.** Include minimum routine maintenance requirements and potentially performance-based requirements (i.e., water usage) in vendor contracts to better delineate the system requirements and achieve better performance. Indicate that flow switches should be used to calculate water flow.
- **Consider the implications of gray water.** If using gray water for irrigation, consider the sensitivity level of plantings, as well as any effects of potential contamination or pollution of landscaping.
- **Use a single controlling system.** One of the innovations that has facilitated landscaping success in GSA projects has been the cloud-based irrigation control system, which allows O&M staff to monitor or adjust the irrigation remotely at any time through a cell phone application.

AVOID:

- **Maintenance-sensitive stormwater retention pond features.** Interconnecting piping, culverts, and drain grates can increase maintenance requirements. If more complex or interconnected systems are necessary, the designer should provide a maintenance plan at facility turnover so that adequate O&M maintenance can be included in future facility budgets.
- **Allowing the irrigation system** to wet surrounding walking surfaces.

Soiled hardscape detracts from a facility's appearance

Lesson 3. Hardscape

Exterior hardscapes contribute to a public building's sense of entrance, provide communal areas for occupants and visitors, and can provide space for public functions. These exterior plazas and features can suffer from extreme environmental exposure and soiling, leading to the need for frequent cleaning and maintenance.

When designing exterior hardscape features:

DO:

- **Standardize concrete mix.** Use standard mix designs for concrete paving (and/or purchase substantial attic stock if natural stone is used) to facilitate 100-year maintenance expectations while maintaining aesthetic consistency. Document the concrete paver mix design in the project's O&M manual.
- **Carefully monitor concrete mix design, placement, and cure.** Drying shrinkage cracking typically results from high water content in the concrete mix or inadequate curing of the concrete once installed.
- **Consider cleanability.** Choose paving materials that are easily cleaned using standard pressure washing equipment and that can tolerate chemical cleaners without damage. Select low permeability and non-staining paving materials with slip-resistant surfaces.
- **Consider paver size.** Consider the size of pavers and their joint widths for ease of maintenance. Larger pavers are difficult to remove or replace and grout in narrow joints is more likely to fail prematurely and require replacement.
- **Consider pedestal paving.** Evaluate pedestal paving systems as an alternate to traditional mortar-set systems to reduce durability concerns. The lack of joint material reduces joint maintenance, and the ease of paver removal reduces drain and waterproofing maintenance.
- **Take deicing into account.** Recognize that snowmelt procedures (use of deicing chemicals) can damage certain natural stone or concrete pavers, even though they would otherwise be considered durable.
- **Weigh the use of snow melt systems.** They can be prone to frequent repair and maintenance requirements.

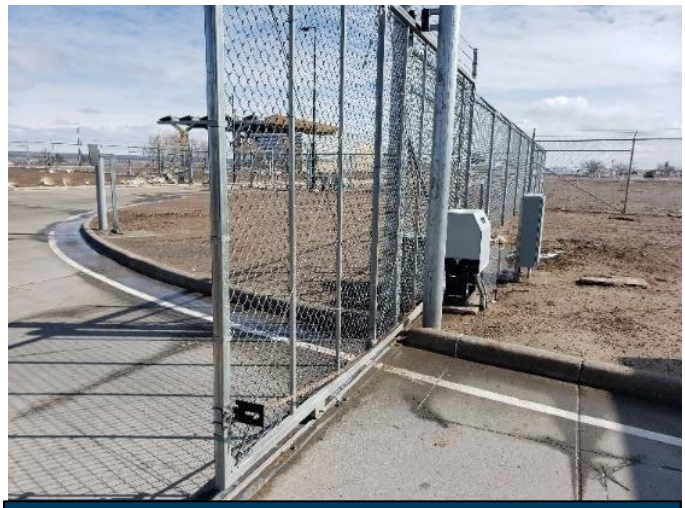
- **Educate clients.** O&M staff should make sure that tenants understand snow removal contract conditions and limitations regarding priority areas for clearing and hours of operation.

AVOID:

- **Selecting untried stone.** Do not choose natural stone that does not have a track record of performance and availability in the local climate. Inappropriate stone selections can lead to substantial repaving costs over the lifecycle of the building.

- **Selecting colored concrete,** as it can be prone to fading over time due to UV exposure, show signs of wear faster in high-traffic areas and require more extensive maintenance, and is more difficult to match when patching.

Lesson 4. Access Gates and Barriers



Inoperative access gate

Most GSA facilities incorporate large heavy access/parking gates and barriers into the site to provide front line of security to the building and/or to the site itself. These gates and barriers typically have recurring maintenance and repair issues due to climatic conditions such as rain, wind, or ice. The maintenance and repair time required can put undue stress on the operation of the facility; in addition, many of the replacement or repair parts—as well as the skilled personnel needed to install them—must be special ordered and come from locations a significant distance from the facility, further delaying the operational capacity of the facility.

When selecting access gates and barriers:

DO:

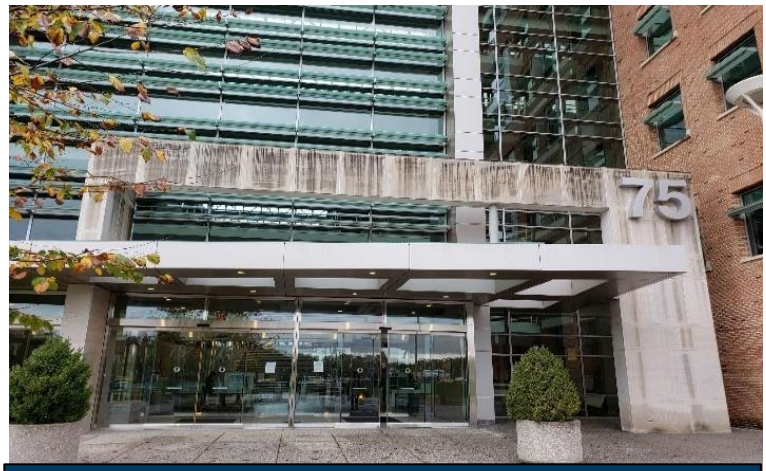
- **Select gates and barriers in accordance with the site's existing climate conditions.** Some types of gate and barrier equipment do not perform well in heavy winds, rainfall, or ice/snow, which suggests product selection and reliability do not reflect the given project requirements.
- **Select horizontal or vertical gates depending on the amount of snow accumulations.** Snow and ice can have significant effects on the movement of gates, especially horizontal gates.
- **Ensure foundations are appropriate for the size and weight of gates.** Large, wide gates that cantilever from each side of the road require significant foundations. Poor soil and undersized piers can make automatic gate operation difficult.
- **Select barriers that meet cycling requirements.** Barriers with motors specified for the number of repetitive cycle requirements should be selected.

AVOID:

- **Bollards and pop-up barriers on sites with significant snow**, ice and freezing temperatures. This type of equipment has a poor track record in extreme weather conditions.
- **Gates and barriers that are difficult to replace or require skilled repair contractors**. Equipment that is unique or custom designed is very difficult to repair, and parts are delayed causing major security concerns or disruption to the facility.
- **Non-standardized gate sizes**, which may be difficult to get replacement parts for.

Lesson 5. Facades

The building facade is often the most striking element of a public building. Façade staining and soiling create a significant problem that can affect building operations as well as life-cycle costs through its required maintenance levels and energy efficiency. Serviceability and maintainability—as well as the visual attainment of an architectural vision—need to be fully optimized for a successful building envelope.



A stained facade significantly detracts from the building's presence

When designing the building facade:

DO:

- **Select appropriate façade materials.** Facade material selection has a significant influence on long-term staining. Water-permeable or absorptive facade materials (such as masonry) will be more likely to stain than impermeable materials (curtain wall, metal panels, etc.). Once water saturates a material, it can promote mold growth, differentially attract soiling, discolor the substrate, or dissolve components within the wall assembly, all of which can cause staining.
- **Incorporate flashing over horizontal surfaces.** Flashing will limit absorption of water into permeable substrates such as stone and clay masonry. Flashings will have a visual impact on the facade but can significantly reduce staining and associated long-term damage.
- **Consider providing drip profiles at transitions.** These will reduce the impact of water that collects on a horizontal surface from running back against the vertical building surface below.
- **Minimize difficult-to-access conditions.** Facilitate cleaning as part of the overall design by incorporating a permanent means of access to the facades.
- **Include periodic cleaning of facades into the building's maintenance plan.** As part of a long-term maintenance plan, façade cleaning can be combined with other periodic maintenance tasks, such as window washing or sealant replacement.
- **Consider façade cleanability and maintenance up front.** Consideration of the impact of enclosure complexity should lead to successful harmony among aesthetics, shading, and cleaning concerns.
- **Evaluate color and texture.** The color and texture of façade materials should be evaluated in the context of the local environment for cleaning demands. Light-colored buildings in urban environments may require more frequent cleaning.
- **Anticipate rundown staining.** Evaluate the potential for staining facade elements, adjacent systems, or objects at grade due to water rundown staining or component corrosion.

- **Weigh the use of ledges and recesses.** Ledges, niches, and other recesses should be avoided or at least their depth and slope should be critically evaluated, due to their propensity for staining from water rundown and bird roosting.
- **Consider making parts of the façade removable.** For veneer cladding systems, consider requiring that the façade be removable in discrete segments or regions to access and repair the weather-resistive barrier (WRB) system without extensive façade disassembly.

AVOID:

- **Poorly fabricated façade systems or poorly installed materials.** Careful selection and quality control of facade materials during construction can reduce the risk of future staining and the associated costs for remediation.
- **Designing non-redundant enclosure systems.** Don't specify non-redundant enclosure systems that do not include a drainage layer and rely solely on exterior layer integrity for air- and water-tightness.
- **Encouraging streaks.** Don't choose highly polished exterior surfaces that can streak or spot and are otherwise difficult to keep clean.
- **Allowing roosting sites.** Don't create inviting places on the facade for birds to nest. They will.

Lesson 6. Exterior Glazing and Shading

Poor selection of exterior shading system inhibits window cleaning and allows ice dams to form

Building fenestration systems provide positive attributes—such as views to the outside and daylighting—and negative elements—such as thermal transfer and solar radiation, which can be mitigated through exterior shading devices. Problems associated with glazing assemblies include fracturing of the glass and impediments to window washing from the shading devices.

A major concern at many of the land ports of entry is the cracking of the ballistic-resistant glazing (BRG) found in the inspection booths as well as the buildings. The cracking in much of the ballistic glazing limits visibility and potentially compromises the safety of US Customs and Border Control (CBP) officers. The glass is expensive to replace, so most of the damaged glazing remains unrepaired in the ports, especially on the southern border. Further investigation of this issue is strongly recommended, along with an assessment of glazing in all ports of entry.

When selecting the exterior glazing and shading:

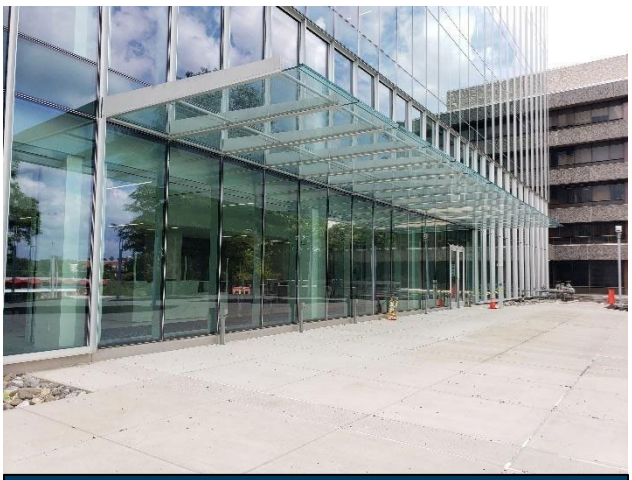
DO:

- **Minimize difficult-to-access conditions.** Facilitate facade cleaning as part of the overall design by incorporating a permanent means of access.
- **Include periodic cleaning of windows in the maintenance plan.** As part of a long-term maintenance plan, window cleaning can be combined with other periodic maintenance tasks.
- **Carefully consider the effects of exterior shading devices.** Exterior sunshades need close scrutiny, as they can generate wind noise and complicate cleaning and other exterior wall maintenance. Architectural vertical extensions and cantilevered “fly-bys” designed to hide air intakes can cause air recirculation and entrapment, allowing odors to be drawn back into the building
- **Include the infrastructure.** During the enclosure design process, incorporate infrastructure (engineered roof anchors, safety line tiebacks, window-washing equipment, etc.) at the roof for the more intensive aspects of facade maintenance (such as sealant replacement or glazing replacement) that involves swing stages or lifts.

AVOID:

- **Long-term costs associated with specialized equipment and contractor expertise for window washing and façade maintenance.** Complicated and customized window washing and maintenance systems will dramatically increase the life cycle cost of the building envelope.

Lesson 7. Entrances and Canopies



This canopy, while protective, has proven difficult to clean

Building entrances are a major element of "presence" in Federal buildings. They can have large doors entering into vestibules or directly to the lobby. Canopies over the entrance provide useful shade and shelter at the entrance; however, they may conflict with functionality and increase maintenance and cleaning requirements.

When designing building entrances and canopies:

DO:

- **Keep it simple.** Avoid complex materials and assemblies as well as corrosion-prone materials. Recognize the extreme exposure requirements for the entrance/canopy materials and assemblies (such as excessive heat, snow load, wind uplift, etc.).
- **Anticipate drips.** Review drip lines and patterns to avoid slip risks and rundown staining.
- **Plan for access.** Consider means of access to the canopies for repairs and maintenance. As non-critical elements, they may receive minimal preventive maintenance or attention until a severe problem occurs.

AVOID:

- **Proprietary specifications.** Product availability and manufacturer reliability in the local market should be considered as part of the procurement process, greatly reducing increased replacement costs. Custom-designed and –installed building entrances and canopies can become a source of major repair/replacement costs.

Lesson 8. Wayfinding and Signage

Interior wayfinding and signage can be a significant issue in Federal buildings that are accessed by the public. As visitors enter and move through the building vertically and horizontally, the layout of the building can create confusion if wayfinding is not adequately designed.

Exterior signage, especially at land ports of entry, provides directional wayfinding. Signs posted include notifications, warnings, and other clarifications posted to be read, however; if the text is small, it is extremely difficult or impossible to read, particularly from vehicles. Minimal bilingual signage has been observed at various facilities.

Use of temporary signage

When designing wayfinding and signage:

DO:

- **Consider the formation of a wayfinding committee.** A committee of building tenants can be formed to provide information to the design team in terms of the building's wayfinding and signage needs.
- **Develop a comprehensive wayfinding plan.** A plan should be developed to show assumptions and solutions for providing a comprehensive and simple wayfinding schema for the entire facility both inside and outside.
- **Provide large and clear text on signage.** All signage, both interior and exterior, should be readable from a distance and clearly express directions and room location.
- **Locate signage at visible and appropriate places.** Signage should be located at appropriately visible places both inside the building and outside.

AVOID:

- **Relying on temporary signage and security officers in the lobby to provide direction.** Overreliance on temporary signs and staff assistance to alleviate wayfinding inadequacies should be discontinued and new solutions designed and implemented.

Lesson 9. Interior Finishes

Typical corner damage

Selection of appropriate interior finishes for a building is key to its success, the quality of its workplace, and its ability to project a positive impression. To enhance these positive conditions, consider durability and ease of maintenance carefully when selecting all interior finishes.

When selecting the interior finishes:

DO:

- **Consider neutral carpet colors.** Light-colored carpet or carpet with a regular geometric pattern shows stains easily and is challenging to maintain. Give preference to darker, neutral colors and irregular patterns
  that conceal incidental stains, particularly in high-traffic areas.
- **Use larger tiles on floors and walls.** The use
- of large tiles, especially in restrooms, reduces grout joints, which are difficult to keep clean.
- **Design to avoid glare.** In spaces that use natural light, recognize the potential for glare from reflective floor finishes such as polished stone and terrazzo. Note also that excessive glare can make security camera images difficult to read and can present a hazard for people with vision impairments.
- **Use tested floor materials.** Select materials with a proven track record for durability and maintenance, and steer away from unusual or untested flooring materials.

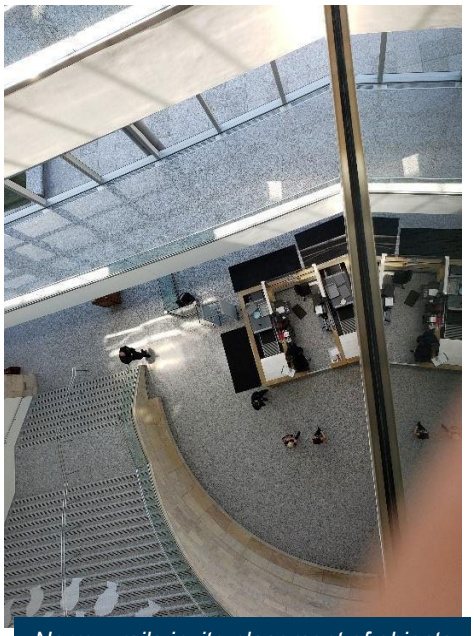
AVOID:

- **Installing finishes in an unconditioned space.** Construction sequencing that allowed this condition may be responsible for persistent splitting that has occurred on the surface of wood finishes and furniture.
- **Choosing light color finishes.** Avoid floor tiles with numerous grout joints (especially with white or light-colored grout) as well as painted floors in areas of high pedestrian traffic or wet locations.
- **Specifying unique, specialty wall finishes.** As with floor finishes, the selection of unusual or untested wall finish materials should be avoided. Choose only materials with a proven track record for durability, maintainability, and continued availability.
- **Using oversized acoustic ceiling tiles.** Systems with tiles larger than 2-feet by 4-feet are difficult to handle for above-ceiling access, and a supply of replacement materials is more difficult to guarantee for the life of a facility.

Lesson 10. Atriums, Lobbies, and Vestibules

The aesthetic value and sense of identity created by atriums, lobbies, and vestibules can be an expression of the building's mission and merit additional costs in design, construction, and maintenance; however, it is important to consider the increased O&M requirements to maintain these building features.

Screening visitors and employees is an integral process for gaining access to Federal buildings. In planning to accommodate this activity, designers should consider the typical peak hour, as well as the normal hourly and daily totals of people who enter through the screening areas, both at the primary and service entrances.



Narrow rails invite placement of objects that can fall to the floor below.

Ample space should be provided for security personnel and equipment, as well as space for unscreened individuals to queue and space for individuals to collect their belongings after the process. Location within the lobby and positioning of security staff should consider vulnerabilities from all sides, including those from above if located in an open atrium. The security staff should have clear lines of sight, unobstructed from building elements, landscaping, queue lines, or sun glare.

Tall buildings, and particularly those with multistory atriums that include direct connections to the outdoors, struggle with pressurization control at their main entries. Adding to this, not only can there be a significant stack-effect inducing infiltration at the main lobby, but surface winds can prevent operation of the doors.

When designing atrium, lobbies, and vestibules:

DO:

- **Consider all equipment needed.** As part of the overall design, consider equipment and details required to access high ceilings, upper portions of walls, and art for cleaning and maintenance. Include consideration of clearances to walls and fixed installations (benches, furniture, etc.), clearances at doors, floor loading, and the specifications of readily available equipment. Note also that this in-house equipment will require dedicated storage areas.
- **Reduce heat gain and glare.** Reduce heat gain and glare with window treatments, fenestration, or well-designed external shading.
- **Simplify circulation.** Consider the location of the vertical circulation and restrooms or consider placing them in more than one location. Present clear, familiar, and recognizable destinations from the lobby that carefully consider arrival and departure paths. Inadequate and ineffective circulation patterns can decrease occupant and visitor satisfaction as well as reduce the efficiency of the facility mission.

- **Consider users with low vision.** Lobby stairs with no tread delineation and translucent floor panels, with or without uplights, present challenges to low-vision occupants and visitors.

- **Consider safety and security concerns.** Safety concerns can increase the time and costs to alleviate a hazard in addition to dramatically increasing liability. For instance, some atrium guardrails are placed low or narrow enough to tempt children to climb and people to set down drinks, phones, and heavy boxes, which can fall to the lobby below.
- **Consider vestibules, even for smaller buildings.** In buildings without vestibules, extra attention and adjustments to both air systems and door hardware were found to be ongoing activities even after years of operation. For all buildings, architectural compartmentalization (separate spaces) at exterior doors and active pressure control measuring across each building exterior door would enhance the reliability of pressurization control and reduce commissioning and retuning efforts.

AVOID:

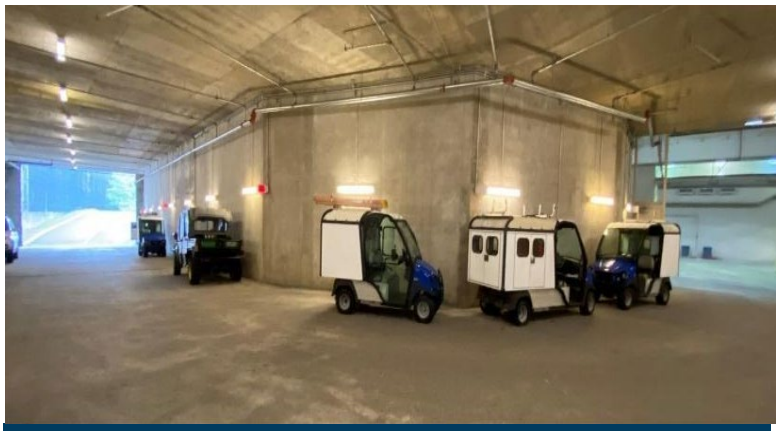
- **Relying on custom equipment.** Avoid the need for unique or custom-built access maintenance equipment that cannot be readily acquired or rented, or that may require specialized maintenance and operation.
- **Choosing shades with hard-to-reach motors.** Do not use mechanical or operable shades in large lobby or atrium areas that will require motor maintenance at elevated or difficult-to-reach locations, or that are prone to breakage.

Lesson 11. Loading Docks, Garages, and Mailrooms

Limited or poorly designed loading dock areas can dramatically increase the inefficiency of delivering packages, supplies, and other materials to the facility. The lack of freight elevators and direct transfer routes can exacerbate these inefficiencies, increasing staff time and resources required for movement of incoming and outgoing materials. Large, customized overhead doors and horizontal gates found in garages, loading docks, and secure parking areas are prone to racking and breaking down, requiring long delays in terms of acquiring skilled, out-of-town repair contractors and parts from overseas.

Garages, such as secondary inspection garages at land ports of entry, tend to get extremely hot and are not conditioned like repair garages. There is a small amount of vehicle emission exhaust, but no air motion for officer comfort. These inspection garages often have large, roll-up doors that have little or no shade from overhangs or site plantings. The doors can transfer heat to the interior beyond the ability of the mechanical systems to compensate.

Although the volume of mail received in Federal buildings has been substantially reduced over the last decade, the mailroom remains a key part of the successful operation of most Federal facilities. The potential threat that insufficiently screened mail represents has made security a central concern associated with the design of mail rooms.



Loading dock requiring almost 180-degree turn

When designing loading docks, garages, and mailrooms:

DO:

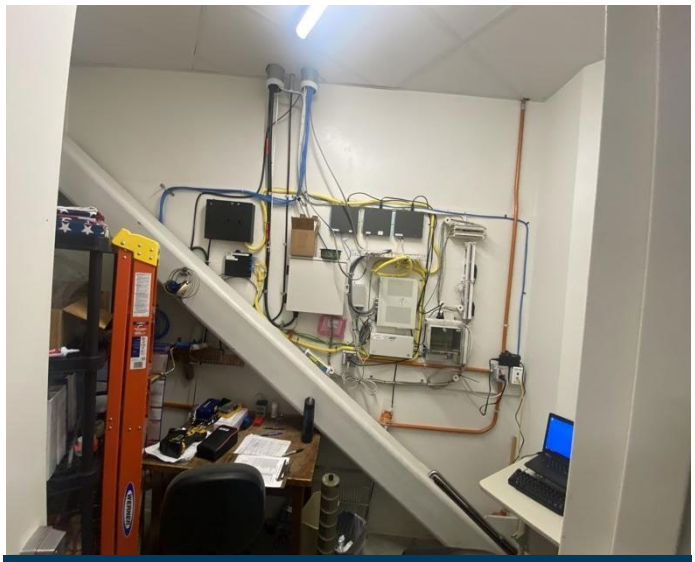
- **Secure access.** In no case should unscreened vehicles or pedestrians be afforded access to loading docks and areas.
- **Consider acoustics.** Consider acoustic requirements for any building program located adjacent to or above the loading dock.
- **Size matters. Make sure the dock is adequately sized to accommodate trash and recycling storage and collection.** Provide enough space for security personnel and security screening equipment, including a security booth, magnetometer, and x-ray scanner for packages.
- **Consider improving conditioned space in garages.** Garages, although not considered fulltime occupied space, should have proper cooling, heating, and air circulation working at all times.
- **Provide a clear line of sight.** Maintain a clear line of sight between the security area and the loading dock entrance, as well as to ancillary equipment, such as dumpsters and compactors.
- **Provide optimal turning room for vehicles.** Provide clear space for turning radii. Additional space for maneuvering vehicles substantially reduces delivery and departure times, improves operations in enclosed loading docks, and reduces the risk of accidents.

- **Provide restrooms for drivers.** Restrooms within the loading dock but outside the facility's secure perimeter permit drivers to use restrooms without the need to pass through security screening. This can speed up delivery and departure schedules substantially and improve loading dock efficiency.
- **Design to accommodate efficient and secure mail screening.** Provide a security screening area immediately accessible to the mailroom that allows x-ray of large packages. The mailroom should accommodate glove boxes and ventilated hoods for handling suspicious packages, as well as space for carts to pass one another to reduce the likelihood that a cart ready for deliveries will be trapped by a cart that is parked or being filled.
- **Include emergency showers.** Provide emergency showers that include a floor drain and seamless floor finish.

AVOID:

- **Encouraging excess noise.** Don't locate the loading dock next to acoustically sensitive activities.
- **Using proprietary specifications.** To greatly reduce replacement costs, product availability and manufacturer reliability in the local market should be considered as part of the procurement process.
- **Designing custom garage doors.** Nonstandard sizes, custom designs, or other issues affect replacement part availability. When a door goes out of service due to unscheduled maintenance, it can directly impact operations and security of a facility, especially if replacement parts or service technicians are not readily available.

Lesson 12. Building Storage



Small storage space

The long-term success of any facility depends on the implementation of a thorough operations and maintenance program, and one of the keys to the long-term success for operations and maintenance is providing sufficient areas in the building to efficiently store spare materials, replacement parts, and the equipment that is necessary to keep the building functioning with optimal efficiency. When buildings fail to accommodate these storage requirements adequately, makeshift storage areas appear in spaces intended for other functions, most frequently mechanical and electrical rooms. In these instances, the stored materials quickly can become a hindrance to equipment access, a fire hazard, and a potential obstacle to safe egress.

When designing building storage spaces:

DO:

- **Consider storage needs early.** Develop an equipment list as early as possible in the planning and programming stages of the project and dedicate space in the O&M and janitorial storage areas for storing the equipment. Anticipate and dedicate storage requirements for maintenance materials, the total amount of attic stock material called for by the specifications, and dedicated space for oversized equipment such as lifts and ladders. Include storage for outdoor equipment, such as snow blowers.
- **Include a workspace.** O&M staff a workspace for a stand-alone BAS workstation, a work bench, tools and equipment, and O&M manuals.
- **Consider adjacencies.** The O&M storage space should be easily accessible from a freight elevator. The location should consider minimizing the acoustic impact for adjacent spaces. The location should discourage the potential for the O&M storage area to be annexed for a different programmatic function.
- **Right-size freight elevators.** Use the equipment list for sizing freight elevators.
- **Provide janitor's closets on every floor.** Custodial closets should include a dedicated area for local storage of supplies and cleaning materials on standardized shelving. The location of these closets should be uniform on every floor.
- **Plan the paths.** Consider routes and the clear paths for all equipment for the entire facility in the planning process. Selection of finishes, especially floor finishes, should also take into account the planned routes for heavy equipment.
- **Include shelving.** The layout for the O&M storage should be able to accommodate standard shelving units in a manner that maximizes both linear feet of shelving and ease of access.

AVOID:

- **Overlooking space requirements for large equipment**. Don't forget storage space requirements for lifts, scaffolds, and bulky equipment such as floor buffers.
- **Designating off-site storage.** Don't designate storage for materials off site, even in an adjacent facility.

Lesson 13. O&M Contractor Skill Level

This water-source VRF system has significant operational issues

In certain GSA buildings, the O&M vendors struggle to operate the building in the way it was specifically designed as a SMART or high-performance building to leverage sophisticated control and monitoring systems intended to significantly increase energy efficiency. The skill set of the O&M vendor is general at best and procuring the required vendor level of expertise in a local marketplace tends to be substantially above the labor rates GSA is accustomed to.

This leads to a conundrum: If the O&M vendor service requirements for operating such specialized buildings cannot be procured, due to open competition or service delivery cost restrictions, what are the true environmental/energy benefits of designing such sophisticated buildings? In other words, is achieving the first costs/operating costs paradigm for these buildings being accomplished, if you consider O&M vendor financial and contractual restrictions?

GSA seems to have a recurring issue of designing SMART and sophisticated buildings in remote parts of the country, where the workers with the skill sets needed to operate these buildings effectively are particularly hard to find.

When requiring O&M services for a SMART or high-performance building:

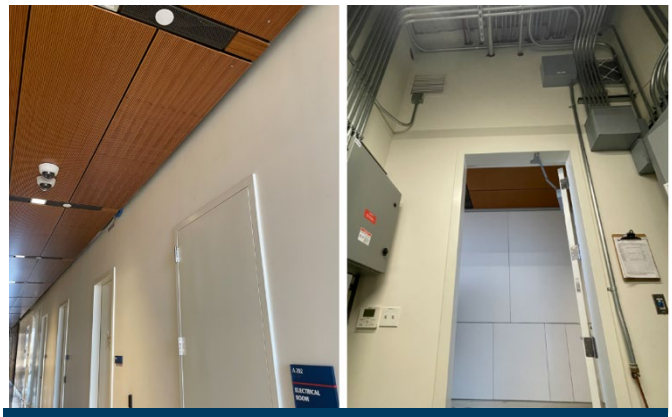
DO:

- **Require skilled contractors.** O&M contracts should require prerequisite training; a checklist of mandatory conveyance procedures, including updated O&M practices and training of the incoming staff: a stated reasonable transition; and a pre-established process for accounting and invoicing for O&M transition services at the end of the contract period.
- **Contractors need documentation.** Documentation must be assembled completely, clearly, and logically with a mindset that the people using it most likely will be those not familiar with the initial design, construction, testing, and training. This includes photos during construction to document concealed piping, conduit, and equipment.
- **Provide specialized training.** Training is the best opportunity to aid first-generation O&M success. Training in complex systems should be conducted by both a factory-authorized representative and the commissioning agent. Effective training requires hands-on practice.
- **Provide access to system information.** Links to service videos, videos of the specific site training segment, datasheets, and equipment suppliers should be affixed to each piece of equipment; QR code, or barcode.

- **Educate building occupants.** The onboarding process for occupants should include a review of workplace systems (all user MEP, lighting, and fire) to educate on functionality, adjustments, and expectations.

Lesson 14. Equipment Accessibility

To achieve maximum utility and life of installed equipment and increase total value through reductions in maintenance task labor, provide: unobstructed clearances, access to those clearance spaces, prompt availability and convenient location of spare parts, and provisions to expedite inspections. Suspended equipment, concealed equipment, equipment in occupied spaces, equipment located outdoors, and equipment housed in confined, or below-grade spaces are all likely to experience neglect, reduced performance, and potentially shortened service lives—as well as increased labor maintaining and repairing the equipment.



Difficult access to equipment above ceiling

DO:

- **Plan ahead.** Plan for maintenance, operations, workshops, and proximities of spare parts storage early in the programming and design phases of a project.
- **Know the O&M staff's capabilities.** Understand the current and potential maintenance capabilities of staff. This is essential to designing a system that will meet the performance goals of the project in both the short- and long-term.
- **Loop management in.** Inform the property management team , including the OE representative, of maintenance and operations implications, as well as service-enhancing and labor-reducing features during exploration of design alternatives.
- **Provide access for immediate operational adjustments.** Means of automating monitoring and enabling remote operation, such as intuitively via the building automation systems (BAS), should be the first consideration. Recognize the added burdens and maintenance costs of locating controls and distribution devices in places with difficult access or where normal schedules of users need to be interrupted.
- **Know schedules.** Know building operation schedules that indicate when equipment can be taken off-line for service. For spaces that operate 24/7, consider redundant, standby, or temporary connections to avoid loss of service or unexpected costs. Additionally, to reduce maintenance costs, either locate components requiring planned maintenance outside of restricted spaces (such as holding cells) or provide an alternate means of access that does not compromise restricted zones.
- **Incorporate access provisions to minimize maintenance task durations.** These provisions include locating spare parts storage in locations convenient to the points of use, as well as providing stairs, doors, hatches, lifts and hoists of satisfactory capacity and location to allow for maintenance activities.

- **Plan for roof equipment maintenance accessibility**. If equipment is roof-mounted, make sure it is not too tightly penned in and have adequate space.
- **Plan for equipment replacement/removal accessibility.** Small openings, such as single-leaf doors, can generate significant replacement time and costs. Use double-leaf doors to facilitate delivery and removal of equipment such as air-handling units. Plan travel paths. Avoid locating equipment in hard-to-reach spaces, which require significant time to access and make it difficult to respond to emergencies.
- **Plan access for end-of-useful-life replacement.** Plan for the replacement or upgrading of the prime equipment for mechanical, electrical, and plumbing systems to occur several times over the life of the facility. As such, the means of replacement should be inherently obvious and not require imagining dismantling and reconstruction of building components such as walls, floors, and roofs, or protecting less durable or highly valuable features.

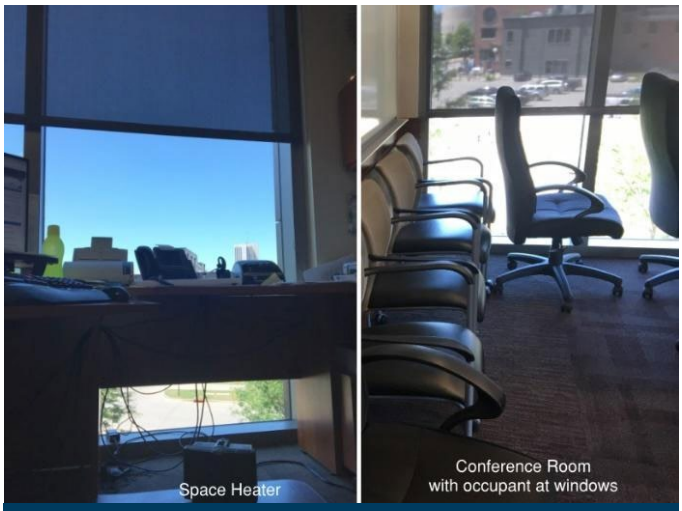
AVOID:

- **Placing equipment in hard-to-reach spaces.** Suspended equipment, concealed equipment, equipment in occupied spaces, equipment located outdoors, and equipment housed in confined or below-grade spaces—all are likely to experience neglect, reduced performance, and potentially shortened service lives.

Lesson 15. Thermal Comfort and Control

Providing high levels of occupant thermal satisfaction with the indoor environment continues to be a challenge for many GSA facilities.

Land Ports of Entry (LPOE) inspection booths in particular continue to experience heating and cooling deficiencies for US Customs and Board Protection (CBP) officers. The booths are small, open constantly to communicate with drivers, and often are situated in areas with harsh climates, which perpetuate the inadequacies of providing a comfortable working environment.



Space heater in an occupied space

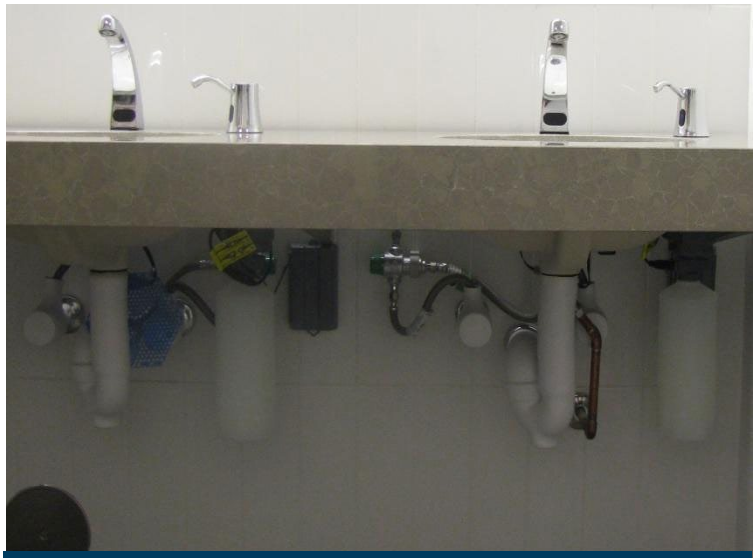
When designing for a comfortable thermal environment:

DO:

- **Tenants want control.** Allow users to adjust their air flow. Allow occupants of the space (or maintenance staff) to adjust all supply air system patterns. Just knowing that the airflow pattern is adjustable provides an element of control to occupants and raises satisfaction levels.
- **Design for individual controls.** Design radiation systems to be controllable by individual spaces, and not by the entire building façade. Without independent space control, higher levels of dissatisfaction occur with baseboard radiators.
- **Let staff teach occupants.** Give facilities staff simple means with which to educate space occupants of the options available for customizing working environments.
- **Control solar radiation.** Design building enclosure designs to allow control of solar radiation into occupants' and perimeter spaces.
- **Control surface temperatures.** The building enclosure needs to demonstrate control of heat gains and losses on surfaces in the perimeter zone. Stabilize material surface temperatures to closely match the desired air temperature. Give special attention to window interior surfaces, metal panels, skylights, medium- and dark -colored flooring, and horizontal surfaces below skylights.

Lesson 16. Plumbing and Restroom Fixtures

It may seem to be a small thing; however, battery-powered restroom fixtures prove to be an extremely high maintenance item in buildings that house busy public restrooms. The battery replacements can be a weekly necessity, requiring the facility to expend O&M staff resources on a continuing basis.



Battery-powered restroom features can be labor-intensive to maintain and keep operating.

Because the batteries fail at different times, battery replacements become a continuous maintenance task. Further, identifying where the failed batteries are among numerous and disparate locations can be difficult. Battery replacement is time intensive, particularly for lavatory and soap dispensers, which require staff to crawl and access the battery pack under each counter. Providing hardwired or photovoltaic electrical supply to automated fixtures in heavily used restrooms results in increased reliability and performance, along with reduced maintenance, labor, and expenses. When possible, manual commercial-grade soap dispensers should be provided in lieu of automated soap units of any kind.

When selecting restroom plumbing fixtures:

DO:

- **Avoid batteries**. Provide hard-wired power for water closets, urinals, and lavatories to prevent long-term labor and material costs of battery replacements in large public and frequently used facilities. Hard-wiring also minimizes frustration caused by dead batteries and non-operating fixtures for users and janitorial staff alike.
- **Push for soap**. Provide manually operated soap dispensers. They are sanitary, as hands are washed after coming in contact with them; always reliable when filled with soap; and do not inadvertently activate when not intended.
- **Consider special cases.** Consider photovoltaic, battery powered, or manually operated water closets and lavatories for private single occupant restrooms *not* used by the public. These limited use fixtures will remain operational if the power is lost to the restroom for any reason, during both unexpected or planned outages.

Lesson 17. Artificial Lighting Levels

Excessive artificial lighting levels present an issue for many GSA buildings, some of which have levels 50 - 100% above Illuminating Engineering Society (IES) recommendations throughout the building. A reduction in light levels would present significant energy savings in the building stock.

This space, with abundant daylighting and luminaires, is over-lighted

Many of the spaces that use daylighting tend to be over-lighted. Corridors that do not have access to daylight are also over-lighted, due to the quantity of luminaires. A reduction in lumen output and higher quantity of luminaires could provide a more appropriate light level and less glare, while saving energy and money.

Daylighting can be an effective strategy for reducing lighting levels and saving energy and energy costs in the building. A well-designed lighting control system, which includes daylight harvesting, occupancy sensing, scheduling, and ability to link into the BAS system, is a critical element of a well-designed and -operated, energy-conserving building.

When designing lighting levels:

DO:

- **Use recommended illumination levels.** Design LED lighting with appropriate illumination levels per IES recommendations. Perform lighting calculations for every space to determine luminaire types, quantities, and locations that meet recommended levels. Lighting should always be designed in coordination with interior furnishing locations.
- **Use dimmable LEDs.** All luminaires should be specified with dimmable LED drivers.
- **Minimize glare.** Select lighting equipment with minimal glare for users. Indirect lighting is most appropriate for interior ambient lighting. For exterior spaces, select lighting with no greater than a G2 glare rating.
- **Darken empty rooms.** Design lighting controls that turn off lighting or reduce the amount of lighting when the area is unoccupied. Motion sensors are appropriate in common areas, and vacancy sensors are appropriate in individual use areas.
- **Users want control.** Provide users with control over their own lighted environments. Provide spaces with personal task lighting and dimming controls.
- **Commission the lighting system.** Commission all lighting to finetune illumination levels and ensure that lighting controls are working properly.

Lesson 18. Daylighting and Shades

As GSA buildings continue to provide more extensive and much appreciated increased access to daylighting, the importance of shades is paramount for completing a comfortable, daylighted scenario of which occupants approve. Shades should not be a tenant finish item; rather, they should be supplied as part of the building construction, as they are as much of the overall daylighting strategy as the size of the windows or external, fixed shades.

These inappropriately sized shades have gaps along the edges, possibly inviting in direct sun and glare

For optimal use of shades:

DO:

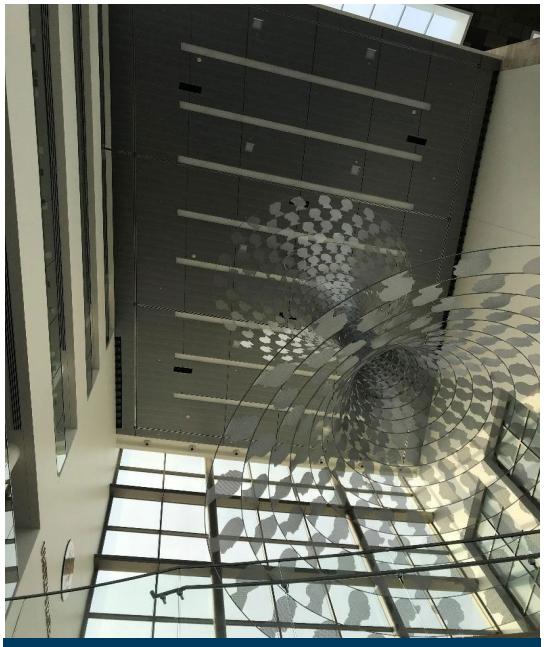
- **Integrate shades.** Consider shade design as part of the overall lighting strategy.
- **Shades should fit.** Design shades to fit each window. Require the shade manufacturer to send a representative to visit the building as it is nearing completion to obtain accurate in-field measurements of each shade required. Shades should not have gaps.
- **Mix and match.** Consider a strategy that includes a mix of manual and electronic shading.
- **Optimize shades.** Tie electronic shades into the building control system or lighting control system.
- **Automate shades opening.** Program the system to automatically open the shades every morning and allow for users to adjust the shades as needed.
- **Shade skylights and clerestories.** Consider shades for skylights.
- **Consider maintenance of shading**. Make sure that interior shading devices are easy to service or replace. Restricted access requires significant time and expertise in replacing or repairing the shades, adding to the overall operations costs.

AVOID:

- **Placing desks under unshaded skylights.** Do not locate workstations underneath skylights without employing a shading system.
- **Requiring tenants to install their own shades.** Make shading design part of the design process.
- **Specifying ill-fitting shades.** The intent is to avoid ill-fitting, ineffective shades. Odd-shaped fenestration should be avoided, along with extremely long windows that require excessively heavy shades. Additionally, avoid tucking the shade pocket where it is difficult to access for maintenance.

Lesson 19. Lighting Equipment Accessibility

All lighting equipment needs replacement or repair at some point in its life. And note that while LED luminaires ensure that that required access will be less frequent than for fluorescent or legacy light source equivalents, access to lighting still will be necessary throughout the lifetime of the building.



This atrium lighting proves very difficult to access for maintenance and cleaning

DO:

- **Keep luminaires within easy reach.** Avoid luminaires located in high ceilings, especially in atrium spaces. These prove difficult or impossible to clean and re-lamp. The result is that many lights are never used or remain permanently broken. If a lift is required to maintain luminaires, it may necessitate robust floor protection before it can be used, potentially adding significant O&M labor time and costs.
- **Consider the toughness of luminaires.** Review all IP (Ingress Protection) ratings for all luminaires. This robustness measure is particularly important for luminaires in kitchens, showers, restrooms, back-of-house spaces, and exterior environments. Exterior in-grade luminaires often see moisture penetration and are notorious for early failure.
- **Consider shading luminaires.** Excess heat greatly impacts the life of luminaires, especially LED luminaires, and daylight can cause excessive heat gains that will affect a luminaire's lifespan. Consider shading systems, which can also extend the life of luminaires by reducing direct sunlight exposure.
- **Consider lighting access.** O&M staff must also be able to access the components *within* the luminaire. Consider both aperture size and disconnect locations of drivers, ballasts, and light sources.
- **Standardize lamps/ballasts.** The lack of lamp/ballast standardization leading to use of many different types of lamps/ballast in a building can increase O&M times and costs, as well as increase storage requirements.
- **Use quality products.** Review industry standard test data for the projected life of light source, driver, and/or ballast. Use mock-ups for evaluations.

AVOID:

- **Mounting luminaires above louvers.** Mounting luminaires above louvers increases recurring labor costs, as one or more louvers must be removed to replace a lamp.
- **Neglecting obstacles to O&M.** Maintenance obstacles, such as security screening equipment and staircases, are easily overlooked in maintenance accessibility discussions.

Lesson 20. Lighting Optimization and Controls

Energy-efficiency goals have steered designers and engineers toward designing for overall lower light levels in workspaces with supplemental tasks and personalized lighting. Additionally, relying on control for some, if not all, of the lighting in users' space results in their higher satisfaction with their work environment. In areas with reduced light levels, consider building-provided task lighting by default to increase overall satisfaction.

When designing for lighting optimization and control:

This building offers a wide range of controls to the users, much to their satisfaction

DO:

- **Optimize lighting.** Balancing and optimizing lighting can improve energy efficiency and occupant satisfaction, especially in open offices. Users near the windows and directly under skylights can receive too much light, while furniture and shelving can block adequate light from overhead luminaires from reaching others' desk surfaces.
- **Avoid multiple occupant controls.** Overly complicated and numerous controls are difficult to learn and operate and only reduce their use to optimize the lighting.
- **Provide task lighting.** Provide task lighting to all occupants, especially those working in open offices with no control over the ambient lighting.
- **Take control.** Provide localized vacancy or occupancy sensors on task lighting in each workspace or provide a controlled outlet to power the task lighting.
- **Keep up with training.** Schedule training with the controls system manufacturer whenever there is a change in operations maintenance staff or control systems' software update. Do not assume that there is sufficient information regarding the lighting control system to be passed along when O&M staff changes.
- **Plan regular maintenance.** If the control system manufacturer does not offer a continuous service contract, implement a plan to ensure the lighting control system receives repetitive maintenance from knowledgeable staff.
- **Keep up with energy savings.** To improve the functionality of the lighting control system: regularly update the lighting control system software; train operations personnel on how to optimize and set the lighting control levels and features; and educate tenants on their personalized lighting control systems.
- **Match controls to luminaires.** Make lighting controls compatible with luminaires. If the systems are not compatible, lighting will likely flicker, especially when dimmed. This is noticeably

prevalent with phase-dimming technology, such as Magnetic Low Voltage (MLV), Electronic Low Voltage (ELV), forward-phase, and reverse-phase. LED retrofit lamps are the biggest offenders.

- **Commission and recommission.** Schedule training with the controls system manufacturer whenever there is a change in operations maintenance staff or a control systems' software update. Implement a plan to ensure the lighting control system receives repetitive maintenance from knowledgeable staff, and that the system receives any software updates upon availability. Recommission the lighting control system at least once within five years of the initial commissioning.
- **Coordinate lighting, electrical, and controls** Forcing a luminaire to operate outside of its tested parameters will strain the electrical components and light source, resulting in early failure.

AVOID:

- **Assuming the lighting control system won't change.** Changes in furniture placement, space function change, and surface color will affect the operation of the control system and may trigger the need for recommissioning.
- **Affecting security by glare.** Do not create direct or reflected glare, especially in courtrooms, entry guard stations, headhouses, and other areas concerned with security. Where reflective or glossy finishes are specified, check camera locations with light modeling to better assure images will be readable.

Lessons by Building Type

The GSA POE project examines the three major GSA building types: land ports of entry, Federal courthouses, and Federal office buildings. Over the past five years of POEs, we have noticed specific O&M concerns directly related to building types; they are categorized below.

Land Ports of Entry

Land Ports of Entry (LPOE) provide controlled entry into or departure from the US for persons and materials. Located at land and inland water (river) boundaries with Canada and Mexico, land ports of entry have varying needs and requirements, largely based on their location. While the operational functions of all ports are similar, variations in context, traffic types, traffic volume, and security requirements between the northern and southern borders have resulted in some distinct physical variations between northern and southern ports. Also, climate variations along the respective borders affect the design and operation of the LPOE: Canada-border LPOEs are designed to operate in harsh winter conditions, while the LPOEs along the Mexico border are designed to operate in extreme heat, sun, and blowing sand conditions.

LPOE facilities are generally organized into these five components:

Site. The site includes the landscaping and vegetation covering the land enclosed by the perimeter security fencing, the irrigation system, entrance/exit gates, and the roadways traversing the site. Operations and maintenance issues identified at the site component include deficiencies with inappropriate landscaping, inoperative/damaged irrigation systems, including retention ponds; exterior lighting deficiencies; inappropriate or lack of traffic signage; and inoperative entrance/exit gates.

Main building. The Main building serves as the center of the non-commercial inspection and processing operations at a LPOE and includes the pedestrian processing area, operational support areas, public counter areas, and detention and enforcement areas. Issues identified within the main building component include ballistic glazing cracking throughout the facility; damaged and hard to maintain finishes; lack of storage for officer equipment, housekeeping supplies, O&M supplies/equipment, and attic supplies; limited access for servicing or repairing/replacing mechanical equipment; limited or inappropriate shading devices; and artificial lighting levels that exceed industry standards.

Cracked ballistic booth glazing

Noncommercial vehicle inspection area. The noncommercial vehicle inspection area is used to conduct inspections of buses and privately-owned vehicles (POVs) that are not carrying merchandise for resale or manufacturing within the US. This component includes the primary inspection area, with its lanes and the technology/equipment located

within them, and booths with canopies for performing the initial screening inspection of traffic entering the US. This component may also include secondary inspection with secondary screening areas, both covered and enclosed, and a Headhouse. Issues identified within the noncommercial inspection include booth deficiencies including climate control, glare, ballistic glass cracking; equipment access; air circulation under the inspection canopies; secondary inspection garage deficiencies; and lack of exterior hose bibbs.

Commercial inspection area. The commercial vehicle inspection area has a distinct function and its own set of requirements that are separate from those of the non-commercial inspection facilities. Commercial inspections include regulatory (documentation-based) and physical inspections of vehicles. Commercial traffic includes trucks, automobiles, and other small vehicles carrying goods for resale or manufacturing in the US. Issues identified within the commercial inspection area include problems found at the large inspection canopies including air circulation and bird roosting.

Bird roosting

Outbound inspection area. The outbound inspection area is used to conduct inspections of commercial and non-commercial traffic, buses, and pedestrians leaving the US. This port component includes primary and secondary inspection processes. The outbound inspection component includes inspection lanes, technology islands, booths, canopies, docks, and support spaces that aid in the processing of traffic leaving the United States. Issues identified within the outbound inspection area include inadequate shading; inability to access equipment; damaged and hard to maintain finishes; dangerous traffic patterns; and inappropriate lighting levels.

Federal Courthouses

Federal courthouses promote respect for the tradition and purpose of the American judicial process. To this end, a courthouse facility must express solemnity, integrity, rigor, and fairness. Courthouses are planned and designed to frame, facilitate, and mediate the encounter between the citizen and the justice system. A U.S. courthouse houses multiple court units, court-related offices, and other federal government agencies. Courthouses are planned and designed—and must be operated and maintained—to accommodate the needs of the public, as well as the needs of the judges, court staff, U.S. Marshals Service (USMS), and other court-related offices.

The primary areas found in a typical Federal courthouse are:

Site. The grounds surrounding the courthouse typically include the landscape vegetation, irrigation system, exterior lighting, and hardscape/plaza area. Operations and maintenance issues identified with courthouse sites include inappropriately selected vegetation; inoperative or damaged irrigation systems; ineffective exterior lighting; and damaged/soiled hardscape.

Building envelope. The envelope of the building includes the facade, fenestration, and roof. Issues identified with the courthouse envelopes include stained envelope systems; ineffective window/curtain systems; ineffective window-washing systems; poor exterior shading; and roof leakage.

Grand entrance. A courthouse's entrance, canopy, main entry doors, and vestibule are clearly visible and announce its presence to the exterior. O&M issues identified within the entrance area include pressurization problems; hard to clean canopies; and difficult or inoperative entrance doors.

Undersized entrance/canopy

Security screening. The security screening area is in a nonsecure zone in front of the screening equipment (i.e., metal detectors and X-ray machine). Issues identified within the security screening area include inappropriate locations and sizes of equipment, as well as security deficiencies.

Lobby. The main occupant and public gathering point is on the secure side of the security screening station. Issues identified within the lobby area include poor acoustics, deteriorating or difficult to clean finishes, poor signage/wayfinding, poor climate control, poor lighting levels, and poor lighting access.

Atrium. The centerpiece of a typical courthouse is the atrium area, which can stretch to the entire height of the courthouse. Issues identified with the atrium operations and maintenance include difficult pressurization, climate control, difficult lighting access, and security/safety concerns.

Courtrooms. Federal courthouses can have a range of courtrooms, including those used for District Courts, Appeals Courts, and Bankruptcy Courts. O&M issues identified with courtrooms include poor climate control; poor lighting; deteriorating and hard to maintain finishes; and poor acoustics.

Judges' chambers. Judges' chambers, aka office spaces for the judges, are provided close to courtrooms and O&M issues identified with chambers include poor climate control, poor lighting, and deteriorating or difficult-to-clean finishes.

Court libraries. The location of central court libraries (when provided) must offer access for judges, law clerks, and other court staff. O&M issues identified with court libraries include poor climate control, poor acoustics, and poor lighting.

Offices. Federal courthouses have a range of offices for administrative personnel, including clerks, attorneys, probation officers, and other workers. O&M Issues identified with office spaces include climate control, poor acoustics, poor shading, difficult to clean finishes, and poor lighting.

Corridors. The corridor space in courthouses provide for both secure and public movement of building occupants throughout the building. Issues identified with courthouse corridors include poor lighting, difficult equipment access, security concerns, and hard to clean/maintain finishes.

U.S. Marshals Service (USMS) spaces. Federal courthouses incorporate USMS spaces including offices, weapons storage, and exercise facilities. O&M issues identified with USMS spaces include climate control, poor lighting, poor shading, and poorly located exercise facilities.

USMS fitness center

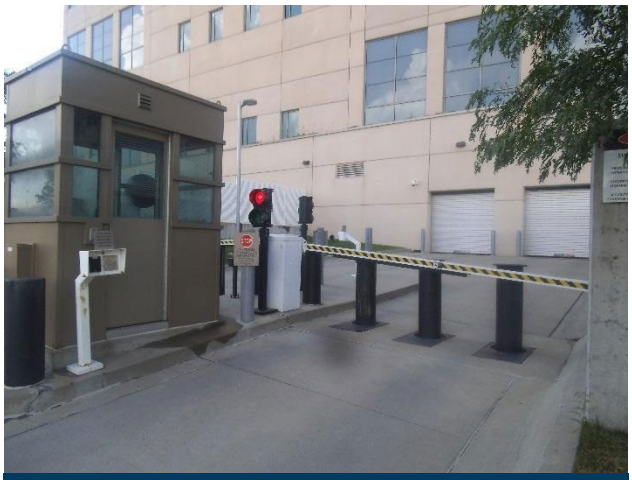
Detention facilities. Federal courthouses incorporate prisoner areas including secure elevators, secure corridors, detention facilities, security camera systems, and sally ports. Issues identified with prisoner spaces include security problems and difficult-to-clean areas.

Secure parking. Secure parking for judges and the USMS is located within the court building. Issues identified with secure parking areas include inoperative/difficult-to-maintain garage doors and gates.

Courthouse service areas. The building service areas include secure loading docks, freight elevators, storage spaces and LAN rooms. Issues identified with these service areas include lack of or undersized specific functional spaces; lack of appropriate storage for housekeeping as well as for O&M supplies and equipment; and inadequate climate control for LAN rooms.

Federal Office Buildings

Federal office buildings house a variety of functions and activities that support the running of the US government. These buildings can be multi-tenant or serve only one tenant agency.



Hydraulic bollards at parking entrance are susceptible to freezing up and seizing up

The primary areas in a typical Federal office building that require operations and maintenance scrutiny include:

Site. The grounds surrounding the building typically include the landscape vegetation, irrigation systems, water features, exterior lighting, and hardscape/plaza area. Issues identified with the site include inappropriate vegetation; inoperative or damaged irrigation systems; ineffective exterior lighting; and damaged/soiled hardscape.

Building envelope. The envelope of the building includes the facade, fenestration, and roof. Issues identified with the envelope include stained envelope

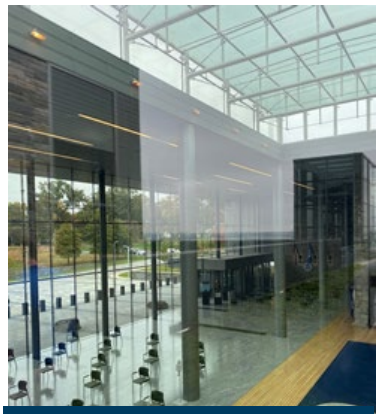
systems; ineffective window/curtain systems; ineffective window washing; poor exterior shading; and roof leakage.

Security screening area. The security screening area is in a nonsecure zone in front of the screening equipment (i.e., metal detectors and X-ray machine). Issues identified within the security screening area include inappropriate locations and sizes and security deficiencies.

Office building showing envelope staining

Lobby. The main occupant and public gathering point is on the secure side of the security screening station. Issues identified within the lobby area include poor acoustics; deteriorating or difficult to clean finishes; poor signage/wayfinding; poor climate control; pressurization problems; poor lighting levels; and poor lighting and equipment access.

Offices. The primary spaces of the building provide workplaces to perform the administrative functions of the specific tenant. Issues identified with office spaces include poor climate control; poor lighting; poor shading; poor acoustics; and hard to maintain/clean finishes.


Lighting in high spaces proves difficult to access

Conference spaces. Spaces within the building of varying sizes to provide for formal presentations and personal interaction related to the functions of the building. Issues identified with conference spaces include poor climate control; poor lighting; poor acoustics; and line of sight obstructions.

Corridors. Spaces that provide for the movement of building occupants throughout the building. Issues identified with corridors include poor lighting; difficult equipment access; and hard to clean/maintain finishes.

Food service area. Areas within the building that provide for the purchase, preparation, and consumption of food for the building occupants. Issues identified with food service areas include poor odor control; ineffective plumbing; limited or inappropriate space; hard to clean/maintain spaces; and space utilization.

Auditorium column location impedes lines of sight

Daycare centers. Some Federal office buildings provide space for the daily care of children. Issues identified

with daycare spaces include inappropriate sizes/configurations; safety concerns; poor climate control; and functional inadequacies.

Building service areas. The building service areas include loading docks, freight elevators, storage spaces and LAN rooms. Issues identified with service areas include lack of specific functional spaces; lack of appropriate storage for housekeeping and O&M supplies and equipment; equipment access; and climate control for LAN rooms.

Blind corners in daycare center require mirrors

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APPENDIX A

SNAPSHOTS OF BUILDINGS UNDERGOING POST-OCCUPANCY EVALUATIONS, 2019 - 2023

Arthur J. Altmeyer Federal Office Building, Woodlawn, MD

POE Conducted September 12-13, 2023

Snapshot

The Altmeyer Building has long stood as the heart of the Social Security Administration's (SSA) campus in Woodlawn, MD. The 10-story, 204,836 gross-square-foot, concrete-framed building serves as home to SSA's executive leadership team and before its modernization had undergone no major alterations since its construction in 1959. With a poorly insulated building envelope and an interior layout that was inefficient in occupant density and access to natural light, the building was overdue for an upgrade.

The 2021 modernization resulted in a high-performance and cost-effective façade of unitized anodized aluminum curtainwall framing and low-e insulated glazing, with applied frit that factored in solar heat gain, maximized views for employees, and ensured every interior workspace benefited from daylight. Tasked with a complete re-cladding, all-new mechanical systems, new stairs and elevator cores, plus a complete interior overhaul with a goal of achieving 150 gross square feet per person to maximize the

building's capacity, the design maximized open office work areas and shifted offices to the interior core of the floor plate. The result provides daylight and views to all occupied areas of the building, achieving the targeted GSF per person design standard.

Outstanding Design Features Affecting O&M

- Successful storm water retention system and irrigation system
- BIM and COBie successfully used in facility operation
- Unique use of aluminum panels in curtain wall
- Building orientation allows for significant daylighting and reduces solar gain
- Lighting system is successful and well-integrated into building
- Ample daylighting
- Effective and successful exterior lighting

Major Issues

Landscape

- Landscaping did not survive
- Lack of seating in large, outdoor plaza area
- Lack of removable bollards at entrance for snow removal and landscape equipment

Architecture/Interiors

- Front guard booth receives direct sun and gets hot
- Lack of outlets at each floor's kitchenette/breakroom
- Lack of O&M, attic, janitorial storage
- Dark blue paint areas cannot be touched up
- Ceiling tiles are difficult to access, remove and break easily
- Ceiling panels are not standard
- No freight elevator
- Elevator cabs have glass walls and have received impact cracks
- Doors between building and adjacent building did not have ADA actuators

Structure/Envelope

- Entrance glass canopy is difficult to maintain

Mechanical

- Vending/recycle rooms overheat
- Inefficient ERU duct connections
- Ceiling panel/grids make it difficult to access equipment
- Hard ceilings make it difficult to access equipment
- Building BAS is not integrated with campus systems
- Some thermostats allow unrestricted adjustments by occupants
- Sequence of operations not shown on construction drawings

Lighting/Electrical

- Some lighting fixtures are difficult to access and maintain
- Entrance checkpoint has no blinds
- Blinds are undersized for windows
- Workstation computer monitors have significant glare
- Lighting control programming needs to be adjusted to reduce energy use
- Emergency lighting does not respond to lighting control system
- Daylight dimming system is not effective
- Lighting levels in certain areas should be reduced through control system
- Lighting control zones have not been programmed into control system
- No occupancy sensors in corridors
- Emergency lighting does not meet sequence of operations
- Lighting control system is not compatible with campus systems
- Minimal contrast throughout building and on main stairs for low vision users

Top Three Lessons Learned

The ceiling tiles that were installed in the building are unique and do not follow the SSA campus's building standard. The 1x4 acoustic ceiling tiles were noted to be problematic, including the following concerns:

- They break easily if touched, moved or disturbed.
- To perform work above the ceiling tiles, more than one tile needs to be removed to get the necessary working clearance space.
- This is the only building on campus that utilizes these ceiling tiles, and there is no attic storage space located within this building. Only a small amount of attic stock is on site, because of the limited space.
- The tiles are special order tiles, a minimum quantity needs to be ordered, and they are expensive.

The new facade design kept the north entrance as a prominent feature despite its lack of use, including a comprehensive interior security screening lobby. The entrance is protected by a glass canopy that provides protection from rain, but not from sun. The canopy glass becomes soiled frequently and is difficult to maintain and keep clean. Glazing replacement is also expensive and time consuming. Maintenance staff would prefer an opaque canopy.

In most of the public areas of the building, there is little to no contrast between different interior surfaces such as stairs, walls, columns, and floors. For people with low vision, contrast is required between surfaces for navigation throughout the area. The stairs were of great concern, because the treads, stair walls, and railing were all white with no visual contrast. White walls and columns next to white floors do not provide any edge definition for low-vision individuals.

Austin Federal Court House, Austin, TX

POE Conducted March 19-20, 2019

Snapshot

The Austin U.S. Courthouse is an eight-story, 252,420-square-foot building of stone and glass. Located in the downtown area, the $123 million project was occupied in 2012 after construction that began in 2009. Sitting on the site of the abandoned Intel shell building, the new facility features eight courtrooms and chambers for 10 judges, compared to the four courtrooms and four chambers at the old Austin federal courthouse.

The courthouse complex occupies a full city block. The exterior is covered in a mixture of banded limestone cladding, dark stainless steel, and narrow multistory glazing. The rectangular form sits atop a concrete plinth set back 50 feet from the streets, creating broad sidewalks on all sides. The segment of San Antonio Street between the courthouse and Republic Square Park is closed to vehicles, forming a wide plaza of concrete pavers, wooden benches, and shade trees in front of the courthouse's principal facade on the east. The main entrance is in the northeast corner at ground level.

The courtrooms, jury chambers, and public spaces hug the exterior walls, making use of the multistory windows for light and external views. The external envelope of the structure makes use of as much glass as possible to encourage the diffusion of natural light into interior spaces.

Outstanding Design Features Affecting O&M

- Appropriate amount of central storage and localized storage for custodial and general building supplies in this building
- Abundant office storage and millwork cabinetry
- The courtrooms have four zones of thermal control (which exceeds GSA and AOUSC requirements)
- There is generous clearance space and access for equipment
- The VAV boxes allow for very easy service access in interstitial spaces in a stair-accessible mezzanine
- Clerestory windows allow for daylight to filter into corridors and other spaces that don't have direct access to daylight

Major Issues

Landscape

- All exterior plazas are heavily soiled and need cleaning. Limestone is not recommended as a paving material due to its high absorption which results in accelerated soiling and discoloration.
- Plaza tree selection not appropriate for shallow wells
- Irrigation storage has inefficient water usage

Architecture/Interiors

- Courtroom wood veneer failure
- There are cleaning problems with the restroom floors and stainless steel
- The US Marshals Service prisoner elevators are experiencing operational problems wherein the elevators will stop, then time out to a floor.
- The sally port layout is dysfunctional in that it necessitates difficult turns by vehicles to pass through a second set of oversized rollup doors.
- The loading dock/sally port oversized doors break down
- The sally port weapon dumbwaiter inoperative

Structure/Envelope

- Limestone façade areas are heavily soiled from air pollution or atmospheric mold

Mechanical

- The O&M vendor is unable to operate the "smart" building
- The facility is not achieving its energy goals
- Humidity levels in courtrooms cannot be adjusted
- Pressurization in the summer impedes closing of the entry door
- Condenser-water-cooled speed drive inverters continually fail due to biological fouling in the circuit board heat exchangers.
- A failed condenser water pump and dirty air filters remained in place for long periods without being serviced; the reason for neglected maintenance is not clear.

- There is significant water contamination from construction debris. It is not an expensive or difficult feature to add a pressure differential sensor across the service entrance strainer(s) in the system that can be monitored by the BAS.
- Battery-driven flush valves require excessive maintenance
- Because a required fire service entrance was not coordinated with the City AHJ, the backflow preventer had to be retrofitted to be above grade. The backflow preventer now sits in a hot box enclosure obtrusively positioned inside the service lane entry gate.
- Garage and sally port sump pump drains are dysfunctional
- Thermal expansion not designed for thermal solar panel
- There are no traps in telecommunication room floor drains
- Hose bibb locations are limited

Lighting/Electrical

- There is a high number of inoperative lights; main fixtures are difficult to access
- Lamps throughout the building have different color corrective temperatures (CCT)
- Wall features are overly bright.
- Suspended light boxes are dangerous to re-lamp
- Overhead courtroom lighting is difficult to clean; high ceiling heights and location over furniture make it difficult to reach
- The lighting for lobby art is inoperative
- The building has a large number of different luminaire types
- There is no adaptive transition lighting in the garage entrance
- Lighting levels in the courtrooms are below requirements
- There are manual blind failures
- Courtrooms do not have blackout shades
- The lighting controls are not integrated into BAS
- The control panel is labeled inaccurately
- Office and corridor circuits are together

Security

- Parking/sally port barriers and gates are malfunctioning
- The homeless population use the building exterior after hours

Top Three Lessons Learned

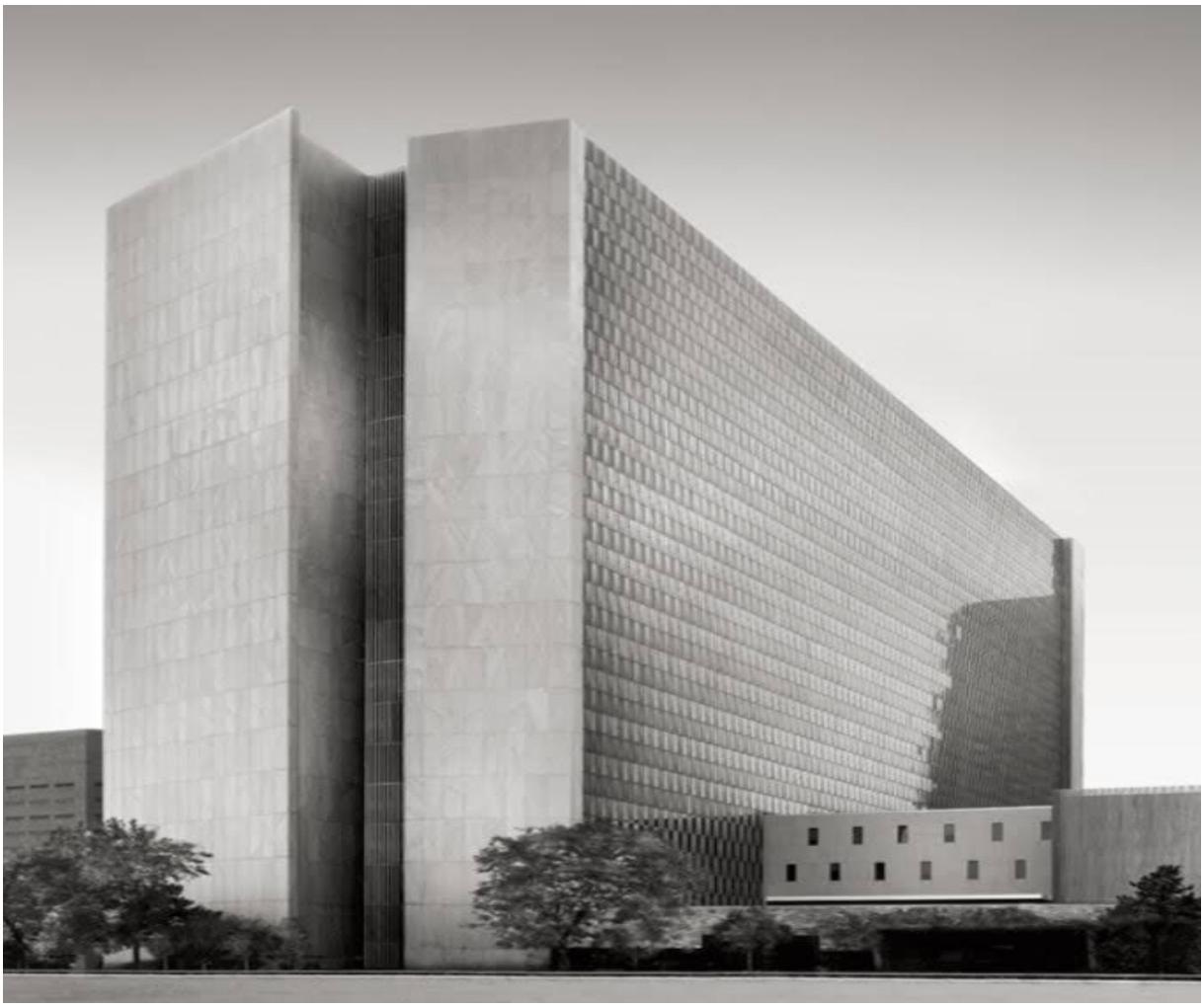
There is a major inability of the O&M vendor to operate the building in the way it was designed as a "smart" building to leverage sophisticated control and monitoring systems to result in significant improvements to energy efficiency. The building has struggled to meet overall energy consumption goals.

Between 20% - 30% of the lamps were inoperable at the time of the site visit. The light sources are difficult, if not impossible, to replace. Additionally, the O&M vendor does not have the staff, skill set, or parts to keep up with burned-out lamps. There are a large number of different types of luminaires in public spaces. This requires a wide selection of lamps to be on hand and an extensive variety of skill sets for O&M staff to master. The varied luminaire selections create an advanced design that requires attentive and knowledgeable staff to maintain.

It should be noted that although it is not a design issue, a number of homeless people use the facility's exterior for sleeping during the night, not only resulting in a security breach, but also unsanitary conditions that require cleaning on a daily basis. (The Federal Protective Service only patrols the facility until early evening, permitting the homeless to use the facility after midnight).

Richard Bolling Federal Office Building, Kansas City, MO

POE Conducted June 14-15, 2022



Snapshot

The Richard Bolling Kansas City federal office building was completed in 1965. The site occupies two full blocks, and the 1.2 million square foot complex contains a tall office tower, a low building, and a landscaped plaza.

The dominant feature of the site is the 18-story office tower with a flat roof. The two primary elevations are faced with glass panes and aluminum panels that alternate in a checkerboard pattern. The glass is tinted gray, and the aluminum panels are slightly concave with a large X pattern located within each plate. The two narrow end walls are devoid of fenestration. These angular elevations are faced with variegated granite.

Renovations in 2003 that included a new entry pavilion, corridor renovations and plaza improvements are part of GSA's First Impressions initiative, which strived to improve the entrance experience for both tenants and visitors. A new entrance lobby was designed on the Twelfth Street elevation. A covered walkway leads to a new two-story, glass-enclosed entrance pavilion and lobby that is connected to the lower building but also provides access to the office tower.

A separate, four-phase project completed in 2015 provided a complete modernization and renovation of the building, including new lighting systems and total replacement of heating, cooling, plumbing, and electrical systems. This project spanned 10 years and cost $280 million.

Outstanding Design Features Affecting O&M

- This is an example of a “best of class” renovation of an older Federal building
- The building is an extremely clean, well designed, and superbly operated facility
- Extensive and pedestrian-friendly landscaping and a park-like setting surrounds the building

Major Issues

Landscape

- The plaza storm drains are blocked
- The outdoor watering system has experienced irrigation tubing and sprinkler breakage

Architecture/Interiors

- The entrance doors on 13th Street are difficult to open due to building pressurization, a shallow vestibule allowing outdoor and indoor to be open at the same time, and heavy doors
- The facility offers limited lactation room amenities
- The barrier gate on the 12th Street side malfunctions during inclement weather
- Wayfinding throughout the building is inadequate

Structure/Envelope

- Rooftop steel dunnage is corroded
- Access for window cleaning is difficult
- Window cleaning fall-protection anchorages are inadequate

Mechanical

- Pantry areas open to office spaces, creating odor and noise concerns
- The small entrance vestibule at 13th Street causes door malfunctions
- The is no capital equipment replacement plan
- The snowmelt circuit has failed, most likely due to a leak in a main pipe
- The sanitary drain line clogs due to hardened deposits built up from not enough water flowing through the system
- Plumbing fixture batteries need constant replacement
- There are no yard hydrants and limited water connections

Lighting/Electrical

- There is an excessive number of lighting fixture/lamp types
- Lighting lens failure
- There is no LED modernization plan
- Open office areas experience excessive brightness
- Light levels in cooktops and exhaust hoods are too low
- There is a lack of lighting control in open office areas
- Exterior in-grade recessed lighting fail
- The equipment electrical circuits not labeled
- There is no emergency generator
- Elevators have no battery backup for elevators
- There are no GFCI receptacles in the kitchen areas

Security

- The CCTV system is inadequate
- There is unrestricted access to building from the Holmes St. loading dock
- The 12th Street entrance security-screening area is undersized
- The parking garage guard booth suffers excessive glare
- The lobby security screening area at 13th Street suffers excessive glare

Top Three Lessons Learned

Wayfinding signage is poor, with issues with fonts, readability, size, location, and lighting. A directory of tenants is not obvious upon entering the building on the ground or first floors. The directory uses a coding system of identifying a floor by a species of tree; no floor occupant information is provided. To find the floor occupant identification, one would have to know to look at a second sign on the opposite side of the lobby, which provides floor occupant identification with chevron arrowheads indicating left or right directional wayfinding for a particular tenant. These directory signs are transparent, showing the wall finish behind.

The aluminum louvers at the east and west facades shade the windows but also make access for cleaning difficult and provide roosting locations for birds. Access to the lower podium's stone facade is also limited by the presence of the aluminum tube screen wall, making access for cleaning and maintenance difficult. Netting is necessary over large areas of the screen wall to prevent bird infiltration and roosting. In general, the application of supplemental shading or decorative elements to the degree employed on this building creates challenges to building maintenance that are difficult to overcome. The windows have not been cleaned in several years due to a 2018 safety evaluation that recommended against use of the existing fall-protection anchorages installed on the roof.

There is a wide variety of legacy lamps used throughout the building. There is a mixture of compact fluorescent, fluorescent (T2, T5, and T8), induction, HID, and LED lamps (non-retrofit). The O&M staff have a difficult time sourcing and maintaining the older legacy lamps. A plan needs to be developed to modernize and replace all the luminaires in the building with LED luminaires to reduce maintenance and increase energy savings for the building. Changing all the luminaires to LED luminaires will greatly increase the life of the light sources compared to the current lamps and ballasts. There is no lighting control zones in the open office areas. There are also no dimming controls in any part of the building except for the conference rooms. Zone and dimming controls would reduce the amount of energy used and allow occupants to personalize their visual work environments. Daylight sensors are in some of the open office areas; however, tenants have complained about the lights dimming so low that there is not enough light. The daylight sensors need to be commissioned correctly to improve the lighting levels in these work environments and to reduce energy consumption.

Land Port of Entry, Calexico, CA

POE Conducted June 22-23, 2023

Snapshot

The Calexico West Land Port of Entry is the main border crossing linking the United States Imperial Valley to the Mexican State of Baja California. Built in 1974, the port's pedestrian and vehicle inspection facility could no longer accommodate current traffic loads or meet the U.S. Customs and Border Protection's security requirements. The port processes approximately 20,000 northbound vehicles and 12,500 northbound pedestrians daily. The project involves the creation of new pedestrian and privately-owned vehicle (POV) inspection facilities, expanding the port on the site of the former commercial inspection facility, whose operations moved to Calexico East in 1996. Phase 1, completed in 2018, consisted of three southbound POV lanes and a southbound bridge over the New River; 10 northbound POV inspections lanes, with primary and secondary inspection canopies to include booths and inspection equipment; a new operations building; and sitework to accommodate those facilities on the sloping site.

In 2021, Phase 2B was funded to complete the project to include the installation of a temporary pedestrian inspection facility. This will accommodate the demolition of the existing pedestrian building and construction of an expanded, permanent pedestrian inspection facility with increased processing capacity. Once complete, the project will provide the port with adequate operational space, reduced traffic congestion, and a safe environment for port employees and visitors alike. The completed $400 million project provides 333,800 gsf, including canopies, on 17.8 acres.

Outstanding Design Features Affecting O&M

- Well-designed Head House
- Significant amenities in the building
- Well-designed passenger waiting area
- Well-designed maintenance and secondary inspection garage
- Facility includes a sally port for secure transfer of prisoners
- Carpet was removed and concrete floor polished, lowering required maintenance
- Large shell space
- Low-maintenance, attractive, and functional envelope
- Secondary inspection roof has good exterior stairwell access
- Booths have a modular air intake system
- Booths retrofitted with an additional two tons of cooling
- BAS meets all of the building's mechanical requirements
- AHU is mounted outside, allowing for more efficient operation
- The building, with a 25% energy savings, achieved LEED Gold certification
- The Head House utility yard allows for easy equipment access
- Bird netting protects equipment from birds
- Easy access is allowed to electrical and telecom room AC filters
- Improved LED lighting at 3500 CCT is dimmable
- O/M staff regulates lighting, providing very efficient energy use
- Luminaires are easy to access
- There is good outside visibility with limited glare
- Enclosed offices have access to outside views
- The building enjoys good lighting control, with separate dimming controls in enclosed spaces
- The emergency generator fuel tank is located outside, which allows easy maintenance
- The Head House has outstanding lines of sight
- There is significant CCTV coverage

Major Issues

Landscape

- The Landscape was overgrown and had to be removed
- A steep berm was stripped of landscape and needs erosion control
- Bollard placement does not allow for cleaning equipment access
- Traffic islands are exposed to weather

Architecture/Interiors

- Dangerous vehicle crossover traffic pattern
- Dangerous vehicle passenger traffic patterns
- The agricultural laboratory had no exterior access and an inadequate number of sinks
- Fixed booth workstations are not adjustable
- Booth doors are heavy and booths don't have pass windows
- Personal Occupancy Vehicle (POV) processing canopy does not protect against driving rain/wind
- Primary inspection has no water fountains or restrooms
- Primary inspection booths have no sinks or eyewash stations
- Secondary inspection has one booth and is not large enough for staff on duty
- There is no direct connection between public and secure waiting areas
- The maintenance garage ramp does not allow for easy removal of vehicles
- The kennel cages are very small
- Sally port prisoner traffic pattern goes through unsecure public spaces
- Only one set of restrooms per floor and not close to inspection areas
- Restroom floors and walls are susceptible to water damage from shallow sink basins
- Restroom partitions and doors are damaged from officer equipment
- There are no shower locker rooms
- Inadequate officer storage lockers and space
- There is no housekeeping or O/M storage
- There is no loading dock or dumpster
- Hallway corners are damaged; there is no corner protection
- The carpet in heavy traffic areas is soiled
- The breakroom's sheet vinyl flooring is delaminating
- Signs outside the building use small fonts and employ limited bilingual wording

Structural/Envelope

- Main roof canopy leaks
- Excessive glazing in some areas allows unwanted solar gain and glare
- Ballistic glazing shows cracking throughout facility and booths

Mechanical

- Operations supervisor space in Head House is at capacity cooling
- Overhead fans under inspection canopies would help keep these areas cool
- The outside air temperature sensor not operational
- AC equipment is above heavy wood ceiling panels, which are hard to move for access
- There are no washable pre-filters for equipment in desert environment
- There are no washable reusable filters in outside generator and fuel tank walls
- There is limited access to fan coil units
- Booth split-system indoor units are damaged
- Heat pump access in the secondary inspection booth is blocked
- The high-volume, low-speed fans are failing
- There are no exterior hose bibbs

Lighting/Electrical

- There is no indirect lighting in workspaces
- Agricultural laboratory metal countertops create glare from overhead lights
- The janitorial closet has no lighting
- Most spaces exceed IESNA standards, resulting in over-lighted spaces
- The luminaries are low quality
- There are no shades in the upper clerestories
- Booths experience glare
- Privacy shading in offices is cut too small
- There are no daylight harvesting devices
- There are photocell failures in the exterior lighting
- Exterior under-canopy lighting not rated for outside and collects insects
- The generator load bank testing needs remote connection
- There is no bypass switch for testing switchgear
- The facility would have benefitted from a photovoltaic system

Security

- The sally port prisoner transfer route goes through unsecure spaces
- The is no direct route from the public and secure waiting areas

Top Three Lessons Learned

A major concern evident at the inspection booths of the Calexico facility, as well as at several other ports, is the cracking of the ballistic glazing—virtually all the ballistic glazing used is cracked, limiting visibility, and potentially compromising the safety of CBP officers. Further investigation of this issue is strongly recommended, along with an assessment of all ports of entry where ballistic glazing is used.

Most spaces exceed the IESNA standard criteria for ambient and task lighting, causing those areas to be over-lighted. The poor quality of the luminaires installed was the largest lighting deficiency of this project. Specifying higher quality luminaires and carefully considering different options could greatly improve the lighting system.

There are no daylight harvesting sensors in the building. With the large number of windows, energy usage could have been greatly reduced by daylight harvesting sensors used in conjunction with occupancy sensors. The only occupancy sensors are non-public maintenance areas, such as storage closets and equipment rooms. Photovoltaic panels were included in the original design of the site but were removed due to budget concerns. PVs on site would have been beneficial because of the roof design and the sunny climate.

Cedar Rapids Federal Court House, Cedar Rapids, IA

POE Conducted July 9-10, 2019

Snapshot

The 305,999-square-foot Cedar Rapids U.S. Courthouse, which opened in 2012 at a cost of $115 million, is one of many projects to benefit from Federal funding in the wake of the Iowa floods of 2008. The flood waters destroyed the previous courthouse, as well as 300 other city-owned buildings and some of the city's most prominent public structures. To prevent such future damage, the courthouse site was raised nearly nine feet before the project was executed.

Certified as LEED Gold, the project's sustainable design strategies achieve 22.5% greater energy efficiency than the baseline standard. Sustainable features include sustainable site design and gray water capturing for irrigation; 30% reduction in building water use; a high-performance building envelope; an efficient mechanical plant; sustainable materials; and recycling 95% of the project's construction waste.

The eight-story building features a central atrium that sweeps the public lobby, upper-story courtrooms, and corridors along the building's north face. The eastern portion of the building houses the administrative units of the agencies operating the courts. The 300-by-100-foot curtain wall aligns with this stretch of public interior. An asymmetrical roofline extends just beyond the glass, supported by a series of attenuated metallic columns.

Outstanding Design Features Affecting O&M

- The O/M team received comprehensive training and training materials, including construction videos, that are archived and still used
- A separate contract provided construction clean-up services, which allowed the O/M contractor to focus on the startup operation of the building
- The building underwent total building commissioning. This is the first project that the POE team has evaluated that used a systems integrator on the project team
- Because of past operational issues, the pneumatic transport tube system was not installed.
- The facility's automated hand dryer system eliminates the use of paper towels
- The public and private toilet fixtures and lavatories in restrooms throughout the facility operate with hard-wired electronic sensors
- A committee established during design and construction created systems for room-numbering and wayfinding that work well
- The courtrooms have the required three zones, plus a unique control feature that allows the judge override capability from the bench to make the other two zones slave to match his bench thermostat setting.

Major Issues

Landscape

- There is a lack of irrigation for turf areas
- Wind stress pushes on the main entrance doors
- The main entrance steps difficult to traverse
- The minimal site slope causes groundwater to accumulate
- The security bollard and wedge barriers freeze up
- There is insufficient distance to the street leaving garage/loading dock

Architecture/Interiors

- The open atrium and the first-floor monumental stair generate safety and security concerns. The open atrium creates an opportunity for objects to fall. The openness of the atrium space also gives some visitors a sense that the area is not securely enclosed, making it feel like the edge of a cliff or creating a vertigo effect for some people. Some visitors with these perceptions have requested escorts to walk them from one side of a floor to the other.
- Security of grand jury room is also a concern; its placement requires jury members to transverse a public corridor to get to the room
- There is a lack of acoustic privacy in prisoner/attorney area
- The US Marshals Services' fitness room causes sound vibrations in adjacent spaces when it is in use
- Use of lavatory single mixing valve in judge's chambers, where because of a single line for the water, only tepid to hot water is available for drinking or teeth brushing
- The employee entrance is not accessibility compliant

- The garage doors are custom-designed. They are from foreign manufacturers and it is hard to get replacement parts for them

Structure/Envelope

- The atrium handrail glass is prone to breakage
- The façade metal panels dislodge
- There is etching of the concrete panel wall's glazing

Mechanical

- Baseboard heaters are not installed at all corner locations
- There is a lack of afterhours cooling in USMS spaces
- The chillers short-cycles due to frequent transitioning between economizer and chiller operation
- It is difficult to determine setpoints for sump system
- It is difficult to maintain water levels in sump tanks
- The main entrance door fails because of building pressurization
- The direct-wired restroom fixtures are not on the emergency circuit
- There is an insufficient number of hose bibbs

Lighting/Electrical

- There is a lack of re-lamping access
- Courtrooms do not meet light level requirements
- There is excessive daylight reflection on upper floors
- The lighting control system is difficult to program
- There are different types of switches/keypads for lighting/shading
- The courtroom vacancy sensors are inoperative

Security

- Courtrooms have direct line-of-sight windows without ballistic glass
- The atrium raises safety/security concerns

Top Three Lessons Learned

The original design included a stormwater harvesting system to supply water for drip irrigation at the newly planted trees; irrigation was not provided for the turf areas. It is not clear what drove the decision not to include irrigation for the turf, but such high-water demand planting clearly requires provisions for watering.

A significant safety/security concern in this building is the 100-foot-tall open atrium, which is only protected by a thin glass partition. The floors above open to the atrium from their respective elevator lobbies and with the open corridor bridge that spans the entire length of the front façade to connect the courtrooms with the administrative offices. The open atrium creates an opportunity for objects to fall. The Courts Security Officer (CSO) station, in the lobby at the central north side of the atrium, is at risk from any falling object from the upper floors.

The openness of the atrium space also gives some visitors a sense that the area is not securely enclosed, making it feel like the edge of a cliff or creating a vertigo effect for some people. Tempered glass breakage was reported at several of the handrail panels at the walkway perimeters.

Access for re-lamping is a major problem in the building. In the main atrium, lights are located six stories high. The design includes a system to access equipment located in this ceiling that is very time-consuming. As a result, the facility has decided to permanently turn off some luminaires. It is also challenging to access some locations of the stone wall washers, due to their height and precarious locations. In many areas of this courthouse, access issues are largely a product of the architecture. The catwalks between courtrooms, especially on the sixth floor, do not provide accessible walls or ceilings for mounting luminaires.

Thad Cochran Federal Court House, Jackson, MS

POE Conducted April 9-10, 2019

Snapshot

The Thad Cochran U.S. Courthouse was completed for $123 million and occupied in 2011. The 413,000-square-foot building arranges courtrooms, offices, and public spaces around a public, open-air rotunda in offset volumes. Set on axis with the State Capitol's Beaux-Arts profile seven blocks to the north, the courthouse's wings surround the open-air rotunda with a curving enclosure that echoes the capitol's prominent dome.

The building's 12 courtrooms are wrapped in curving walls, daylit by clerestory windows, and revealed to the exterior in extruded glass boxes. The courtrooms include electronic evidence delivery to each juror, two audience monitors, lawyer kiosks with screens, and raised floors for flexibility. Adjustable lighting, virtual reality simulation, and acoustic mockups were reviewed with the judges to ensure the courtrooms' optimum function.

The interior spaces are protected from intense direct sunlight by variegated sawtooth details on precast façade panels. Horizontal glass frit patterns cast changing patterns of light and shadow as the day progresses.

The courthouse's design and construction incorporate numerous sustainable technologies and practices. Seventy-five percent of the construction waste was diverted from landfill disposal with a significant

reuse of building materials at the site. The consumption of portable water was kept at a minimum, while use of recycled content products was maximized.

Outstanding Design Features Affecting O&M

- The final occupancy of this building is the most successful in terms of final resolution of deficiencies and ultimate acceptance of operational/functional aspects of any building evaluated by the POE team
- Successful completion of final building inspection/commissioning, completion of identified deficiencies, and resolution of warranty issues
- The O/M staff worked with the system manufacturers during the fine-tuning of the building and received outstanding training on the new systems, which has contributed significantly to the continuing successful O/M of the building
- A courtroom mockup allowed the design team to work through many design and construction issues
- The only battery-operated accessories are soap dispensers in public restroom locations
- O&M building supplies are stored in ample spaces throughout the building

Major Issues

Landscape

- The main plaza has significant staining
- Bollards are not capped
- Ramp retaining walls are leaking

Architecture/Interiors

- The main interior ramp is not ABAAS-compliant
- The sally port pneumatic weapons tube not used
- Delamination of terrazzo flooring
- Elevators were obsolete at installation
- Wayfinding is difficult on the first and second floors

Structure/Envelope

- Architectural precast panels are discolored
- Sealant at the joints on grade are deteriorated
- Window glass is etched
- Bird deterrence needs repair and maintenance
- The green roof is difficult to maintain

Mechanical

- Courtrooms and interior spaces are overcool
- Courtrooms incorporate only two zones
- The chillers short-cycle during low-load conditions

- In winter, the security screening area experiences stack effect and is cold
- The building experiences inconsistent pressurization
- The roof lacks a penthouse

Lighting/Electrical

- Many spaces in the building are significantly over-lighted
- The building uses a large number of lamp types
- Some of the lighting is difficult to access for re-lamping
- Window-roller shades do not fit windows and let unwanted light in
- The building has limited lighting control
- The courtroom lighting control system not utilized
- The exterior step lighting not operational

Security

- The loading dock is not secured from street
- The main entrance door does not have mag locks

Top Three Lessons Learned

Wayfinding and signage is a significant issue in the building. Overall, the layout of the building creates confusion in the entry and on access to the courtrooms and other spaces, as visitors first enter at street level, then ascend a long ramp on the second floor to the central core and elevators. Because of the long processional entry, visitors often become confused when trying to orient themselves. Supplemental signage has been added to assist in directing visitors; in addition, Courtroom Security Officer (CSO) staff the area during high occupancies to provide direction to visitors.

Cooling-only boxes in the courtrooms pose a continual problem for operations. The air systems are sized for high occupancy and internal loads and are capable of successfully cooling the rooms when in moderate and full use. When the courtrooms are lightly loaded, however, and during the unoccupied times immediately prior to occupancy, the spaces become overcooled and there is no means by which to warm the rooms except with the heat from the lighting. Further complicating the task of controlling temperature in the courtrooms is that each room is provided with only two zones of VAV thermal control, which is contrary to the U.S. Courts Design Guide and PBS-P100 requirement for three zones in courtrooms.

During the winter, there is a significant stack-effect-induced infiltration issue at the security screening area of the building, which results in cold local conditions for the guards. During busy periods, both in-board and exterior doors of the vestibules are held open—usually via the powered door openers for ABAAS access—at the same time, and unimpeded winter air flows in through the created tunnel. There is no supplemental heat provided at the floor level. The security screening area is an isolated space from the rest of the building. The POE team observed that the building has unnecessarily energy consumption from inconsistent pressurization. This is presumably the result of air-system duct-riser static pressure sensors attempting to reposition dampers and fan speeds in response to the varying door positions.

Land Port of Entry, Columbus, NM

POE Conducted August 16, 2022

Snapshot

The Columbus US Land Port of Entry is New Mexico's only 24-hour border-crossing facility. The original port, covering 16.79 acres, was constructed in 1989. The expansion project, built to accommodate increasing vehicle and pedestrian traffic, started in 2014. This expansion includes the previously developed port site plus 11.86 acres of previously undeveloped Chihuahuan Desert Grassland. The port experiences heavy daily pedestrian traffic, primarily from students who cross the border to attend school in Columbus and Deming, NM, as well as private vehicle traffic and commercial traffic. In 2018, the port saw 277,000 pedestrian crossings and 353,000 passenger vehicle crossings. The modernization of the 74,000 GSF facility, with a budget of $96 million, was completed in 2019.

Outstanding Design Features Affecting O&M

- Extensive water conservation and harvesting systems; gabion boxes help retain water
- Photovoltaic system; panels feed power to the local grid
- High Solar Reflective Index (SRI) on roofs and paving
- 43 Roof monitors
- Offsite modular construction

- O&M and housekeeping storage/closet locations are adequately sized and located
- Equipment and finishes are durable and appropriate
- There is good mechanical equipment diversity throughout. Passive air-to-air recovery units precondition outdoor air and provided redundancy to air-handling units
- Limited ceiling baffles and open design allow good equipment access
- The BAS is well integrated with lighting controls system
- There is effective and efficient solar water heating
- BAS training videos are accessible to staff
- Practical and consistent LED lighting
- Ample access to daylighting
- Lighting controls include daylight harvesting
- Raised floor allows easy access to electrical wiring

Major Issues

Landscape

- Retention ponds flood
- Most landscaping is native; however, the non-native trees on site require extensive irrigation
- Mowing damages the irrigation systems
- Narrow POV inspection lanes
- Crossing gates' foundations sinking—gate operation is difficult to impossible.
- The boundary is not totally enclosed

Architecture/Interiors

- Inspection booths lack easy access to water
- Location/elevation of the Headhouse is inadequate
- Undersized kennels with no exercise runs
- Not enough lockers
- Bird roosting causes major O&M problems, including blocked drains. Drain cleaning that was budgeted for semiannually is required weekly
- Acoustic and odor transmission
- Ballistic glazing is cracked and crazed
- Outdoor louvers in some places block exterior window cleaning
- Indoor exposed piping, ducts, lighting makes interior window cleaning above 8 feet difficult

Mechanical

- Air distribution noise due to supply registers in steel beam penetrations
- Canopy fan control not accessible to booth officers
- Heating and cooling extremes cause uncomfortable booth conditions
- Fan coil units are hard to access
- Occupancy sensors are too close to the doors
- No centralized Universal Power Supply system
- Multiple rooms on single temperature sensors cause occupant comfort control issues

- Air motion in booths is very noisy
- Solar loads exceed capacity in the Headhouse

Lighting/Electrical

- Clerestories are not shaded
- Direct glare is a concern in the lobby and main security office
- No outdoor lighting at night in the approach zone; booth officers can't see inside vehicles or read license plates from a distance, as vehicles must keep their headlights on
- Too few outside electrical outlets
- Transfer switch/circuit breakers between the utility grid power and emergency generators do not work; breakers must be manually activated

Security

- Outbound lane from US to Mexico provides a potential crossover escape route
- Entry gate at crossing is not lighted
- CBP Officers are positioned with their backs to the lobby and luggage screening

Top Three Lessons Learned

The Command Center Headhouse is next to the secondary inspection area that provides the overwatch of the POV secondary inspection. The Headhouse is not on high ground and is too far back from the secondary inspection area to be useful. Typically, these spaces are closer in proximity to the inspection area and at a higher elevation.

At several of the booths (and some building doors) the window ballistic glazing is damaged; small fractures present throughout the glazing panels appear to be in the polycarbonate inner layer. Further investigation is recommended to determine the cause of the cracking and whether the protection afforded to building occupants from ballistic attack is compromised.

Cooling and heating complaints about the booths occur during extreme weather conditions. Booths are designed for 80 deg F in summer and 55 deg F in winter; however, because the port is open 24 hours, officers need to open the doors around the clock. One button controls both the nozzle fan and the AHU fan together. Air motion in booths is very noisy, and agents cannot hear people in vehicles. For future projects, designs should maximize the use of radiant heating both inside and outside the booth and provide independent speed or airflow control of exterior nozzles for exhaust and pest control.

Land Port of Entry, Derby Line, VT

POE Conducted August 17, 2023

Snapshot

Derby Line Land Port of Entry, the busiest port in Vermont, is a one-story, 30,000-square-foot facility that straddles the interstate and serves commercial, personal, and bus traffic. Spaces include inspection booths, visitor lobbies, interior inspection areas, and exterior canopy space. Landscaped areas flank the building approach to the west; dense plantings and boulders from local quarries soften the visitor experience while providing discreet crash protection. Storm water retention areas support sustainable design strategies and vegetation to attract bee pollination.

The $33 million construction project started in the summer of 2016. The implementation of energy efficient and sustainable design strategies earned the LPOE a LEED® Gold certification.

Outstanding Design Features Affecting O&M

- Use of decorative stones in planting beds
- Perimeter gates are functional and operational during winter
- Art in Architecture exhibit is successfully maintainable
- The building enclosure is virtually maintenance-free
- The bullet-resistant glazing has no fracturing
- Easy-to-use dial timers are used in secondary inspection and in booths
- Radiant floors heat the garage
- The LAN room has independent air-conditioning
- There is no mechanical equipment on the roof
- There is no snow melt system; plowing is adequate
- Use of bird netting protects the port from feathered friends
- Interior lighting uses a limited number of lighting equipment types
- Recessed downlighting illuminates the booths
- The site has good lighting design
- Exterior lighting poles are protected
- LED light strips in booths are officer-controlled

Major Issues

Landscape

- Snow storage on site cannot accommodate heavy snows
- Embedded rail posts and column base plates are corroding

Architecture/Interiors

- Small site results in organizational challenges
- Onsite parking is inadequate
- Signage is ineffective
- Facility point of entry is not emphasized
- Bus visitors' vestibule is undersized
- There are too few staff lockers
- Weapons storage is not adjacent to lockers
- The building has inadequate O&M storage
- Officers' views are obscured
- Secondary inspection garage doors need to be left open in summer for cooling
- The building has no master keying system
- Custodial storage in commercial vehicle inspection area is inadequate
- O&M storage room is leftover space and is inadequate
- The K-9 space is not used
- Speaker ports in the ballistic glass panels have been removed
- Canopy access ports are inadequate
- Booth mechanical chases are difficult to open

- Lane gates are too low to be visible from high trucks
- Polished concrete floors are damaged by salt
- Interior wall guard protection is limited

Structure/Envelope

- Roof leaks
- There is no roofing fall arrest system

Mechanical

- The VRF HVAC system does not function adequately
- The HVAC system for the booths is not independent
- Booth doors are always open
- Fan coil units in the high bay space are noisy and difficult to access
- There is no cooling in secondary inspection garages
- The BAS was unsuccessfully implemented and does not operate well. The BAS was not part of Smart Buildings, and there was a secondary project for recommissioning the BAS. There was an apparent compatibility issue with the digital thermostats and incomplete commissioning effort with respect to full remote control.
- Digital thermostats require individual reprogramming after a power disruption.
- The main vestibule creates a wind tunnel when open
- The facility has no back-up resiliency HVAC options. At this facility, glass panels had to be removed to allow temporary air conditioning units to operate. Only one LAN Room has an auxiliary system. In facilities with chilled water circulation to terminal units or air handling units, a temporary chiller can be brought on site and connected into the central plant for distribution throughout the building. With a VRF system, this is not possible, as the distribution throughout the building is refrigerant.
- The water cooling tower has operational issues
- Access to change filters is difficult
- Hard ceiling access panels make it difficult to replace equipment
- Water closets have auto-flush valves
- There are no hose bibbs in precast wall areas
- There are no collars on the roof overflow drains

Lighting/Electrical

- Recessed lighting causes shadows in workspaces
- Mechanical and lighting equipment overhead placement was not coordinated
- There are no windows in some rooms
- Shading devices are not cut properly, causing gaps
- The lighting system is not integrated with BAS
- The daylight zone doesn’t work well for photos that must be taken for IDs
- The exterior lighting photocell system doesn’t work
- There is excessive glare in the exterior booths

- The exterior is over-lighted
- Under canopy lighting remains on continually

Top Three Lessons Learned

The site is smaller than was originally anticipated, which resulted in systemic challenges for the operation of the LPOE and its mission. These included inadequate parking, difficulties with wayfinding, limited sight lines for personnel to survey vehicles and the building approaches, and congestion for vehicles leaving the site. The site organization also leaves little opportunity for expanding the facility in the future.

The exterior canopy and entry vestibule for visitors arriving by bus is undersized. Queues of visitors back up through the vestibule, leaving both doors open, which diminishes the effectiveness of the airlock, thus making the interior uncomfortable and difficult to balance heat-wise, especially in the winter.

The satisfactory operation, and the ability to maintain consistent operation of the water-source VRF (variable refrigerant flow) HVAC system, has been the most demanding issue at this facility. To date, the facility has spent over one million dollars on post-construction mechanical issues.

Marcelino Serna Land Port of Entry, El Paso, TX

POE Conducted February 4-5, 2020

Snapshot

The Marcelino Serna Land Port of Entry (LPOE) is a new border crossing that replaced the Fabens Port of Entry on the U.S.-Mexico border. It opened in 2013 and is built around a six-lane bridge, located about 650 feet from the existing two-lane Fabens–Caseta International Bridge, which can accommodate vehicular, pedestrian, and commercial traffic. Construction of the LPOE began in July 2011, and the facilities opened at the end of 2013.

The $32 million, 250,000-square-foot LPOE provides enhanced border services to facilitate anticipated major trade growth at the southern border of the U.S. The design of the new port involves increasing the project site from just over 8 acres to more than 117 acres.

The project was awarded LEED Gold certification. The water-conscious design creates a vest-pocket desert micro-ecology within the immediate region's green agricultural context, which in turn resides within a vast desert that reaches for hundreds of miles into both Mexico and the U.S. Dominant materials are native stone quarried a few miles from the site, corrugated steel panels, and precast concrete. The performance-inspired precast roof canopy panels are designed to incorporate inspection technology, convective ventilation, daylighting, and non-disruptive expansion potential via modularity.

Outstanding Design Features Affecting O&M

- HVLS (high-volume, low-speed) large diameter ceiling fans under the canopies remove exhaust fumes and help keep agents cool
- Ceiling-mounted space differential pressure control sensors modulate airflows in adjacent spaces where pressurization control is required
- The interior lighting at this LPOE is a good design, with very few lamp types
- Lamps are easily accessed, with most lamps requiring only a ladder for access
- Labeling of components on the electrical system is extremely thorough

Major Issues

Landscape

- The retention pond culverts are clogged by silt and invasive plants (cattails and similar plants). According to the O&M staff, culvert cleaning and maintenance is not part of their current scope of services.
- The Irrigation system is inoperative
- The Security fence gate closer malfunctions

Architecture/Interiors

- Large site areas are earmarked for future expansion, and the resulting long distances between existing buildings require increased O&M resources. Additionally, the large amount of open space is reportedly a burden to the O&M contractors, as these enclosed grounds must be maintained, even at a minimal level.
- Storage in the Main Building is insufficient
- Acoustical problems in the interview area impedes interview safety
- The travertine flooring is showing major pitting
- Storage in the Head House is insufficient
- Bird roosting is prevalent throughout site
- Signage for traffic is inadequate

Structure/Envelope

- The roof canopy's internal drains collect rain water and snow melt, then direct it to drain leaders incorporated into the column structure. The flexible piping that connects the roof drains to the drain leaders becomes easily blocked or overloaded with water.
- Bullet-resistant laminated glass is experiencing failures
- Booths have enclosure glazing and roof leak failures

Mechanical

- Chiller/compressor fails due to oversizing/underuse

- Vehicles coming into the U.S. from Mexico tend to have very poor emissions and run on various fuels. At times, the noxious exhaust gets into the booths. A ground-level punkah system would help.
- Bird roosting causes problems at booths
- The above-ground water tank failed
- Head House plumbing has failed; underground piping ruptures in the summer
- Battery-operated fixtures require frequent maintenance
- Restroom pressure-activated trap primers fail; pressure drop is not great enough

Lighting/Electrical

- Emergency luminaire operations are problematic. Reportedly, the battery backup is forcing the emergency luminaires to remain on; the most likely cause is incorrect wiring
- Booth shade controllers malfunction and need to be replaced
- Manually-controlled exterior lighting is only controlled by switches in the booths that officers don't know that they can operate
- Light wall packs have issues with mounting
- Lighting during power outages
- There are limited circuits in break areas
- Generator fuel spills have occurred. The fuel inventory control system, which did not properly limit the delivery to the generator subbase "belly" tank, is thought to be the issue.

Security

- Exterior site lighting is inoperative at one corner of site
- Retractable security barriers have operational issues

Top Three Lessons Learned

The seven unlined and one lined retention ponds on the site are interconnected and intended to drain by gravity to the single lined pond for long-term retention of stormwater for irrigation use. All the ponds, which were intended to direct water by gravity to the lined pond, retain water on an almost permanent basis due to blockage of the connecting pipe culverts by silt and invasive plants. As a result, the lined pond has never accumulated enough water to use for irrigation. Culvert cleaning and maintenance is not part of the current scope of O&M services. When complex systems are introduced into a project, it is critical that O&M staff are aware of the maintenance requirements so that appropriate procedures and funding can be put in place to ensure adequate performance. (As a rule, complex systems with extraordinary maintenance requirements should be avoided; they are not likely to be adequately funded.)

A significant issue has been created by the oversizing of mechanical equipment due to the phased construction of the facility and subsequent reduction in operational requirements. The present size of the facility appears to be less than half of the masterplan buildout. For phased site developments, providing smaller capacity modules optimized for the reduced loading is recommended. The low loading of the chillers in the central plant has caused significant operational stresses and equipment costs in these first few years of LPOE operation. The facility has already experienced eight expensive compressor failures.

The louvered design of the precast concrete panels; the large, open truss system that supports the spandrels; and especially the exposed light fixtures that were selected for the canopies provide ideal spaces for birds to perch and nest. The spaces are too high and difficult to access to deter the birds, or to easily clean the droppings that accumulate with alarming speed. The fact that the birds have easy and relatively unchallenged access to these spaces also affects operations, as droppings falling on personnel was reported to be a regular occurrence.

Federal Research Center Building 75, White Oak, MD

POE Conducted October 29-30, 2020

Snapshot

The site of the consolidated US Food and Drug Administration (FDA) encompasses 670 acres and lies within Montgomery County and Prince George's County of Maryland.

Building 75 is an eight-story office building, one building in a series that was designed and constructed at the same time on the southeast part of the campus. The building exterior highlights the features of existing original buildings that include the use of brick and cast stone sills and copings. The primary function of this building is as an office building in support of other adjacent buildings that are both laboratories and offices.

Building 75 was part of a major campus project that began in the late 1990s. The building was a design/bid/build project whose construction spanned from 2010 to 2014, with an overall budget of approximately $87 million. Although the building was registered with the U.S. Green Building Council and was targeted to achieve LEED Gold, no funds were allocated for the building to undergo the certification process.

Outstanding Design Features Affecting O&M

- Good wildlife management by a consultant who controls deer, resident geese, migratory geese and other migratory birds, foxes, raccoons, groundhogs, and rabbits in this suburban setting.
- The AHUs are prefabricated and have advantages of factory assembly quality control of the equipment, controls, power wiring, and enclosure
- The atrium maintains a comfortable temperature
- Large windows and sawtooth skylights in the atrium allow large quantities of daylight to enter the space
- The same lamp types are used throughout, which reduces the different types of lamps that O&M staff must keep in stock and makes replacement simple

Major Issues

Landscape

- Exterior drains are set above grade
- There is distinct discoloration of retaining and site walls

Architecture/Interiors

- The monumental stair toes are difficult to clean
- File storage space is underutilized
- Heavy interior doors experience frequent hardware failures

Structure/Envelope

- There is severe staining of façade brick veneer, cast stone, and limestone
- The light shelves' interlayer is deteriorating
- The outward slope of light shelves allows water/ice to drip down
- Rain has caused corrosion of the elevator hoist cable. It was suspected that the cables were left outside unprotected during construction, and moisture saturated the cables and initiated the corrosion process.

Mechanical

- Multiple rooms on are the same thermostat
- The elevator does not go to roof
- The cryogenic storage room has limited redundancy
- The restroom flush and faucet valves clog
- Restroom floors slope away from drains
- There is a limited number of exterior hose bibbs

Lighting/Electrical

- Clerestory accent lighting is ineffective and very hard to access
- Daylighting strategies allow only small amount of daylight to the interior offices
- Cords to shades are too high to allow access

- Lighting control allows interior/exterior lights to be kept on when not needed
- Items stored in front of electrical panels impede access

Security

- There is a missing bollard at the main entrance
- There is an open access route from the loading dock to main entrance

Top Three Lessons Learned

Most of the doors have had issues with the hardware, with poor lockset operation or issues with hinges. The issues with the original door hardware may have been because poor quality hardware was used. As a result, most of the doors and their hardware have been replaced.

At several locations along the roof parapet, the brick veneer and cast stone are severely stained due to water exposure. The slopes of the cast-stone copings and lack of a drip edge have facilitated water saturation of the brick veneer, which has caused the formation of efflorescence and black mold, as well as weakened the mortar and mortar-to-brick bond at the uppermost courses. The windowsills are composed of VDT cast stone and suffer problems with respect to staining and discoloration due to excessive water absorption. At the main facade, the entry portico limestone is also stained from a lack of flashing over the horizontal surfaces, allowing water to saturate the material and keep it wet for prolonged periods.

The atrium and adjacent corridors receive large amounts of daylight. This design allows offices surrounding the atrium to also receive daylight, even with no views directly to the outdoors. However, on each level, open offices are surrounded by private offices, which greatly reduces the amount of daylight open offices receive. Private offices are equipped with floor-to-ceiling windows to the open offices, but these only allow limited daylight to penetrate the inner spaces. Daylight in the open offices is further reduced by the high partitions of the cubicles.

Benjamin P Grogan and Jerry L Dove Federal Office Building, Miramar, FL

POE Conducted February 26-27, 2022

Snapshot

The new 475,000-square-foot Benjamin P. Grogan and Jerry L. Dove Federal Office Building is developed in pursuit of the 2030 Zero Environmental Footprint project goal. A project of the U.S. General Services Administration's Design Excellence Program, this iconic, highly sustainable building design expresses the dignity, enterprise, and stability of the United States government, while the landscape restores the native environment by reintroducing wetlands and vegetation typical of the everglades.

The office building achieved a LEED Platinum Core & Shell certification. The campus was designed in anticipation of additional, near-term sustainability improvements that will allow achievement of a net-zero energy goal by 2030. The $194 million project was designed in seven months, constructed in 30 months, and delivered under a two-phase bridging-design-build delivery method.

The ambitious environmental project goal is achieved by a design process that rigorously follows three consecutive goals which build upon each other: reduction of energy and resources consumption, use of high-performance building envelopes and systems, and harvesting of renewable energy sources on-site.

Outstanding Design Features Affecting O&M

- The overall facility design is well received by the tenant agency staff
- The documentation and delivery of the building system's O/M was and continues to be one of the more successful efforts the POE team has observed.
- O/M staff can quickly access a wide range of training materials for identifying, maintaining, and repairing systems
- Site plants and site features are properly selected for the local climate
- The water recovery system harvests roof run-off, condensate, and other gray water sources, then processes it for irrigation and other uses.

Major Issues

Landscape

- Stormwater run-off is blocked
- Planters and curbs are stained and cracked, most likely due to inadequate quality control of the architectural concrete
- The irrigation system lacks volume control/pipe leakage
- The retractable barrier and controllers have failed

Architecture/Interiors

- There is no service corridor and freight elevator
- The secure entry and the building lobby are separated
- Staff lounges are too small and poorly distributed
- The visitor screening area is too small
- There is no interview room in the visitor center
- The visitor center is remote from the main building
- The mailroom lacks an emergency shower
- The centralized paper pulverizer was rendered inoperative because the length of ductwork and number of turns required, coupled with the high humidity of the Florida climate, results in the pulp regularly jamming within the ductwork.
- The delivery staging area is too small
- The service garage was not provided with oil/water lines
- Parking garage lanes are too long, allowing speeding
- PV array is unsafe as a roof for the parking garage. The structure supporting the arrays is not fire rated, and there is no suppression system for this level. Although the design was fully vetted by the appropriate authorities, the GSA Fire Protection Engineer responsible for the final occupancy inspection deemed the condition unsafe for firefighters. As a result, the top level of the garage is currently unused, resulting in a loss of nearly 200 parking spaces.
- There is a lack of privacy (allowing noise) between work/conference areas
- The battery-powered bathroom fixtures require high maintenance
- There is a lack of custodial staff break rooms, custodial supply storage space, attic and O/M storage space, and O/M equipment storage space

- Signage and signaling of elevators are inadequate
- The O/M staff doesn't use the BIM documentation provided by the design team, because it is in non-COBie format.

Structure/Envelope

- Parking garage drainage problems occur during weather events
- Window washing of curtain wall is high maintenance
- Walkway canopies do not drain properly

Mechanical

- Cooling towers use an elevated structure
- The battery bathroom fixtures require high levels of maintenance
- Solar thermal system connector has failed

Lighting/Electrical

- The LED luminaires out of date and impossible to replace
- Indirect lamps at elevator bays are difficult to re-lamp
- The blinds are difficult to maintain because of their shape and size
- Exterior in-grade uplights are experiencing water penetration
- There is only limited UPS for computer subsystems

Security

- There is a lack of CCTVs on roof because of enclosure system
- The retractable ramps at the entrance require high maintenance
- There are no bollards at the front entrance's circular drive

Top Three Lessons Learned

There is no back-of-house service corridor or service freight elevator for delivery of bulk items. Large deliveries come from the loading dock in the annex building directly through the main building lobby and to the public elevators, with the result that finishes in these showcase spaces and the adjacent corridors are showing the signs of damage and wear that are inevitable in areas assigned for large deliveries.

The secure entry for the facility is remote from the main public entry and lobby. Locating the secure entry remotely renders the public lobby ineffective and undermines the role the main entry is clearly designed to play in creating a first and favorable impression of the building. The visitor scanning area is sized to permit screening of a single visitor at a time, with no accommodation for surge capacity and very little space for visitors to queue before screening. The visitors screening facility includes no dedicated interview room for visitors that come to provide testimony. While an interview room is provided in the secure lobby of the office building, in practice visitors that come to report information are not permitted beyond the screening facility, and as such the testimony is given in the scanning area where the conversations can be easily overheard. There is no covered connector between the visitor screening facility and the main building; in inclement weather visitors must use umbrellas, or be retrieved by staff with umbrellas, after screening.

The lack of local storage for supplies on each floor makes cleaning and stocking operations inefficient. Storage facilities for attic stock and operations and maintenance materials appear to have been poorly considered by the design. There also appears to be a lack of sufficient storage space for O&M equipment and supplies. Ladders, lifts and other essential equipment for maintaining the facility are stored in mechanical spaces and other areas not ideally suited as storage for these materials.

Convent Avenue (Laredo I) Land Port of Entry, Laredo, TX

POE Conducted March 3-4, 2020

Snapshot

The Convent Avenue Land Port of Entry's $28 million 55,164 gsf modernization included a complete renovation of the site's historic Administration Building, along with optimization of the interior spaces to improve pedestrian flow through the port. The modernization remedied canopy shortcomings and is sensitive to the historic nature of the facility. The Administration Building is more than 70 years old and offers the only pedestrian crossing between the downtown areas of Laredo, Texas, and Nuevo Laredo, Tamaulípas. It is eligible for the National Register of Historic Places and is the only historic Port of Entry in GSA's Region 7. The project was designed to increase efficiency, improve safety and security of vehicle processing, expedite pedestrian processing, consolidate operations, and improve security and safety of pedestrian traffic. Construction was completed and occupancy started in 2018, making it the fourth busiest pedestrian port in the nation.

Outstanding Design Features Affecting O&M

- The facility is an improvement over the previous building in terms of size and adjacencies of spaces
- Exterior paving systems are a successful and highly durable option for pedestrian-intensive areas
- With its many amenities, the plaza appears to be highly successful as a resource to the border-crossing pedestrians
- The landscaping is low maintenance
- The innovative elevated planter wall installation functions well by incorporating plantings in a tight space and shading the POV Secondary Inspection Areas
- General storage space for daily use and bulk storage items for office, O&M, and housekeeping items is well accommodated in the building
- The booths at the POV primary inspection area are performing well
- The directional punkah louver supply jets and canopy ceiling fans successfully create air movement and disperse fumes from under the canopy.
- The building automation system (BAS) is well designed and is an integral part of successful operations of an LPOE.

Major Issues

General

- Lack of commissioning/O&M integration
- Poor O&M training
- Poor access to ePM for property management staff

Landscape

- Plaza pedestal pavers are unstable

Architecture/Interiors

- Poor performance of door hardware

Structure/Envelope

- There is water penetration through the below-grade walls

Mechanical

- Certain spaces have thermostats located where they sense cold ceiling diffuser airflows cascading down a nearby wall that can be as much as ten degrees or colder than the temperature of the general room air around the occupants.
- Air supply distribution is inadequate in pedestrian processing
- The administrative office areas are inadequately shaded
- The LAN room is not cooled adequately

Lighting/Electrical

- Lighting luminates were poorly selected
- The building has excessive illumination levels
- There is limited lighting control on the interior and exterior of the buildings
- All booth lighting is on one circuit, offering limited flexibility
- In some cases, the inspection canopy light levels are too low

Top Three Lessons Learned

The Laredo LPOE modernization project has the highest number of commissioning/O&M operations-related deficiencies of all the projects reviewed by the POE team. The O&M staff was not included during the construction process, and in fact they reported they were not allowed on the construction site of either facility. The facility management staff and O&M staff report that they have not received any commissioning reports, including the testing, adjusting and balancing (TAB) report.

The door hardware in the facility is subject to high frequency and rough use by the occupants. In several locations, lockset, levers, and magnetic locks are failing, either by being pulled off or becoming unfastened. Additionally, door hinges are failing, causing the doors to sag, bind, not close, or become difficult to operate.

The lighting selection in most locations causes extreme glare, due to bare-bones budget luminaires. Since no optics are provided on the luminaires, lighting is not well distributed throughout any given space. In most locations, light levels are dramatically higher than recommended. For example, the Illuminating Engineering Society (IES) recommendations for light levels suggest 15-fc for a high-trafficked corridor. Corridors throughout the building were measured to be between 70-fc to 150-fc.

Juarez-Lincoln (Laredo II) Land Port of Entry, Laredo, TX

POE Conducted March 3-4, 2020

Snapshot

The Juarez/Lincoln Land Port of Entry (LPOE)'s $77 million, 269,215 gsf modernization improved the flow and processing of vehicle traffic through the LPOE while enhancing safety and efficiency of operations for both the inspection agencies and the traveling public. The new vehicle processing area accommodates the increased bus traffic and enhances officer safety during inbound vehicle inspections. The current facility processes approximately 100 passenger buses each day. This modernization was not designed to accommodate this level of bus traffic. Current port operations require personal occupancy vehicle (POV) traffic to funnel to one path between existing canopies, which creates delays and safety issues for staff and pedestrians.

Outstanding Design Features Affecting O&M

- The under-canopy vehicle emission exhaust and management system includes directional axial propeller fans mounted to the columns of the highest bus canopies, which solves a potential problem of very difficult-to-service equipment mounted to the ceiling, while successfully creating adjustable air movement and dispersion of the fumes under the canopy
- Lower canopies are provided with high-volume, low-speed (HVLS) fans
- General storage space for daily use and bulk storage items for office, O&M, and housekeeping items is well accommodated in the building
- The interior finishes are appropriately selected and durable
- The BAS is well designed and is an integral part of successful operations of the LPOE
- Equipment labeling is very clear and useful
- The LPOE contains simple interior lighting with little variety in luminaire types
- The LPOE is equipped with a building-wide, centralized control system

Major Issues

General

- Lack of commissioning/O&M integration
- Poor training of O&M staff
- Poor access to ePM for property management staff

Landscape

- The lane orientation causes buses to back into the wall
- Water is ponding in the retention pond, the cause of which currently is unclear.

Architecture/Interiors

- Door hardware failures are common
- Doors are not protected from harsh use

Mechanical

- Variable Refrigerant Flow (VRF) system has limited redundancy
- The roof has poor equipment accessibility
- The facility experiences sewer backups because of faulty installation
- The agriculture lab sink backs up because of improper venting

Lighting/Electrical

- The facility interior and exterior both are over-lighted
- There is no shading in the primary inspection control areas and no canopy at the Z Portal, so CBP agents are exposed to the elements.

Top Three Lessons Learned

The Laredo LPOE modernization project has the highest number of commissioning/O&M operations-related deficiencies of all the projects reviewed by the POE team. The O&M staff were not included during the construction process, and in fact they reported they were not allowed on the construction site of either facility. The facility management staff and O&M staff report that they have not received any commissioning reports, including the testing, adjusting and balancing (TAB) report.

Stormwater is managed on site by a combination of landscaped trenches at the site perimeter and in-ground drains that outflow to a single retention pond. The pond is landscaped and intended to serve as a temporary holding site for stormwater until it is absorbed into the ground. Any overflow is discharged through a culvert to the Rio Grande River. A major concern of the O&M team has been the continued presence of water in the retention pond, even long after rain events. The moist environment promotes mosquito proliferation.

There appears to be an issue with the installed door hardware and the high frequency and rough use by the occupants. Lockset, levers, and magnetic locks are failing, either by being pulled off or becoming unfastened. Doors show signs of heavy use, such as paint finishes being scratched off, most likely caused by Customs and Border Protection (CBP) officers' utility belts. The lack of door kickplates allows scuff marks on the lower portion of the doors. These doors also lack armor plates or other protection panels; finishes would benefit from the protection of such plating.

Mickey Leland Federal Office Building, Houston, TX

POE Conducted April 18-19, 2023

Snapshot

The Mickey Leland Federal Office Building is a prominent high-rise government office building located in downtown Houston. The 376,000-square-foot building was completed in 1983 and stands at 22 stories tall, with a Modern architectural design that includes a mix of granite, glass, and aluminum.

GSA acquired the building in 1987. In 2009, using American Recovery and Reinvestment Act (ARRA) funding, GSA transformed a dated, undesirable, energy-inefficient structure into a fully-leased model of energy efficiency. To achieve the GSA's enhanced energy performance goals, the building was clad in a new high-performance curtain wall.

Completed in 2014, this major renovation project also included upgrades to its mechanical, electrical, and plumbing systems. The renovation included the installation of new cameras, access controls, and fire alarms. The exterior of the building was refreshed with new paint and a new LED lighting system, and inside, updates to the building's interior included the modernization of elevator interiors and the refurbishment of the lobby area.

Designed to improve the building's energy efficiency, reduce its environmental footprint, and enhance the overall comfort and safety of its occupants, the Leland Building achieved LEED Platinum certification in 2015.

Outstanding Design Features Affecting O&M

- The retrofitted building offers a major design statement to downtown Houston
- The building is now considered desirable space by tenants and is fully leased
- The modernization yields significant energy and water savings; LEED Gold certification
- The buildings have clear and extensive documentation and an innovative Design Guide
- Generous green spaces and hardscaping complement this urban site
- The mature trees are thriving
- Concrete walls double as vehicle barriers
- A shady breezeway protects visitors in line to enter the screening area
- Curvilinear benches offer a resting place and "direct" visitors to the front entrance
- Granite pavers and cobblestone pavers are performing well.
- Exterior amenities, such as bicycle racks, additional benches, trash cans, etc. were added
- Tenants and staff generally like the building and report that it functions well overall
- The view from lobby for security is relatively unencumbered
- There is a dedicated security lane for employees
- The double-height lobby is "stately and elegant"
- Most open office spaces are located near windows
- A large, shared conference room is well appointed and shared with other agencies nearby
- The new food service café is right-sized and very popular
- Much of the food service equipment is on wheels, which helps keep the prep space clean
- The loading dock is sufficiently sized and kept in good order
- Restrooms in general are appropriately sized and located for tenant use
- The centralized basement O&M storage is sufficiently sized
- There is an ample amount of parking
- The roof is well maintained and in good condition
- There is a 40 percent savings in electrical use (reported informally)
- AHUs on every other floor (instead of every floor) is a right-sized decision for a system that works well
- The increased numbers of sensors/thermostats result in very high tenant satisfaction ratings
- More than 80% of interview respondents rated their environmental comfort as 4 or 5 out of 5.
- The project is expected to offset 4.21% of total energy costs by solar PVs
- The BAS was recently replaced successfully, with very few control migration issues
- The BAS successfully integrates the lighting control system
- The upgraded BAS is very informative, easy to navigate, responsive, and has useful trends set up.
- The BAS can be accessed via a remote login, which is extremely convenient and useful.
- An added fan coil unit in the penthouse will aid in humidity control
- Pressure differential sensors successfully control OAHU offsets at the lobby level
- Demisting pre-filters added to the OAHU intake filters increase filter life from one month to three months.
- Fluorescent T5 lamps currently being replaced by energy-efficient Type C TLEDs
- Using few different luminaire types makes maintenance easier
- Luminaires in mechanical and service rooms are easy to access

- Most building areas receive a generous amount of daylight
- Manually operated shades provided by GSA offer tenant control and consistent appearance
- Highly secure perimeter includes substantial barrier walls and appropriately located bollards

Major Issues

Landscape

- Non-native landscaping was employed
- Much of the irrigation tubing is damaged or disconnected at junctions, drip lines, or sprinkler heads, exacerbated by an insufficient number of hose bibbs, which necessitates longer runs of hose
- Exterior terrazzo is cracking and heaving

Architecture/Interiors

- The granite lobby floor difficult to clean
- A horizontal lobby shelf is very difficult to clean
- Visitors sit on the floor in the lobby due to insufficient signage to direct them to designated seating areas
- Art and Architecture installations are difficult to clean
- Lobby restrooms are undersized
- Restrooms have towel dispenser and trash can opposite sink
- Restroom wall tiles are small and hard to clean
- Janitorial closets are undersized
- The white color is used throughout the building makes surfaces hard to keep clean
- The elevator rear panels are textured, they snags users' clothing and are hard to clean
- The lobby building directory is too small to be usable
- The elevator runs are reversed (the first group of elevators accessed from the main lobby only access the upper floors, an inversion of both the original design and common practice)

Structure/Envelope

- The Underground tunnel leaks
- Curtain-wall glass showed breakage
- The green roofs perform poorly; Property Management has struggled to find an O&M contractor to adequately maintain them
- The facade access system ineffective; it needs more outrigger arms available for use at one time or a system in which the outriggers can be permanently fixed into the davits. Despite the increased risk of facade damage, window washing from boatswain's chairs is less costly than using the in-house facade access equipment.

Mechanical

- The chillers are oversized
- Cooling towers are at end-of -life

- The stairwells are over-pressurized
- All plumbing fixtures are battery operated
- Lavatory faucets overspray
- The hot water system inadequate; it provides one electric tank type water heater for every 3 floors, with no recirculation line. With the electronic low flow lavatory fixtures, it takes a long time to get hot water to the lavatories.

Lighting/Electrical

- The daylight harvesting system is now inoperative because the new TLED lamps installed do not work with the current system
- Incorrect CCT was used throughout building
- It is difficult to access certain lighting for replacing lamps
- Stairs are difficult for people with low vision to use
- Shades are cut too narrow, allowing sunlight inside
- The lobby glare affects the guards
- The stairwells are 100% lit
- Exterior lighting is inappropriate
- The flagpole inground lighting has water penetration
- Guards in the garage are affected by lighting glare
- Elevators are unable to be changed on emergency generator

Security

- There is Inadequate access to the CCTV system
- The security operations center is inadequate
- The mailroom lacks appropriate security equipment

Top Three Lessons Learned

- Many of the landscape species used were unable to acclimate after the first year, leaving a visually significant deficiency in the landscaping. Survival of the landscaping was further challenged by the irrigation system, which has experienced (and continues to face) damage that prohibits its use for prolonged periods. Much of the irrigation tubing is damaged or disconnected at junctions, drip lines, or sprinkler heads. With the lack of functioning irrigation, the landscaping is hand-watered. According to the operations and maintenance staff, there is a dearth of hose bibbs around the building perimeter to facilitate shorter hose runs.

The color palette is overwhelmingly white, and it is nearly impossible to keep looking pristine. Challenges with this choice included:

- Standard wall colors include four different sheens of white. It is not reasonable to expect that these can be accurately maintained when touch up is required.
- The selection of white was included for the vinyl floor tiles in loading areas from the loading dock. These have proven impossible to keep clean.
- White was also selected for the typical floor base. The wall base was also specified to be 3” tall, lower than a typical 4” base. Since it should be expected that wall base will be regularly impacted by vacuuming or buffing equipment, and that the 4” standard base height is meant to accommodate the heights for marks that this equipment would typically leave, the selection of a shorter, white base is difficult to understand.
- White was selected as the color for the restroom doors. Since the doors are opened by pushing, and not all users will reliably use the push plate, the selection of white paint in this location practically assures that fingerprints will regularly need to be cleaned.

The facility has inadequate access control, and a security camera system made up of outdated components. As security cameras fail, they typically are not replaced; currently at least one-third are inoperative. During the renovation, new security systems were ordered and delivered early in the design phase to take advantage of available funding. The components were stored and not installed until after construction four years later, and by that time were outdated, with expired warranties. In addition, the sole security operations center is located within an enclosed space in the center of the lobby. There is only one monitor on which to view the 40-50 security cameras still in service. Only one officer is in the center to monitor the cameras and survey the lobby entrance. There is only one x-ray set-up, which slows down visitor traffic (which can exceed 600 people each morning, many of whom are headed to the passport office). The mailroom has no security equipment including screening equipment, personal protective equipment, isolation space, and other security systems typically found in Federal building mailrooms.

Mobile Federal Courthouse, Mobile, AL

POE Conducted May 10-12, 2022

Snapshot

Construction of the new U.S. Courthouse and renovations to the historic John A. Campbell U.S. Courthouse in Mobile, Alabama, were conducted simultaneously from July 2018-April 2020. To maximize the $118 million in available funding, the two projects were awarded as a single design-build contract, tying the new construction to the repair and alterations of the historic courthouse.

The new $100 million, 155,600-gross-square-foot building was designed to meet the long-term needs of the courts, which include six courtrooms and nine chambers. The new courthouse has five floors and a below-grade, secured tenant parking garage. Its exterior is of Alabama limestone cut from the same quarry in Russellville, Alabama, that produced the limestone for the Campbell courthouse 80 years ago.

The new courthouse meets the LEED Gold certification standards and contains Energy Star-rated equipment, high-efficiency lighting, water-conserving plumbing, solar-powered water heating systems, and low-emitting materials.

Outstanding Design Features Affecting O&M

- The building design included substantial input from neighborhood stakeholder groups
- The design team collaborated and coordinated closely with the historic architectural team renovating the original courthouse
- A significant feature of the design process for this courthouse was the creation of a full-scale mockup of a typical courtroom, used to improve and refine design elements through multiple reviews by courts personnel including the judges
- The mockup allowed furniture location and the associated power and data connections, to be precise. This allowed the elimination of raised floors for the courtroom (a standard feature of the U.S. Courts Design guide), which in turn introduced substantial savings that were able to be applied to other parts of the building
- The current plantings and mulch are performing well. The original plantings and mulch choices performed poorly in the local climate, and subsequently, local vendors provided recommendations for new plantings that are more heat-resistant and stable during heavy rains.
- The stormwater management system has performed well
- Daylight is simulated in courtrooms with the use of large-panel LED lights in the arched ceiling
- The USMS spaces are well designed and sufficient to permit the safe transfer of prisoners
- Dedicated custodial storage is large enough and sufficiently distributed to support efficient operations for keeping the facility clean.
- Signage and wayfinding design was included as part of the base building contract, resulting in a signage system well integrated with the building
- Equipment specs are the same between both buildings, allowing the same O&M staff care for both buildings

Major Issues

Landscape

- There is lack of irrigation and a limited number of hose bibbs
- The parking garage layout is considered poor due to lack of spaces for empaneled jurors and no accommodation for large personal vehicles
- There is no overhead exterior card reader protection
- The gate equipment has experienced failures
- Exterior handrails are loose

Architecture/Interiors

- Lobby acoustics are poor
- There is no restroom in or near the lobby
- The loading dock is reached via an angled approach
- The small wall tiles in the restrooms introduces a high proportion of grout joints which can prove challenging to keep pristine over time. Additionally, the paper towel dispenser and disposal are remote from the lavatories, which can lead to staining of finishes from water drips.
- The fitness center is poorly located over the clerks' offices, generating noise and vibration

- Limited O/M storage is offered
- The lobby columns show efflorescence staining, most likely caused by the cleaning protocol.
- The access to card reader in elevator

Structure/Envelope

- The single ply TPO roof assembly has failed

Mechanical

- The sally port ventilation system doesn't exhaust
- There are acoustic issues associated with the fitness center and the roof dry cooler
- The waterside economizer is not used
- The Double-height air handling unit is difficult to access
- Fan coil units overhead in IT and AV closets pose a potential threat of water damage to equipment below
- The holding cell toilet shows significant staining

Lighting/Electrical

- The Lighting system is fluorescent
- The holding cell luminaires are too dim
- Sally port luminaires are not tamper-resistant
- Doe-patterned frit windows cause glare and view issues
- There is a lack of daylight harvesting
- The GSA-owned public parking lot has no lighting
- The 325 kW permanently installed generator test load bank is not big enough to test the 650-kW emergency generator.

Top Three Lessons Learned

The single-ply thermo-plastic polyolefin (TPO) roof assembly has reportedly been problematic since its installation, with persistent leaks remaining to be addressed

A waterside economizer was commissioned for the building but is never used. The heat exchanger unit is too small and would not meet load often enough. In the local rainy, hot, and humid climate, there are not enough operating hours to produce chilled water of a temperature suitable for cooling.

The building's lighting system is composed primarily of fluorescents and compact fluorescents with very few LED luminaires. The O&M staff find it difficult to replace fluorescent lamps for some of the luminaires, because they have been discontinued. The O&M staff also have difficulty sourcing the correct drivers and ballasts, causing the staff to use incorrect drivers and ballasts, which in turn causes the fluorescent lamps to fail long before their end of life.

Douglas A. Munro US Coast Guard Headquarters, Washington, DC

POE Conducted October 26-27, 2020

Snapshot

The Douglas A Munro U.S. Coast Guard Headquarters (USCG HQ), completed under a design-build contract, sits on the west campus of the former St. Elizabeth's Hospital. This was the largest GSA construction project ever undertaken. It consolidates a workforce of nearly 4,000 employees, who were previously scattered among 24 locations around Washington, D.C. The 1.2 million-square-foot, 11-level office building is the central component of the 176-acre campus, as well as its most unique element. The structure is built into the sloping hillside and only two of the levels are entirely above-grade. The lower nine are built into—and extend out from—the hillside. The building consists of linked, quadrangles, clad in brick, schist stone, glass, and metal that follow the site's natural change in elevation and cascade toward the Anacostia River. The site includes an 800,000 square-foot, 1,973-space parking garage and a central utility plant.

Highlighting the project's LEED Gold certification are the sprawling 450,000 square feet of green roof installed on top of the headquarters and garage. A massive retention pond at the lowest level of the headquarters collects runoff from the entire St. Elizabeth's West Campus.

Outstanding Design Features Affecting O&M

- The facility is the largest GSA project ever attempted and is considered a success by the US Coast Guard and the building occupants
- The building has one of the largest square footage of green roofs in the country and is highly successful
- The native plant selection for the site and green roof areas are regionally appropriate, with extremely low plant loss
- The building is considered a successful implementation of open office workstations

Major Issues

Landscape

- Wildlife including deer and groundhogs can gain access to green roofs/courtyards, get trapped, and must be removed.
- The main entrance water feature generates noise. The interior portion of the water feature disrupted indoor ceremonies and is no longer used.
- Courtyard access for the landscaping contractor is difficult
- Drip irrigation system pipes are damaged

Architecture/Interiors

- Lack of corner guards in conference center
- The Child Development Center and Food service cafe have numerous deficiencies, including The rooms in the Child Development Center including inadequate storage, blind corners that required the installation of mirrors to permit staff a full view of the space, hanging ceiling fixtures that to be coordinated with security camera locations, and glass pendant lights that are susceptible to breakage from balls and flying toys .
- The building lacks lockers and changing rooms
- Loading dock turning radius is tight
- There are few restrooms near exits
- Overall, the building has inadequate storage space for building operations
- Wayfinding throughout the building is limited

Structure/Envelope

- The stone cladding shows severe efflorescence
- There is significant water leakage and resulting damage to interior finishes. The most severe leakage occurs at floor areas located directly to the interior side of courtyard entry doors, which requires routine repair to damaged interior floor and wall finishes. Standing water collecting against the exterior side of the courtyard entry doors is routinely reported by building maintenance during heavy rain events. Staff has identified improper slope of the courtyard hardscaping towards the walls and doors instead of drainage to the courtyard drains.
- Placement of fins and the deep setback of the punched window systems with oversized snap covers make cleaning of the window systems difficult. The curtain wall snap covers are failing.

Mechanical

- The Ceremonial hall has temperature control problems
- The Child Development Center (CDC) does not appear to be purposefully constructed for small children or completely in conformance with standard GSA PBS-P120; as it continues to adhere to the typical office-space systems configurations. The HVAC systems are overhead VAV systems, with no temperature sensing at the floor level and no heat at the floor.
- The HVAC in Health Clinic is not separately zoned
- The UPS experienced lead-acid battery failure
- The BAS has systemic problems
- There is no building submetering
- No building humidity control
- Fan coil units have limited accessibility and often their condensate overflows
- HVAC storage space is too small
- Frequent replacement of batteries in restroom fixtures is required
- The restroom floors slope away from drains
- Restroom floor drain traps dry out
- As designed, there is limited hot water available to janitor closets

Lighting/Electrical

- The building uses a large number of lamp types
- High workplace illumination levels and limited task lighting
- Lamp accessibility is limited
- Inappropriate linear LED retrofit lamps are used
- Office-space shades are cut too small
- Inoperative electric shade controls in conference center
- Lighting control systems are not programmed correctly
- There is an insufficient number of accessible power outlets
- Complex electrical power layout

Top Three Lessons Learned

Given the size of the building, the accommodation made for storage for operations and maintenance materials and for custodial equipment and supplies is inadequate. O&M staff reported that this lack of dedicated storage for their materials has necessitated creating makeshift storage areas in unused spaces and public corridors. While smaller custodial closets are well distributed, it is not certain that the original program considered centralized storage for custodial equipment and supplies. A makeshift space in a basement corridor has been retrofitted for this purpose. This storage area lacks sufficient power outlets to charge numerous cordless cleaning devices and is inadequately secure to discourage theft of materials and supplies.

Fan coil units serve back-of-house spaces, including electrical closets, telecom rooms, and machine rooms. Access to the fan coil units has been an ongoing issue. It has been noted that some fan coils are located where facilities personnel have trouble accessing the unit. In addition, some fan coil units have

not been provided with secondary drain-pan leak detection or drain piping. When the primary drain-pan clogs, condensate from the cooling coil spills into the secondary drain pan. Without a moisture sensor to note the presence of the condensate or drain piping, the condensate is unable to be disposed of properly. All secondary drain pans should be required to have a moisture sensor that alerts the BAS that the primary drain pan has an issue.

One obvious deficiency is the large quantity of different types of luminaires throughout the building. There are multiple styles of cove lighting and wall-washers, and different shapes and sizes of recessed downlights with various types of decorative trims, suspended direct/indirect linear luminaires, recessed linear luminaires, track lighting, pendants, and recessed step lights. The wide array of replacement parts poses a real maintenance issue, necessitating the use of product manuals to maintain operation of the various types of luminaires. Most lighting is accessible for lamp replacements. The ceremonial lobby is the most challenging, with linear fluorescent lights located high up in the ceiling. Although O&M can reach the lights with a lift, it is a time-consuming and expensive task.

Oklahoma City Federal Office Building, Oklahoma City, OK

POE Conducted July 26-27, 2022

Snapshot

The Oklahoma City Federal Building is a national symbol of strength and resilience. Born of tragedy, the 181,000-square-foot office building replaces the Alfred P. Murrah Federal Building, a nine-story structure that was destroyed by a truck bomb in 1995, killing 168 people. GSA developed new security guidelines for Federal buildings, many of which are introduced within the Oklahoma City Federal Building Campus. While ensuring safety, GSA also required the public architecture of the new Federal building to be open, accessible, and inviting.

Construction on the $40 million building started in 2001, and the building was occupied in 2003. The building design is based on the duality between security and openness: the building has both a soft side and a hard side. To frame this softness, a “hard side” of massive exterior walls is composed of cast-in-place concrete, which, combined with thermally efficient windows, conserves energy. The building uses a striking colonnade to separate the glass-enclosed courtyard from the adjacent street and communicate a sense of openness while maintaining physical security.

Outstanding Design Features Affecting O&M

- The building's design adds to tenants' sense of security, and tenants reported it is a desirable space to work in
- The city stormwater system is inadequate and causes water to back up into the building through the service entrance and loading bay. A flood gate was installed, which has been successful in limiting the inflow of water
- There are benches and site amenities for building tenants and other downtown pedestrians to use
- The finishes throughout the building have held up well, and janitorial staff find the building finishes easy to clean
- This building has highly successful, easy-to-understand wayfinding
- With the underfloor air distribution (UFAD), and resulting limited overhead equipment, none of the mechanical equipment is difficult to access for maintenance
- The electrical rooms are well maintained and clearly labeled

Major Issues

Landscape

- The irrigation system includes pop-up sprinkler heads with no drip irrigation at trees or feature areas. The irrigation controls are stand-alone and not integrated into the building automation system. Based on the landscaping conditions observed (large regions of browning grass and bare patches), the existing irrigation system is not adequate to sustain the current landscaping and likely is water-inefficient.
- Entrance ramps have accessibility issues

Architecture/Interiors

- There is no A/V system in building's conference room
- Glass walkways create visual problems
- The building doesn't have a fitness center
- Building storage space is minimal
- The door hardware has not held up well and often needs repair or replacement
- Structure/Envelope
- The fabric sun shades have deteriorated and complicate access for maintenance and window washing

Mechanical

- Occupant thermal comfort rates poorly compared to other Federal buildings
- The heating coil is improperly located in UFAD system

- UFAD system may not be capable of balancing the heating and humidity systems as it needs to because as the heating coil was placed in the pre-heat position, there is no means to reheat dehumidified air coming off the cooling coil
- The loading dock's manned screening station has no air conditioning
- The hydraulic elevator needs a dedicated cooling unit
- The outdoor air sensor conduit is not connected properly
- There is a freight elevator only on one side of building; getting heavy equipment to the other side of the building requires transport over glass atrium bridges

Lighting/Electrical

- There is no clerestory shading
- Lighting sensors are improperly located
- Exterior lighting is minimal and often inoperative
- Canopy lighting is difficult to access

Security

- The CCTV system is inadequate
- There is limited exterior lighting
- Exterior entry doors not on the locking schedule
- There are too few bollards at vehicle security entrance

Top Three Lessons Learned

Building storage is minimal, and many of the building services staffs, including janitorial and O&M staff, store materials and much of their equipment in adjacent Federal buildings. Building O&M has a very small space with limited attic stock and building supplies, located on the lowest level of the building. Janitorial storage for bulk supply is also insufficient, and overflow items are stored at other Federal buildings nearby. The cost of transporting materials between buildings is a cost borne by the government in higher contract costs.

Each of the windows and curtain wall panels is capped at the interior and exterior by a projecting sunshade to reduce solar heat gain. The sunshades are composed of a metal frame spanned by a diffuse fabric intended to allow water to flow through. The fabric of the sunshades is in poor condition, with numerous sections torn or missing. The use of fabric for the sunshades presents a significant long-term maintenance challenge for the building because access to replace them is difficult. Repair is a continual process, due to variations in location around the building and varied exposure to the elements.

The CCTV system is inadequate. Most cameras are out of date, a number have problems moving and have become frozen in one position, and a few are completely inoperative. The facility recently failed the Federal Protective Service (FPS) Facility Security Assessment (FSA) because of the inadequacy of the CCTV system. Exterior lighting surrounding this building is very limited. There are many dark, blind spots in CCTV camera views due to inadequate light levels. The security guards cannot see people approaching the building at night.

Land Port of Entry, San Ysidro, CA

POE Conducted July 18-19, 2023

Snapshot

Southern California's San Ysidro Land Port of Entry (LPOE) is the busiest international border crossing in the western hemisphere, serving 70,000 northbound vehicle passengers and 20,000 northbound pedestrians crossing daily.

The 403,000-square-foot San Ysidro Land Port of Entry Expansion Project is a bi-national effort between the United States and Mexican governments that includes a mix of demolition, relocation, expansion, renovation, and modernization of the existing land port of entry in the San Ysidro district of San Diego, as well as construction of new administrative and operational facilities. The project calls for a complete overhaul of the current international border inspection facilities on both sides of the border at a total cost of about $625 million, which includes $577 million[for the expansion of the northbound U.S. point of entry and roughly $48 million for the construction of an entirely new southbound Mexican point of entry.

All three phases of the total complex achieved LEED Gold certification and have the potential of achieving net zero energy use once all systems are approved by the local and state governments and are online. This would be the first U.S. facility open 24 hours a day, seven days a week, 365 days a year, to achieve net zero energy use.

Outstanding Design Features Affecting O&M

- Successful landscaping was employed
- The cloud-based irrigation control system works well
- Successful water conservation features are incorporated
- Staff amenities on site
- The gate is labeled for maintenance/repair responsibility
- A single-lane exit traffic pattern simplifies traffic flow
- There is a staff roadway system and vehicle tunnel
- Staff building utilizes sky bridges and pedestrian tunnel
- The project earned LEED Gold Certification
- Use of high wall air diffusers
- Use of personal louver air diffusers
- Radiant lean-to-cool booth plates help keep agents comfortable
- The project employs an integrated robust BAS system
- IT closets have modular water-cooled air-conditioning units
- There is a low-voltage wire bird deterrent system
- The project follows principles of good lighting design, including good daylighting practices and sensors
- Luminaires are easy to access
- Appropriate shading devices
- ETFE panels allow diffused daylight
- Good lighting design under inspection canopies
- Art-in-Architecture lighting system is effective

Major Issues

Landscape

- Bus and truck routing requires vehicles to back up in order to exit the site
- Irrigation isolation valves are poorly located

Architecture/Interiors

- Speed bumps are high
- There is a 90-degree curve on the southbound exit lane
- Tandem booths (although permitted by the CBP Design Guide) do not work well and do not improve efficiency. The processing speed is only as efficient as the lead booth and if there is a delay, breakdown, or other issue at the lead booth, traffic at the second booth can't move forward.
- There is a lack of clear queue line signage in the pedestrian processing area
- Exit turnstile gate access is difficult
- The southbound secondary inspection area doesn't have a canopy
- Recessed computers under glass counters are difficult to reach

- The large main gate to the garage is inoperative Due to their size and source, replacement parts are difficult to obtain, so the gate is often nonfunctioning.
- Trash receptacles are located away from sinks in restrooms
- Staff lockers are too small and limited in number
- The loading dock and mailroom are too small for efficient functioning
- The topical finish on the floors is delaminating
- The aggregate stone surface countertops are deteriorating
- The pedestrian processing magnetic gates and signage are ineffective

Structure/Envelope

- There is leakage at Customs House expansion joints
- Window types are expensive to replace when broken
- The ETFE roof is expensive to maintain
- The bullet-resistant glazing is cracking
- The Customs House copper roof leaks
- Parking garage joints and masonry enclosures are not sealed

Mechanical

- The building is overcooled
- Radiant heating and cooling floor slab in pedestrian processing area does not work all of the time
- There are a limited number of thermostats
- Booth airflow is inadequate
- There is no airflow in Garage
- Chilled water capacity is inadequate
- Geothermal heat rejection by the modular chiller is not being used as designed
- Geothermal field is not balanced annually
- Geothermal plate cleaning requires shutdown of the field
- Heat recovery chiller valve and elbows experience failures
- Hung water source heat pump have insufficient access for maintenance
- Booth filter access is difficult
- Poor access to catwalk access and custom house equipment
- Membrane bioreactor system is shut down because maintenance costs exceed water savings
- Hot water storage tanks are undersized
- The sewer lift station is inaccessible
- The cistern overflow not operational
- There is only one exterior sanitary drain on site
- There is reduced water pressure in janitorial closet
- There is only one hose bibb at pedestrian processing building
- Floor drains lack trap primers

Lighting/Electrical

- Poor lighting in high ceiling areas
- The exterior of the building as well as the interior spaces are over-lighted
- Lighting mounted directly over counter tops causes reflective glare
- Seismic restraint of lighting fixtures is inadequate
- There is significant direct glare in Command Center
- Lack of appropriate shading in open offices of Headhouse building
- There is no operable shading in booths
- Lighting control systems are not integrated
- Exterior luminaires are not wet/damp location rated
- The PV inverters are hard to access
- This port never shuts down, yet still has requirements to test and service main switchgear periodically. There are no means provided to use the generators and bypass the main gear.

Security

- The southbound exit routes not secured
- There is an open exit in the Pedestrian Processing area
- There are several unsecured alarmed doors with access to the U.S.
- The mailroom has no security/screening equipment

Top Three Lessons Learned

An ethylene tetrafluoroethylene (ETFE) roof system is installed over the Primary and Secondary Inspection areas. This system uses two ETFE foil layers that create externally pressurized air pockets. The system provides excellent reflectivity and insulation from solar radiation while allowing natural light through. Despite its benefits, staff have found that the cost to maintain pressurization and perform maintenance outweigh savings from reduced lighting usage during daylight hours.

One of the most concerning observations was the cracking of the ballistic-resistant glazing (BRG) at the inspection booths and other locations around the site, including the Customs House, where interior glazing was added to improve security and energy performance while keeping the original historic windows. This remains an ongoing issue that requires further investigation at this and numerous other LPOEs.

There is no annual balance between heat extraction (winter) and cooling heat rejection (summer) to the geothermal field, as there is not a winter season. With the constant weather conditions, there is no chilled water reset strategy, and chilled water is supplied at approximately 42°F. There is no pressurized equipment, so IT and internal cooling spaces require chilled water in the low 40s°F. When the plates need to be disassembled and cleaned it is a three-day operation, and the geoexchange field is not able to provide heat rejection capacity and the plant is short on cooling capacity. It is not possible to meet demand cooling loads and do annual service on the heat exchanger.

Mary E. Switzer Federal Office Building, Washington, DC

POE Conducted December 15-16, 2021

Snapshot

The construction of the Mary E. Switzer Federal Building initiated the revitalization of the southwest quadrant of Washington, D.C., and its transformation into a Federal enclave. Completed in 1940 on the eve of World War II, the building was requisitioned for wartime use just prior to its completion, serving the National Defense Committee and Department of War.

The modernization was a complex, phased, and occupied historic renovation of the building. All primary systems were modernized. Non-historic interior construction as well as items that had reached obsolescence were demolished and replaced. Finishes were replaced except at designated preservation zones. Restoration was performed to preserve the exterior stone-and-brick façade and interior. The existing curtain wall was replaced with a new, thermally improved curtain-wall system. The existing penthouse was replaced with a much larger one. The Switzer Building's restoration initially was designed to achieve LEED Silver Certification.

Construction began in 2005 and proceeded in two phases. Phase I renovated half of the building and ended in 2008. Phase II renovated the other half and was completed in 2014. Renovations included an entirely new HVAC system, fire suppression system, and emergency electrical power plant; replacement of all electrical wiring and plumbing; a new telecommunications system; security upgrades; and

refurbishment of the main lobby. Because the modern mechanical and HVAC equipment was much smaller than the units it replaced, the two-story mechanical penthouse was reclaimed and converted into office space. The elevator shafts were extended to the two topmost stories, and new elevators were installed. Windows throughout the building were replaced with modern energy-efficient ones, and a green roof was placed atop the structure. In 2014, GSA renovated the Switzer Building into open workspaces.

Outstanding Design Features Affecting O&M

- The native-to-the-area landscaping and judicious use of turf are successful
- The housekeeping closets are appropriately sized and located throughout the building to meet the cleaning needs
- The central location for housekeeping operations provides workstation cubicles, break area, and lockers for staff
- The finishes throughout the building are high quality
- The building controls converted from pneumatic to direct digital controls (DDC) with the Phase 1 modernization
- Occupant comfort and satisfaction showed a “very big improvement” with the modernization
- The BAS optimized start-stop algorithms show “learning” to bring systems on as needed and maintain comfort
- Systems are well labeled, marked, and color coded
- Systems and components are well configured with respect to providing access and service clearances

Major Issues

Landscape

- The granite exterior pavers are showing joint failures
- The Limestone/granite walls show deterioration and damage

Architecture/Interiors

- The child-care center’s electrical outlets accessible to children
- Towel dispensers and trash receptacles are too far away from the lavatories
- There is minimal O/M and attic storage
- Lack of wall corner guards allows damage

Structure/Envelope

- The major pedestrian tunnel has water leakage
- There is parapet coping joint deterioration
- The window shading film is deteriorating
- The green roof is inoperative; its sprinkler system was never activated

Mechanical

- There is no ability to connect to the BAS from laptops
- Birds roost in the chiller on the roof
- Lavatory faucets overzealously spray water

Lighting/Electrical

- The installed LEDs are too bright
- Many lamps are burned out due to lack of maintenance, mostly in areas of low occupancy
- Task lighting is low level and not dimmable
- Office occupancy sensors are not well calibrated
- The loading dock is under-lighted
- Sprinkler heads are located under lights
- There is minimal lamp storage area in building
- The building doesn't have a lighting controls system
- Much of the photovoltaic system is inoperative. Possible reasons may be a faulty inverter, incorrect circuiting installation, or an incomplete installation.

Security

- The main lobby is not well designed for security
- The secondary lobby guard is not well-positioned for security purposes; the guard has no direct sight line to the entrance door

Top Three Lessons Learned

Although the original limestone-clad site walls were partially reconstructed, substantial damage remains. Joint materials are extensively deteriorated, and cladding panels are displaced, cracked, eroded, or spalled. Granite cladding that surrounds the loading dock exit ramp also appears to be original and is extensively damaged, showing displacement, cracks, and joint material distress. The joint material at the parapet coping is substantially deteriorated, leaving the joints open to water ingress. The limestone is also heavily stained and soiled from atmospheric contaminants and selective water rundown. Much of this limestone and granite damage likely predates the modernization; it is not clear how these conditions were overlooked, but this has resulted in a substantial deferred maintenance scope that should be a high priority to avoid increased damage.

The building has a wide range of luminaires and lamps with varying correlated color temperature (CCT). Throughout the building there are different types of luminaires. The LEDs installed are far too bright, especially when compared to their fluorescent counterparts. The LEDs appear to have been matched to the fluorescent wattage instead of lumen output, so they create an over-lighted space that is uncomfortable for occupants. There needs to be a well-designed plan for replacing all the fluorescent luminaires with similar lumen and CCT LED luminaires that have dimming and control capabilities in accordance with P100-20243.

There is no control system for the lighting throughout the building, and it is not connected to the Building Automation System (BAS). Spaces either have an on/off switch or an occupancy sensor. Occupancy sensors turn on all the lighting in a work area, with no zoning for low occupancy. In many places throughout the building, the occupancy sensors are poorly placed, causing lights to switch on when they are not needed. This building would benefit greatly from having a central control system for the lighting to reduce energy and prolong the life of the luminaires. Daylight sensors throughout the building, especially in the atrium area, should be used to reduce the amount of energy used by the electric lighting system.

50 United Nations Plaza Federal Office Building, San Francisco, CA

POE Conducted June 11-12, 2019

Snapshot

The 50 UN Plaza Federal Office Building was built between 1934 and 1936 as part of the city's master plan to revitalize the city's Civic Center after the devastation caused by the earthquake and fire of 1906.

The building's rectangular form is oriented east-west and surrounds a central courtyard space. This massing provides effective floor plates that allow nearly every room in the double-loaded racetrack corridor plan exterior access for daylight and ventilation. The building is a six-story, steel-frame structure with concrete floor slabs and walls of unreinforced masonry and hollow clay tiles, totaling 350,213 gross square feet on a two-acre site.

Since its completion in 1936, the building has served 74 years without a major renovation and survived a catastrophic earthquake.

In 2009 under American Recovery and Reinvestment Act (ARRA) funding, the building underwent a major renovation that included earthquake-resistance, blast and security enhancements; environmental remediation; new mechanical, electrical, lighting, and plumbing systems; roof replacement and refurbishment of existing historic wood windows; and restoration of the historically significant interiors

and central courtyard as well as redesign of office interiors. In 2017, the building was listed on the National Register of Historic Places.

Outstanding Design Features Affecting O&M

- The building was well studied, had a well-conceived design, and was able to meet the high-performance requirements of the ARRA program.
- The O/M vendors were well trained on the systems, which was documented and is currently being used by the O/M staff
- The building's central courtyard is landscaped with a combination of low-maintenance grasses and trees
- The conversion of the workplace environment from enclosed offices to a more open office area environment is successful
- Storage facilities throughout the building are more than adequate
- The basement includes ample space for attic stock storage, building operations and maintenance storage, and maintenance shop space
- Less invasive seismic modifications were found to be feasible structurally, cost-effective, and easily integrated into the new interior space layout
- Glazing was upgraded to include greater blast resistance in addition to thermal improvements
- An innovative secured cable catchment system was integrated into the window blinds to retain the restored window assembly fragments and limit the risk of projectile injury or damage
- Netting installed over large portions of the façade discourages roosting and prevents other bird-related damage.
- Occupants can adjust the windows, ceiling fans, radiators, window blinds, and the artificial lighting.
- Equipment parts, replaceable items, filters, and fan belts have ample storage
- Systems are properly located with provisions for access
- The lighting control system is integrated with other building systems to create a flexible workspace
- The lighting system utilizes several control strategies: time clock scheduling, manual personal control, daylight dimming, tuning, and occupancy/vacancy sensing
- Task lighting in every workstation improves users' acceptance of lighting design

Major Issues

Landscape

- The site contains an isolated high-maintenance grass area

Architecture/Interiors

- There is high reverberation in corridors
- There is an underutilized, vacant elevator lobby
- Kitchenettes are undersized
- Workplace pods are not ventilated

- Workplace thresholds create a tripping hazard
- Operable windows are not screened
- The loading area is not effective

Mechanical

- The building is uncomfortable in extreme weather. Analysis of extreme weather conditions is needed to find solutions to alleviate the discomfort they cause
- The perimeter steam heating system is energy intensive
- The building's two large boilers need to be in full operation (one on standby) 24/7

Security

- The upper portion of the first-floor windows are accessible
- The loading area is accessible by climbing over a fence
- The mailroom has no shower, eye wash station, or emergency HVAC activation switch

Top Three Lessons Learned

Owing to the restrictions imposed by retaining the historic configuration, the loading area and associated areas are inadequate for the needs of a Federal office facility of this size. The existing loading access is via a curved, narrow, steeply sloped access ramp, which does not easily accommodate typical delivery vehicles.

A critically detrimental decision was made to maintain perimeter heating with steam. Operation of steam systems lead to higher energy costs, due to the inability for low turndown/cycling, the necessity of keeping the systems operational even when not needed to reduce the likelihood of equipment and piping failures from thermal shock and corrosion, heat losses through piping and insulation required due to the higher operating temperature (compared to 140 deg F water), and undesirable bypassing of live steam through failing steam traps at terminal equipment. When compared to low-temperature hot water systems and the pumps and control valves needed, steam systems can have higher maintenance costs due to boilers, boiler feed equipment, steam traps at points of use, and drip legs, as well as condensate return pump equipment.

The retention of the historic finishes, all of which are hard surfaces, combined with the opening of the office areas to the corridor, results in sound reverberation that was reported to be highly distracting. For historic facilities, where hard surfaces must be retained, it is recommended that the designer's scope of work include acoustic modeling so that strategies for limiting sound reverberation, such as strategic placement of partitions and bulkheads and the selective locations of acoustically absorptive furnishings, may be incorporated into the design.

Land Port of Entry, Van Buren, ME

POE Conducted August 20-21, 2019

Snapshot

The Van Buren Maine Land Port of Entry (LPOE), located on a 21-acre site on the St. John River, replaced the existing permit border station that was damaged in a 2008 flood. The new 24-hour commercial port facility consists of approximately 46,000 square feet and includes a main administration building with a passenger lobby, document processing area, administrative offices, interview rooms, search and detention cells, staff services, and building support areas. There is also a secondary non-commercial garage and a commercial vehicle and cargo inspection facility. This American Recovery and Reinvestment Act (ARRA) project used a Bridging-Design-Build delivery method and was completed in 2013 with a budget of $45 million.

The facility was awarded a LEED Gold certification and employs sustainable technology and design features to cut energy and utility costs. The sustainability features include: energy-efficient construction using insulated precast concrete panels; a geothermal heating and cooling system with nearly 50 400-foot-deep wells; radiant floor heating; a solar water heating system that provides hot water to the building; solar tubes which bring daylight to interior rooms; and a 1,250kW biodiesel generator to provide backup power in case of power outages.

Outstanding Design Features Affecting O&M

- Security fencing was selected to minimize the port's visibility to the surrounding community
- The medians between lanes at the primary inspection are covered with interlocking recycled rubber pavers that facilitate rapid and efficient incorporation of new technologies to the booths or lane control devices
- The facility is fully supported by card readers

Major Issues

Landscape

- Native grasses and berms became security concerns
- Soil is not adequately prepared for tree plantings
- Slate stones around building perimeter create a security hazard
- Snow removal is difficult around the open emergency generator
- Snow removal concerns exist at security parking gates
- Personal occupancy vehicle (POV) primary inspection gates were manufactured overseas, resulting in delays in obtaining parts for repairs

Architecture/Interiors

- The LPOE doesn't have a wide load lane
- There is limited signage at the wide paved area after inspection lanes, the outbound lane, at the port's entrance
- There is no pedestrian inspection booth/lane
- The lobby area has a limited line of sight
- The heavy inspection booth doors are not functional
- The garage doors are not insulated

Structure/Envelope

- The exterior panels are discolored and deteriorated
- The inspection booths' bullet-resistant glazing is fractured
- Roof drains are prone to ice blockage

Mechanical

- The building's HVAC system is overly sophisticated for the O&M labor force
- The height of the lobby, coupled with its lack of shading, results in poor conditioning of the air
- The flat skylights are not energy-effective
- Radiant floor thermostat control lags cause poor performance
- Building vestibules don't have slab sensors
- The is no external shading on the building
- The radiant heating flooring causes condensation in booths
- The radiant heating system is losing glycol
- The building's mechanical equipment room is too small

- Below-grade water and sewage lines freeze

Lighting/Electrical

- The lighting system, with its varying lamp lengths, is hard to access
- Workspaces experience significant glare
- Shading is ineffective
- There is significant glare in inspection booths
- Induction lighting in truck canopies is failing
- Lighting in the walkway's external bollards is easily damaged
- The building's façade lighting is poorly designed
- The inspection booths have limited electrical outlets
- The port doesn't have an uninterruptible power supply (UPS)
- The high-level sensor in emergency fuel tank has failed
- The emergency generator is exposed to the harsh climate

Security

- The main lobby door is not lockable
- There are a limited number of CCTV monitors
- The outbound lane can be used for port running

Top Three Lessons Learned

The controls system design was created in isolation of the total system and is not compatible with the Building Automation System (BAS), resulting in recurring system shutdowns. These problems have apparently been rectified with software and BAS upgrades; however, the total system may be too sophisticated and complex for the skill level of available operations staff in this isolated, rural part of the country. GSA has a recurring issue of designing sophisticated buildings in parts of the country where staff members do not have access to the skill sets needed to operate these buildings effectively.

One of the most striking aspects of the exterior is the amount of discoloration and staining present on the rain screen panels. While the source of the discoloration is not clear, it affects most panels on all elevations and buildings that are not under cover or otherwise partially protected from the elements.

There are challenges in maintaining the lighting system, due to frequent ballast replacements and varying lamp lengths. The primary issue is access: ceiling tiles are not easily removable. The secondary issue is the multiple varieties of lamps installed in each luminaire, which range from two feet, three feet, four feet, and five feet—depending on the luminaire length. Maintenance staff reported that it takes up to four hours to re-lamp one luminaire.

Robert S. Vance Federal Office Building and Courthouse, Birmingham, AL

POE Conducted May 14-15, 2019

Snapshot

The Robert S. Vance Federal Building and U.S. Courthouse is a four-story, 174,000-square-foot historic renovation project. The building originally was designed to house a post office; it currently houses the U.S. Bankruptcy Court for the Northern District of Alabama, which includes three bankruptcy courtrooms, chambers, offices for the bankruptcy clerk and administrator, and a bankruptcy hearing room. In addition, the facility houses one historic district courtroom, as well as the required addition of detention facilities, a grand jury hearing room, U.S. Probation Court offices, and offices for the state's two U.S. senators.

In 2009, the General Services Administration obtained $42.5 million in funding from the American Recovery and Reinvestment Act (ARRA) to renovate the building, bringing it up to current security and accessibility standards, in addition to performing hazardous material abatement. Work included repairing and replacing windows; repairing and cleaning exterior walls; correcting drainage and mold problems; upgrading heating, ventilation and air conditioning; roof repairs and replacement; and elevator upgrades. The building reduced energy and water consumption significantly and was awarded a LEED Gold Certification.

Outstanding Design Features Affecting O&M

- High level of occupant satisfaction with the environment of individual workspaces
- Significant incorporation of daylighting, in keeping with security considerations
- Storage facilities throughout the building are more than adequate
- The finish selections are performing well and provide aesthetic benefits, durability, and ease of maintenance
- Although the AOUSC Courts Design Guide requires three zones of independent temperature control, the three new courtrooms are provided with only two zones of thermal control. These new courtrooms are configured for bankruptcy cases and do not have jury boxes. Without a jury box, it was a good decision to rely on two zones of control for bankruptcy courtrooms
- The IT closets are served by independent air-cooled DX systems
- Accessibility to central plant and systems distribution equipment was taken into consideration
- The need to replace plumbing faucet batteries is not a burden at this facility due to lower frequency of operation of each fixture
- There are very few lamp types required in the attic stock

Major Issues

Architecture/Interiors

- Pre-screening area does not handle visitor surges well
- Entrance ramp includes excessive legs that impede travel
- Unfinished areas in building below shell characteristics
- The Loading dock was eliminated from building
- Restrooms difficult to clean (small tiles/white grout)
- Selection of white wall paint increases glare/reflection
- The freight elevator was eliminated from building
- A signage and wayfinding plan was not included in the design
- BIM was not delivered to the building

Structure/Envelope

- There was only a limited building survey prior to renovation
- The exterior renovation was not 100% complete
- Exterior repair was not 100% complete
- Limited window-washing capability
- Interior water leakage
- No lightning protection for building

Mechanical

- Inoperable mag-lev chiller
- Sump not responsive to water levels
- Electrical heat tracing used in DHW piping
- Cistern was not operational because of lack of treatment

- Magnetic water treatment was eliminated because of slime
- Mailroom emergency floor drain is located above the uninterruptible power supply UPS
- There is a wet sprinkler system in computer server room

Lighting/Electrical

- There is an excessive amount of light in the building.
- Color rendering index (CRI) is too low, causing unpleasant hue
- Skylight louver lights are impossible to replace
- There is no lighting keypad labeling
- Limited lighting control training
- Keypads cannot be reprogrammed
- Daylight harvesting is not effective
- The building has two electrical systems, due to necessary occupancy during renovation
- There is limited electrical equipment labeling

Security

- Increased security requirements because of one courtroom
- There is no building standoff, and street parking is available adjacent to building
- There is a potential trespassing problem around building

Top Three Lessons Learned

The building's third and fourth floor (as well as on the basement level), unassigned spaces are less finished than would typically be expected for a "warm lit shell." In their current state, it appears unlikely that the unassigned spaces will easily attract new tenants, meaning they will likely remain unused or underutilized for the foreseeable future.

The renovated building does not include a loading dock or dedicated area for large-scale deliveries. Although there was no original exterior loading dock, there was an existing freight elevator with exterior-only access on the first floor, which traveled only to the basement. As part of the renovation, this freight elevator was removed and not replaced. The easternmost existing passenger elevator cab was expanded under the project and deemed the new freight elevator. Even with the use of elevator-padding, the walls and floors of the updated eastern passenger-freight elevator have suffered damage to the wood-stained walls with brass highlights and the marble flooring.

Quantification of exterior repairs was reportedly problematic, due to the lack of a preliminary assessment. The masonry joint tuck-pointing scope also was not comprehensive, leading to quantity over-runs, arbitrary selection of repair areas, and instability of remaining mortar. The north-facing brick masonry facade was not repaired as part of the restoration, despite the presence of deteriorated mortar joints (leading to uncontrolled water penetration), cracks, and unstable masonry. Some of the marble sills are also damaged, along with numerous severely corroded window lintels.

Land Port of Entry, Warroad, MN

POE Conducted May 18, 2023

Snapshot

Constructed in 2012 with a budget of $34 million, the Warroad LPOE is a 40,108-square-foot facility, located on a 13-acre site. The port design responds to a complex set of operational issues, including site circulation of commercial, personal occupancy vehicle (POV), and recreational traffic; state-of-the-art vehicle inspection areas, holding areas, officer training area; firing range; and work areas. The latest technologies for securing the border are integrated into the inspection lanes and booths, secondary and commercial inspection structures, and officer work areas.

A LEED Gold-certified facility, the facility underwent enhanced commissioning to optimize its HVAC performance, reducing the building's energy demand. Ground-coupled heat exchange (geothermal) heating and cooling is used to reduce overall energy consumption of the entire facility and take advantage of the site's wet soil conditions. This heating source was paired with in-floor radiant heat to minimize the heating load while maximizing the comfort of officers and visitors within the facility.

Maximizing solar gain in the cooler months and minimizing heat gain in summer were critical design considerations in this northern Minnesota location. Inspection canopies stretched over the southern façade's glazed areas double as solar shading for the windows.

Outstanding Design Features Affecting O&M

- The Warroad LPOE is an extremely well-designed, -operated and -maintained facility
- The indoor temperature and glare control in all seasons are reported to be good, unlike a similar port in Van Buren, Maine. The orientation of the tall, south-facing glass and the canopy configuration serve to reduce the cooling season's solar load impact
- Ground-coupled heat exchange (geothermal) heating and cooling was used successfully to reduce overall energy consumption
- The beds of slate stepping stones, laid in an overlapping "shingle" pattern that surround most of the building perimeters, offer an excellent example of integrating locally available materials into the design
- The Secondary Inspection equipment mezzanine has removable railing sections to facilitate use of a lift to remove major equipment down into the garage space
- The windowless rooms that house the inspection bays, firing range, and mechanical room south of the main building provide shade for the main south façade of the main building
- Electronic shades on all windows throughout the building are controlled by switches on the wall that allow them to be adjusted to any position on the window. The shades are properly sized for the window openings.

Major Issues

Landscape

- Poor snow removal for the unprotected emergency generator
- Location of flagpole at back side of port

Architecture/Interiors

- Art and Architecture installation hidden by trees
- Booths are extremely cold
- Limited power and data outlets in offices
- Poor door location from booths to administration processing
- Poor selection of overhead doors for maintenance garage
- Floor runners block heat from radiant floor system
- Limited number of parking spaces for Global Entry applicants

Structure/Envelope

- Cedar siding on the building requires re-staining every 3 years
- Canopy openings allow snow and ice in pedestrian areas

Mechanical

- Snow melt system reduces the heat to the building when it is in use. Also, it can't dry the pavement.
- The supply air in the administration lobby is stratified and doesn't reach the occupants below, causing the space to feel unventilated
- Space heaters need to be used under desks in the Administration area
- Rubber cushion mats in booths block the radiant floor heat
- Configuration allows strong winter winds into booths
- Heat pumps are located in hard to service locations
- Snow melt valve header vault has poor detailing
- Roof screens cause snow drifts, which bury access doors
- LAN rooms are too small for changing equipment
- There are a limited number of outside hose bibbs
- The snow-melt heat trace temperature is not adjustable
- There is only one water heater for the port

Lighting/Electrical

- The lobby lighting system and the exterior lighting are non-dimmable
- Lamps throughout facility have varied CCTs
- The exterior door into lobby has no shade
- Tubular daylight devices do not daylight harvest
- Interior lighting does not have daylight sensors
- Offices do not have occupancy sensors
- The spacing of the site lighting over-lights the site's paved areas
- Site lighting glare ratings are high
- Bollards have green LED lamps
- Mayflies are attracted to the site lighting
- The port roof would have benefitted from a PV system

Security

- There is no continuous perimeter fence around port
- Port access is unobstructed
- Building security system has functionality problems
- The holding cells/interview rooms are small for new user demographics

Top Three Lessons Learned

Snow-melting systems, when operating, would pull down the available hot water temperature for heating the building. Consequently, the building would become too cold and could not recover. When the exterior temperature drops below 20 degrees F, the snow melt system does not have the heat capacity to dry the slab; thus, the melted snow freezes as ice on the pavement in lumps. As a result, the exterior snow melt system has been turned off since 2019, and snow is removed manually.

With indoor space in the Main Building mechanical mezzanine being at a premium, the water-to-water heat pumps—the ones interchanging heating or cooling energy with the geothermal ground loop—are not in fully serviceable locations. The backs of the units were installed with zero clearance to the stairwell wall. Maintenance staff needs to remove the wall for service operations of both manual and motorized control valves.

The building's security system has had multiple problems since construction. At least one of the servers is out constantly, which affects a third of the doors to the facility. The security control cards that allow officers to badge into the building have not worked from the time construction was completed. The main double doors have tape on the latching mechanism to prevent the door from automatically latching and to allow direct access to the building, as the remote release mechanism does not work. The server that controls the exterior doors for the building often malfunctions, and officers and building maintenance personnel need to carry one of two master keys to gain access into the building. The exterior doors also freeze up during the winter and need to be spray-lubricated to operate.

Robert A. Young Federal Office Building, St. Louis, MO

POE Conducted April 6-7, 2022

Snapshot

The Robert A. Young (RAY) Federal Building is a 20-story, 1.13 million-square-foot office building located in downtown St. Louis. The building was originally constructed in 1933 and served as a warehouse for the Terminal Railroad Association of St. Louis.

As part of the American Reinvestment and Recovery Act of 2009, the building was allocated funds to complete an exterior improvement project. In addition, the project was classified as a "Building Modernization," requiring the project to achieve LEED Silver certification. The overall $28 million restoration of the building entailed extensive masonry repairs and replacement, which included the installation of new through-wall flashing systems and replacement of most of the terracotta accents throughout the building. A thermally improved window system that met the GSA's requirements for blast mitigation—and was historically accurate in appearance – was installed. Overall, the exterior of the building was modernized while maintaining the building’s historic appearance.

Outstanding Design Features Affecting O&M

- The POE team considers the RAY Building one of the cleanest buildings it has evaluated. This is a significant accomplishment, considering that the modernized building is 90 years old.
- A successful seismic retrofit design concept that includes measures to brace secondary masses against ground accelerations, such as partition walls, cable trays, mechanical piping, and equipment pad.
- Janitorial closets are unusually large and more than sufficient to store needed supplies close to their point of use
- The building has one of the better fitness centers the POE team has evaluated. It is located on the lowest floor of the facility, where disturbance caused by the noise and vibrations from its use are minimized
- This building is a great example of how electrical rooms should be designed and maintained

Major Issues

Architecture/Interior

- Auditorium lack of sight lines
- Lack of dedicated mailroom
- Lack of baby-changing stations
- Lack of custodial changing/shower area
- Wayfinding directional signs are inadequate

Structure/Envelope

- Basement water leaks
- Lack of cell phone coverage; the structure is quite dense and composed of materials that traditionally inhibit cellular signal travel
- Building envelope needs repair. Repairs are now needed from damage to materials that has occurred since the 2009 restoration, including the roof parapet flashings, cast stone, and terra cotta. Another category of needed repairs are items that were restored in 2009 but require periodic maintenance to remain in serviceable condition, such as window sealant and the stone paving at the main entrances, where the joint materials have become deteriorated.

Mechanical

- BAS interface issues
- Modular chiller issues
- Building plant economizer issues
- Entrance vestibule door remains open too long
- Lack of isolated air return in lobby screening
- Battery-powered fixtures in high-use restrooms result in a need for high maintenance
- Cast-iron plumbing pipes are deteriorating
- Fire sprinkler system drain in tower overflows
- Lack of exterior hose bibbs

Lighting/Electrical

- Some areas need a lighting retrofit for seismic concerns
- Lack of total LED lighting replacement; luminaires in the areas not renovated were not replaced
- Accessibility problems with some luminaires
- Some areas of the building are over lit
- Lack of lighting dimming controls
- Lack of daylight harvesting
- Lack of light zoning
- Lighting control system unusable

Top Three Lessons Learned

The building plant is experiencing difficulties in both satisfying load when using free cooling, as the heat exchanger cooling capacity is much smaller than the load of the building. It also has issues with sequencing the economizer with mechanical cooling operation, particularly in shoulder seasons. The economizer does not demonstrate energy savings, demands excessive staff attention, and incurs costs for annual heat exchanger cleaning and maintenance.

There is no daylight harvesting or control throughout the building. At the time of the renovation, daylighting controls were required by ASHRAE 90.1, 2013 for both open and enclosed offices. The lighting control system is currently malfunctioning and is unusable. Additionally, the lighting system is not connected to the BAS system. The only lighting control the building currently has is a “full off” sweep, which occurs each day.

There are several areas where luminaires are hard to access. This makes maintenance and cleaning, including replacing the lamps on the legacy lamp (tungsten and fluorescent) luminaires, hard to accomplish. Because they are hard to access, many of the light sources were not functioning at the time of the site visit. Also, due to one-for-one replacement, all spaces equipped with the new LED luminaires are over-lighted, with lighting levels ranging from 40-90 foot-candles (fc).

APPENDIX B

SNAPSHOTS OF BUILDINGS UNDERGOING POST-OCCUPANCY EVALUATIONS, 2024 - 2025

As of this writing in late February 2025, the POE Team had completed evaluations of four additional buildings: two land ports of entry, a federal courthouse, and the Federal Bureau of Investigation's unique central records keeping facility as part of our FY24 contract. Following are synopses of the reports from those POEs, which demonstrate that Lessons Learned in previously years are being recognized, incorporated into GSA design standards, and embraced across facility life cycles, from planning and design through operations and maintenance.

Recurring Issues

- **Wedge barrier gates need frequent maintenance:** Retractable wedge barriers tend break down relatively frequently, sometimes dues to water and debris collecting in the below-ground controllers and actuators. In other cases, building staff reported that there have been several accidents and near-misses because the barriers are not sequenced correctly. When wedge barriers are used at a primary entrance and are used constantly at each car entry, they need frequent repairs and down-time for maintenance.
- **Not enough storage space:** Both for custodial storage and O&M storage tend to come up short
- **Oversized ceiling tiles:** Ceiling finishes with larger than usual lay-in tiles, (usually 4-feet x 4 -feet or 4-feet x 8-feet) are especially difficult to move, replace, or reinstall. Additionally, they tend to deform over time.
- **Confused traffic patterns at LPOEs:** Typically needing adjustment after a port is in operation, unclear traffic patterns create dangerous cross-overs for vehicular and pedestrian traffic.
- **Stormwater drainage patterns:** Poorly placed drains and inadequately sized canals and swales can result in localized site flooding.
- **Exterior sunshades inhibiting window washing:** Fixed sunshades can preclude the use of suspended scaffolding to access building facades.

"New" problems cropping up:

- **Automated records storage and retrieval:** As ASRS are bound to be used more frequently in the future, attention should be given to how they are maintained. The FBI's ASRS is only accessible from above the silo stacks via a service wheelchair that rolls over the grid. A system of platform plates needs to be taken with the service wheelchair when work needs to be performed over the grid, which makes working in the space awkward, time-consuming, and difficult. Additionally, the mezzanine used for maintenance of the archival storage retrieval system is not close enough to any of the air distribution, leading to uncomfortable working conditions. (6.2)

- **Air-cooled chillers require special maintenance:** Air-cooled chillers, a relatively new design, have experienced numerous issues including frozen components, failed control boards, failed condenser fans, and other issues. In one case, when one of the units was replaced, a temporary chiller needed to be brought on site while it was out of service. Maintenance of these units must be performed by a service contractor with specialized training.
- **Screening lobbies are too small:** This issue appears to be coming more prevalent in all building types, and leads to wait times for visitors and employees alike.
- **Outdoor amenity spaces for workers seem to be dwindling in size:** At one facility, it was limited to a single picnic table.

Improvements

- **More thorough commissioning:** Especially of mechanical systems.
- **More reports of well-functioning Building Automation Systems:** With some exceptions, BAS seem to be performing better as they become routinely integrated with other systems, including lighting controls.
- **Better landscaping**: More comprehensive use of native plants, and adequate watering and irrigation provisions, including external hose bibbs
- **Lighting systems are more integrated and uniform**: As LED systems are installed and legacy systems are phased out, lighting systems are better performing.
- **Better and more comprehensive design manuals** and spatial mock-ups are being provided, with increase attention on operations and maintenance**.**

Carroll A. Campbell Jr. U.S. Courthouse, Greenville, SC

POE Conducted June 26-27, 2024

Snapshot

Completed in 2021, the Carroll A. Campbell Jr. U.S. Courthouse is a 193,000-square-foot structure with six floors of office and courtroom space, and a seventh floor for mechanical space, and private underground parking. The $105 million used the Construction Manager as Constructor (CmC) method for project delivery. The facility houses seven courtrooms and chambers for nine judges, along with offices for the U.S. Marshals Service, the U.S. Probation and Pretrial Services, the U.S. Attorney's Office, and a Federal Public Defender. The courthouse was designed and constructed to earn LEED BD&C LEEDv4 Gold certification and SITESv2 Silver certification.

The site, though compact, allows for 50-foot security setbacks at all sides of the building from the street. This allows for a relatively generous amount of pervious earthen areas to help reduce site runoff and reduce heat island effects in this urban area. The landscape edges are defined by curbing/landscape walls and partially enclosed with fencing of varying heights for security. A native and regionally adapted plant species to create a landscape that was more structured adjacent to the building and more organic in the larger open spaces.

High vertical windows for daylighting flanked by articulated precast concrete panels create a vertical expression for the building's elevations. This is further emphasized on the north facade with the expression of the central conference room wing, which terminates at the sky with a precast concrete tower element that conceals mechanical rooms and equipment. Deep precast concrete panels with recesses on the sides of the tower create monumental columns that filter daylight indirectly into borrowed light corridors and courtrooms.

The building earned LEED Gold certification, and energy savings of 26% are projected due to an integrated design approach that includes high efficiency heating and cooling equipment, an efficient building envelope, and LED lighting. Products and materials for which life-cycle information is available and that support environmentally, economically, and socially preferable life-cycle impacts were used and are tracked.

Outstanding Design Features Affecting O&M

- **Well-designed courtroom space.** Based on interviews with building staff, the courtrooms are considered a success, with an efficient layout, sufficient sightlines, and acoustics that support the court proceedings. Much of the success of the courtrooms was attributed to the requirement that a full-scale mockup of the courtroom. Additionally, the courtroom lighting is very good. The diffuse ceiling-mounted lighting provides plenty of light when operating at 100% lighting level. The lighting can be dimmed by the court reporter when needed. In compliance with the *U.S. Courts Design Guide*, each courtroom is divided into three independent thermal control zones, with a dedicated VAV box and independent zone thermostat in each of the judges' benches, well/jury zone, and spectator area. Interviews reported very good comfort levels and controllability in the courtrooms, and facilities operators corroborated that they do not need to pre-cool or take any unusual or added adjustment measures to maintain high client satisfaction.
- **Designed-in flexibility:** During design, it was determined that the programmatic requirements for a staff training room, a computer training room, and a general-purpose conference room offered the potential to combine these spaces into a single, larger general-purpose space, including a room separator so that the space can be subdivided if required. This approach is considered a success and recommends that sharing of programmatic areas in future designs may generally enhance a facility's flexibility and adaptability.
- **Excellent wayfinding:** Incidences of visitors becoming lost or wandering into areas where they do not belong were reported to be extremely rare. This may be attributed in part to the building layout, which is intuitive and easy to follow, and in part to the interior signage, which is well distributed and comprehensive.
- **The BAS system and operation are excellent**.

Major Issues

Landscape

- **Dysfunctional irrigation system:** The collected gray water is intended for irrigation; however, the irrigation is not functional, and the tank is empty due to pump replacements, which have been frequent for several reasons. Although the city-supplied water can be used to charge the irrigation system and bypass the cistern, the interface is difficult to use, not automated, and unfamiliar to the maintenance staff.
- **Inappropriate security gates.** The vehicle security gates are heavier than necessary for the vehicle traffic and threat level, which results in frequent maintenance of the track and rollers. The exit-lane gate from the garage has consistently malfunctioned since construction and often remains open, which poses a security concern
- **Lack of outdoor amenity space:** Amenity spaces within the secure perimeter are limited to a few picnic tables in a landscaped bed outside of the loading dock. Better siting and equipment selection that are responsive to the climate would likely improve tenant interaction with the outdoor environment.
- **Poor driveway design:** The turning radius on the incoming drive was reported to be too tight, and the distance to the card reader (relative to the nearby security bollard) was reported to be too great, leading to drivers scratching their vehicles in the effort to be close enough to use the reader. Access for trucks to the loading area was also reported to be challenging: the access lane for trucks to enter and back into the loading dock is tight.

Architecture/Interiors

- **Screening area is too small:** The screening area only has room for a single magnetometer and a single x-ray machine, and limited space for visitors to queue in case a large number arrives, or the screening process is slowed.
- **Jurors must travel though a secure corridor:** On the fifth and sixth floors, courtrooms do not permit direct access from the courtroom for the jury to the jury deliberation room. Jurors must access the jury deliberation room through the secure corridor, which requires they be escorted by security personnel. (Future designs should endeavor to maintain direct access for the jury to their deliberation room.)
- **Inadequate office supply storage space:** During design, the courts decided to combine programmatic elements to create a larger service/work room to accommodate the requirements of a kitchenette, break area, and administrative office storage. In practice, the office storage portion of this room has been insufficient and challenging to keep organized. (A separate, dedicated closet for office supplies was noted as a superior solution.)
- **Grand Jury Hearing Room inadequate:** The Grand Jury Hearing Room appears undersized and poorly accoutered for its function. It was also noted that the emergency lighting in the space does not activate. When the lights are turned off in the windowless area, the space goes dark. This may be considered a serious deficiency and a security concern.
- **Black flooring shows marks:** All black vinyl composition tile flooring is utilized in many service and amenity spaces, such as lounges and break rooms. This material tends to show the rotary

pattern left by floor buffers, and therefore the black vinyl tile floors have proven especially challenging to maintain in pristine condition.

- **Oversized ceiling tiles:** The ceiling finishes include larger than usual lay-in tiles, up to 4 feet by 4 feet. Lay-in tiles of this size are especially difficult to move, replace, or reinstall, and tend to deform over time.
- **No BIM on site.** The design for the courthouse was executed using Building Information Modeling (BIM) software. The BIM model for the facility is a deliverable typically provided to the government with the building documentation; however Government personnel reported no record of the BIM model being provided.

Mechanical

- **Doors that don't close properly:** When occupants leave through the lobby after hours, the lobby swing doors do not close behind them and positively latch and lock. This may be caused in part by air-system pressurization of the lobby, along with attempting to balance the closer strengths of the heavy doors. (A solution would be to only allow exit via revolving doors after hours.)
- **Chillers in the penthouse:** The water-cooled chillers are in the penthouse, and it is not clear how the chillers are to be replaced at end-of-life given the configuration of the penthouse and the outdoor equipment blocking the doors of the penthouse to the roof.
- **The lobby security booth is always too warm**: The lobby ceiling is about 20 feet high, and the air supply diffusers from that height do not sufficiently circulate air at the guard positions. Further, protective glass panels complicate air delivery to the guards from the ceiling or outside the booth. (A better solution would have been to provide underfloor air.)
- **Water hammer arresters in the wrong location:** Insufficient placement of water hammer arresters has caused solder joints to break. This is particularly noticeable in mechanical rooms, where the 2-inch lines are bouncing.
- **Drains too small:** Garage trench drains at the base of the downhill driveway are narrow and only have a 1-1/2-inch pipe connection, and consequently get overwhelmed in heavy rains. Floor drains inside the garage experienced backflow once to the point where the flood was 8—12 inches deep in the garage. (This may have been due to construction debris in the pipe. This is the second time this investigation team has heard this happening at a GSA building. Testing of all plumbing supply and drainage systems to design capacity should be an added commissioning activity at closeout.)

Lighting/Electrical

- **Office without access to daylight:** The USMS reception area, and most notably the receptionist's desk, are in the building interior with no access to natural light. All staff workspaces should be designed to permit either direct or indirect exposure to sunlight.

Security

- **Blind spots:** The lobby security center has several blind spots both visually and with CCTV coverage at the front door. Anyone coming from the sides of the building cannot be seen by the officers or on the monitors until they are at the front door.
- **Nonworking cameras:** Most of the CCTV cameras on the exterior of the building are either out of service or cannot zoom or move, causing a many blind spots and lack of surveillance for the facility.
- **Open gates:** The most significant security issue is the open gates into the garage during unoccupied times at night. The main entrance gate to the site has been inoperative for an extended period, waiting for parts and service. The rolling horizontal gate always remains open, including during periods when the guard shack is unoccupied. In addition, during heavy rains the vertical rolling entrance gate to the garage can't open due to the sensors located at the bottom of the gate. The sensors are affected by the water that rises at the bottom due to the inadequate drains at the gate entrance. On numerous occasions, both gates have been open during unoccupied periods at night during heavy rains.

Top Three Lessons Learned

Use detailed mock-ups, particularly for court spaces. Occupants of the Campbell FCH had many good things to say about the building they work in: The courtrooms are considered a success, with an efficient layout, sufficient sightlines, and acoustics that support court proceedings. Much of the success of the courtrooms was attributed to the requirement that a full-scale mockup of the courtroom be provided during design for review and comment by court personnel, especially the judges. The review of the mockup permitted refinements to be implemented that might not otherwise have been possible.

Insist on comprehensive and understandable design and construction documentation. The deliverables at the conclusion of the project did include the required "Building Design Standards" manual, a bound volume outlining the design intent, philosophy and methodology for the building systems including finishes, lighting, mechanical, electrical, and plumbing systems and other important features for understanding and maintaining the facility. The Campbell FCH's design manual is well organized and remarkably comprehensive and may be considered an example to be emulated and required of any large-scale capital building project.

Detail outdoor equipment for easy access and maintenance. The main roof of this courthouse benefits from elevating most of the mechanical equipment, which allows access to the roof below for repairs and reroofing. The roof incorporates modern integrated primary and overflow drain assemblies, thereby reducing the number of roof penetrations and the size of the drain sumps. The full-height base flashings at the cooling tower enclosure walls also protect the concrete structure, which reduces future maintenance concerns associated with similar exposed structures. The building's roof-mounted equipment—cooling towers, DOAS units, an air-cooled pony chiller, and extensive piping and duct services—benefits from high-quality insulation jacketing and workmanship. Additionally, the emergency generator is a self-enclosed modular unit located in a secure exterior yard adjacent to the building. When the generator needs to be replaced, this will be a straightforward procedure. Finally, as with the

other outdoor equipment, the installation details for the air-cooled chiller are high quality, including a good inertia base pad for acoustic performance, pneumatic vibration isolators, compressor jackets, and uniquely clear signage for emergency procedures.

Alexandria Bay (NY) Land Port of Entry

POE Conducted September 24-25, 2024

Snapshot

Serving more than 200,000 commercial vehicles and over 590,000 passenger vehicles per year, the Alexandria Bay Land Port of Entry, is the sixth busiest crossing for U.S.-bound commercial vehicles along the U.S. border with Canada. This two-phase, $215 million construction project began in 2017 and was completed in 2022. Compared to its predecessor, the new land port has larger queuing and secondary inspection areas, more inspection lanes, and better-defined truck queuing and maneuvering areas, and many other enhancements. The existing roadways were shifted, lengthened, or altered to accommodate the new port operations.

The new facility houses buildings for administration, primary and inspection, export control, livestock processing, and warehousing. It has seven split-level booths, canopy and inspection lanes suitable for both commercial and noncommercial primary inspection, including one over-sized commercial lane, with expansion capability for four additional lanes.

The facility, which achieved LEED Silver certification, houses the Immigration and Customs Enforcement, U.S. Customs and Border Protection, U.S. Food and Drug Administration, and USDA Animal and Plant Health Inspection Service.

Outstanding Design Features Affecting O&M

- **Well-designed lighting and controls:** The interior lighting is controlled by a combination of occupancy sensors, wall-mounted dimmers, timers and on/off controls. The dimmers work well with preset settings. The dual technology (IR and ultra-sonic) occupancy sensors appear to be well placed in hallways and large areas and are working well with immediate response to movement. Additionally, daylighting is available to most regularly occupied areas.
- **Good mechanical access:** Most of the ceiling system is a lay-in panel system in an open grid that exposes the mechanical and electrical systems above. This facilitates visual inspection and observation, particularly if tracking an above ceiling issue. The MEP systems are well labelled and easily visible through the open grid.
- **Ample storage for operations:** Housekeeping spaces with abundant storage capacity are located throughout the facility building. They are used for the storage of housing carts, equipment and dispensing cleaning materials. Central housekeeping storage accommodates bulk materials , which can be distributed as necessary.
- **Accommodation for tough winters:** The port's harsh winters dictate frequent snow clearing. Most areas of the port are accessible by plow, and there are ample locations on the site where plowed snow can be piled so that it doesn't interfere with vehicle flow. The parking garage on site is extremely popular with the building occupants, as it provides partial protection for the vehicles and occupants from inclement weather, as allows efficient access to the buildings below.

Major Issues

Site/Landscaping

- **Rocky landscaping:** To level the site in preparation for construction, blasting was used to dislodge the native stone. The process left steep embankments of unstable stone that continues to fall, at some locations near buildings or hardscape used by pedestrians. The design team chose to keep much of the rock spoils on site as a landscaping feature; however, the rock beds have proved to be problematic due to the inability to weed them. The beds are also habitat for pests such as snakes. CBP Officers are also concerned about their inability to run across the large boulders if they needed to exit the building quickly to pursue someone. (These rock beds are essentially not passable or maintainable, so the on-site staff have attempted to have them removed and needed to install concrete walkways through them post-construction to improve access to locations that require access for periodic maintenance.)
- **Confused traffic pattern:** The site has a confusing traffic pattern for both personal occupancy vehicles (POVs) and commercial occupancy vehicles (COVs). Customs and Border Patrol (CBP) now provides an escort vehicle to lead commercials vehicles to the x-ray scanner building. CBP also modified circulation further with temporary barriers to redirect POV secondary traffic to reenter the interstate and avoid crossover traffic with COV traffic. The traffic pattern creates cross overflow traffic and mixing of POVs with COVs as the COVs exit the booth lanes.
- **Architecture/Interiors**

- **Space adjacency issues:** Within the Administrative building there are space program adjacencies that create operational challenges such as interior circulation crossover between public and secure space, as well as distances between different program spaces in the buildings. For instance, to aid with a non-compliant detainee, CBP needs to pass through the waiting area and the physical obstacles of waiting room benches. Similarly, the open layout creates security issues when escorting a detainee through the administrative corridor, past CBP cubicles, and the overwatch.
- **Hard-to-read signage:** Exterior signage posted include notifications, warnings, and other clarifications and are in small text that extremely difficult or impossible to read, particularly from vehicles.

Mechanical

- **Poor plumbing planning:** There is an on-site sewage treatment plant that addresses wastewater from the facility including runoff and drainage from the animal inspection building. Reclaimed roof water runoff is collected in a cistern and used for cleaning the remote animal inspection area. Unfortunately, the drain at the livestock ramp is not connected to the sewage treatment plant and requires specialized cleaning. (3.0)
- **Oversized backup generator:** The entire facility is backed up by the standby generator. The generator was oversized which means that it cannot be tested at full load even with the on-site load bank. The location of the generator will make replacement difficult.
- **BAS issues:** The ground source heat pump (GSHP) packaged controllers control the entire system with minimal input from the BAS. This has led to short-cycling, nuisance alarms, and comfort issues. (At the time of the evaluation, automatic control had been temporarily been disabled to address the operational issues, and the facility was planning an update to the BAS to resolve these issues.) Additionally, inadequate BAS integration with the sewage treatment plant which has made it difficult to monitor the system and respond to alarms**.** Also, none of the lighting controls are connected to the BAS system, which makes remote monitoring and adjustments very difficult.
- **Mold:** The duct liner in the supply duct downstream of several air handling units has been contaminated with mold growth. Investigations have concluded that the ductwork and liner must be completed to eliminate the mold. The humidification system provided with the AHUs has been deactivated due to mold concerns.
- **Limited commissioning:** commissioning scope for the HVAC system was limited which led to many issues not being identified and corrected until after building turnover. (6.0)
- **Inadequate ventilation:** The sewage treatment equipment building is not provided with adequate ventilation and dehumidification, which has led to excessive moisture and corrosion.

Lighting/Electrical

Lack of support for proper lighting controls: O&M staff do not have training for operating the control system including changing sensitivity, dimming levels, and troubleshooting malfunctions. Additionally, the manufacturer for the exterior lighting controls has no local support networks.

Top Three Lessons Learned

Check and recheck traffic patterns for ports with the Customs and Border Patrol. Based on feedback from the staff interviewed, the port layout is not conducive to operations for this region. The radiography building required a change in entrance direction, contrary to the intended and programmed path. The commercial side exit booth is one story, and not appropriate for review of existing commercial traffic. The intended bus circulation path is also a challenge and is not used as designed. Commercial vehicles approach the administrative building and veer to the right towards COV booths with illuminated signage designating their open or closed status. Once processed, COVs are directed to proceed to reenter the interstate or to secondary inspection. Per the intent of the original design and actual constructed site, after leaving the booths vehicles would follow signage bearing to the right to circle behind the facility to the inspection yard, perform a U-turn to pass through the x-ray scanner building. If there was an issue after scanning requiring further inspection, that vehicle would need to perform a U-turn to return to the inspection yard to the COV secondary warehouse dock. This traffic pattern has issues because of the potential for a port runner, a driver not understanding the process or not understanding the circulation requirements.

The traffic pattern creates heavy cross overflow as well as requiring tight maneuvering for a U-turn in the service yard. As a partial solution to the confusing traffic pattern, CBP now provides an officer to signal vehicles to approach secondary; as necessary, escort vehicles lead the way. CBP modified circulation further with temporary barriers to redirect POV secondary traffic to reenter the interstate and avoid cross over traffic with COV traffic. It appears the solutions to resolve traffic flow issues were implemented after occupancy instead of ideally being addressed in the design process.

Commission the BAS. Improper integration of the Building Automation System with other components has led to problems across the building's mechanical and lighting systems. The ground source heat pump (GSHP) packaged controllers control the entire system with minimal input from the BAS. This has led to short-cycling, nuisance alarms, and comfort issues. (At the time of the evaluation, automatic control had been temporarily been disabled to address the operational issues, and the facility was planning an update to the BAS to resolve these issues.) Additionally, inadequate BAS integration with the sewage treatment plant which has made it difficult to monitor the system and respond to alarms**.** Also, none of the lighting controls are connected to the BAS system, which makes remote monitoring and adjustments very difficult.

Consider officer safety when planning LPOE space adjacencies. Within this facility's administrative building, there are space program adjacencies that create operational challenges such as interior circulation crossover between public and secure space, as well as long distances between different program spaces in the buildings. In additional to operational challenges, these adjacency concerns may also create safety issues. For instance, to aid with a non-compliant detainee, CBP officers need to pass through the waiting area and the physical obstacles of waiting room benches. Similarly, the open layout creates security issues when escorting a detainee through the administrative corridor, past CBP cubicles, and the overwatch. Additionally, the POV pedestrian inspection is a large open space with a seating area, processing counter, CBP workstations, offices, interview rooms and an overwatch. The seating is forward-facing towards the processing counter, and a plastic laminate countertop assembly with clear acrylic vision panels divides the space between the pedestrians and the CBP officers. The CBP sits at the

same level as the pedestrian, allowing the officer a less-than-optimal view over the space. Additionally, the clear acrylic vision panel extends approximately 12” to 18” above the counter, providing minimal protection to the CBP officer.

San Juan FBI Field Office Building

POE Conducted May 29-30, 2024

Snapshot

Located within the Federal campus in the Hato Rey neighborhood of San Juan, the FBI Field Office project is a five-story, 154,000 square-foot office building. The $89 million project, started in 2016 and completed in 2019, achieved LEED-Gold certification through sustainable features including rainwater harvesting, solar hot water heating, and photovoltaic (PV) panels.

The facility was designed to meet Interagency Security Committee (ISC) criteria for Facility Security Level FSL-IV to mitigate risks associated with acts of terrorism and crime. The result was the integration of unique, site-adapted elements into the secure perimeter barrier system. A performance-based design approached was used to engineer the building's primary frame, exterior facades, and utility-protective elements to resist blast-loading that could be caused by stationary unscreened and screened vehicle-borne IEDs and other explosive threats. The office building was hardened to resist progressive collapse, in accordance with GSA criteria. The hurricane- and blast-resistant façade features architectural precast panels constructed with white Portland cement and integral aluminum sunshade systems.

The building's special design features include:

- Secured seven-acre complex with blast-redundant building enclosure and progressive collapse
- Secured, concealed parking for FBI specialty vehicles
- Redundant mechanical infrastructure and 24/7 capability in mission-critical rooms
- Standby emergency generator set
- Sunshades on all elevations of the building
- Photovoltaic arrays atop parking canopies

Outstanding Design Features Affecting O&M

- **Well-maintained landscaping:** The landscaping on the site (both planted beds and lawn areas) is extensive and well maintained. The site conveys an appropriate balance between lawn areas and planting beds.
- **Well-designed and -appointed offices, open areas, and breakrooms:** The spacious open-office areas are arranged at the perimeter windows, so that they enjoy ample natural light and, when the window blinds are properly set, exterior views. the workstations have common configurations that include adjustable height desks for accommodating work while sitting or standing, a smaller fixed secondary work surface, low storage units, and a built-in cushioned bench seat for visitors. users report that they like the open office areas, and that the workstation layout is sufficient, well-used, and also well-liked. Additionally, the administrative office floors include open teaming areas that are easily accessed from the open office and private office areas, as well as being proximate to open lounge areas. the office areas feature both integrated breakrooms, which are on the same floor and open to the open office areas, and remote breakrooms, which are off corridors and may be shared between work areas. the former enhances the function of the teaming areas, while the latter offers a place of respite from work duties and an opportunity for staff to interact across departments. this combination of different types of work spaces and breakrooms works well and may serve as a model for other similar facilities. all the breakrooms are well accoutered with storage cabinetry, refrigerators, other appliances, and vending machines.
- **Efficient and comfortable SOC:** The building includes a Security Operations Center (SOC) that oversees and directs the security for the facility itself. SOC staff workstation size and configuration, camera access, locations, and views were all reported to be good. This room also includes a small kitchenette, an uncommon but welcome amenity. Because SOCs typically require 24/7 staffing and need to remain secure, a kitchenette for SOCs merits consideration as a programmatic standard.
- **Sustainable systems:** Rainwater harvesting and air-conditioning condensate capture use a 10,000-gallon collection above-ground cistern. Captured water is treated and used for cooling tower makeup and toilet flushing. As a retrofit project, the facility did add a public utility water connection to fill the cistern as desired during periods of low rainfall. This connection was complete with a bypass to feed the distribution during times when the cistern is out of service for maintenance. Except for the addition of a submeter, this is essentially a no-cost feature that should be provided to all installations. Additionally, the building makes use of a solar hot-water heating system. Synergistically, the amount of solar energy that is collected by the water heating

and photovoltaic panels does not become a cooling load inside the building or on parked vehicles. (6.6)

Major Issues

Landscaping/Site

- **Inadequate watering system:** Despite the tropical climate, the landscaping requires watering on a regular basis. There is no irrigation at the property, so watering is performed by hand by maintenance staff. The in-ground hose bibbs frequently break from soil and other debris washing into the control boxes during rain events. (Above-ground hose bibbs would be preferred and likely less prone to damage.)
- **Poorly controlled stormwater drainage.** Stormwater is managed by area drains throughout the hardscape. The inlets receive water from the parking lots, plazas, and walkways, then direct it to a holding tank at the east end of the site. The tank is intended to temporarily hold stormwater and then discharge it into a local canal. However, there are areas of the site where the stormwater bypasses the collection system and flows directly into the canal; this situation has resulted in extensive erosion . The area of discharge for the stormwater holding tank coincides with the area of uncontrolled stormwater, which can cause localized flooding when the amount of stormwater exceeds the capacity of the canal. Examination of the canal and holding tank discharge area is recommended to determine how to limit flooding. (Solutions may include increasing the canal flow rate and capacity downstream and locally clearing debris in the holding tank discharge areas to improve flow into the canal and holding capacity without harmful erosion.)
- **Poorly located swale:** A concrete-lined drainage swale receives stormwater runoff from the parking lots and carries it toward the canal. Unfortunately, the swale fills with trash and tree litter, inhibiting water flow. Additionally, the swale sits in a narrow gap between two secure perimeters, making it difficult to access for cleaning and maintenance.

Architecture/Interiors

- **Undersized screening space:** The Visitor Screening Facility (VSF) is generally undersized for its function, even considering the limited number of visitors expected to access the building on a typical day.
- **Lack of remote operating ability for guards:** The security guards' space does not include remote operation of the vehicle or pedestrian entrance gates; For the campus access points to be opened, VSF staff must leave the facility. Likewise, guards do not have the ability to remotely operate the door beyond the screening area, where visitors exit and access the campus. Ideally guards would be able to control when this door is operable.
- **Poor location for the interview/polygraph room:** The facility's interview/polygraph room is located next to the lobby, so noise from the lobby, as well as the operation of the door from the lobby to the building interior, reportedly tampers with polygraph results.

- **Vulnerable location for cabling:** The location for the Emergency Operations Center (EOC) necessitates extensive power and data cabling, which runs under the floor of the EOC in a depressed slab below the ground-floor level. This makes the critical infrastructure vulnerable to flooding. The EOC may be expected to be active to coordinate law enforcement response during extreme weather events, including hurricanes, and the potential vulnerability to flooding on these occasions is a noteworthy deficiency. (4.4)
- **No eyewash station in mailroom:** The mail receiving area does not include an emergency eyewash station or emergency shower, a significant deficiency.
- **No water hookup in custodial closets**: The eyewash stations in the custodial closets are portable and do not have water supplied from the building system. Since these stations are less reliable, the lack of hard piping to custodial closet eyewash stations may be considered a deficiency. (4.7)
- **Inadequate storage**: The facility has one room for dedicated O&M storage in the facility, contiguous with the O&M staff work area. Although well organized and maintained by O&M personnel, it is inadequate to store all the needed materials, and some O&M supplies need to be stored remotely. Additionally, there is one room for dedicated custodial storage, which does not accommodate all the storage requirements. Space has been allocated in the O&M storage room to accommodate the additional requirements.
- **Exterior sunshades inhibit window cleaning:** Fixed aluminum sunshades the roof, windows, and spandrels of each floor limit access to the windows or the facade for cleaning and maintenance. The sunshades preclude the use of suspended scaffolding to access the facades, and mobile personnel lifts cannot be driven on the landscaping below the facades. Therefore, window cleaning can only be performed by outside vendors using rope access. Fortunately, the sunshades are sufficiently robust to support the contractors who land on them at each level to access and clean the windows.

Structural/Envelope

- **Numerous roof leaks:** Numerous leaks were traced back to membrane damage, and given the number of leaks that occurred, a comprehensive roof assessment is warranted to determine if the insulation remains dry. Furthermore, the amount of rooftop mechanical equipment has increased worker traffic on the roof and led to increased membrane damage. Much of the mechanical equipment required supplemental catwalks and ladders for access to be installed, which has also contributed to increased roof damage. There were also an insufficient number of walk pads installed to protect the roof membrane. Given the use of the roof for mechanical equipment has increased the risk of damage and made access to the roof membrane difficult, roof replacement will likely be required early in its service life and be more difficult to execute. A roof system with a longer service life should have been considered.

Mechanical

- **CRAC units lack reheat capability:** In the primary server room, the computer room air-conditioning (CRAC) units, two equally sized redundant units, were not provided with reheat capability. The spaces often generate warnings of high humidity when the internal loads off the computer equipment are significantly less than peak design.

- **Air compressor room overheats:** The air compressor room of the garage overheats due to radiated heat from the compressor, and the compressor unit has shut down on a high-heat alarm at least once.
- **Evidence room poorly ventilated:** Although the Evidence Room has a dedicated exhaust, the supply air systems are scheduled to turn off during unoccupied office hours. This leaves the room without make-up air, and the result is that the evidence room is not properly ventilated during these off-hour periods. As the materials are only removed in conjunction with legal proceedings, this space needs to be considered 24/7. It was also noted that the entire evidence suite is not on emergency power.
- **Limited system redundancy:** Although the facility is secure, critical, and needs to be considered a remote installation in terms of the availability of local service expertise, the systems were provided with limited redundancy. There are also several logical single points of failure, further complicating and compromising operations. In the central plant, for instance, only one main chiller is connected to emergency power. There is a similar situation with the central plant pumps, and only one of the two cooling tower cells is on emergency power. Because there is a single common condenser water line from the chillers up to the towers, which allows either tower to be operated with either chiller, if the tower connected to emergency power is out-of-service—even for regular maintenance—the entire plant is non-operational.
- **Pony too far from main chillers:** The air-cooled pony chiller's remote location from the main chillers makes it impossible to use its capacity whenever one of the main chillers is operating. The pony chiller can only be used to carry 24/7 spaces through an extreme event, and the design sequence of operation confirms this strategy. As such, the pony chiller cannot supplement a main chiller to serve the building. That is a missed opportunity as that load condition exists often. Also, the pony chiller is also not large enough to supply the central DOAHUs or AHUs.
- **Unprotected rooftop air-handling-unit subcomponents.** Along with the cooling towers and supplemental air-cooled chiller, the primary air-handling systems are unprotected on the roof, exposed to the continuous coastal tropical marine environment. The project delivery team obtained a P100 waiver for this, citing project cost and space limitations as the driving factors. Several critical sub-components that are now demonstrated to not be equally durable as factory-assembled and -tested units, or are extremely difficult to field-install flawlessly, including the control valve actuators, vibration isolators, insulation and vapor barrier joints, and control device penetrations of vapor barriers.
- **Failed pipe insulation:** The insulation on the rooftop piping appears to be fully failed, and is suspected to be completely wet on the inside. Because the chilled water piping is always operating below dewpoint, not only is rain entering the split seams, but ambient air water vapor must be condensing on the piping under the insulation and accelerating the corrosion process. Where galvanizing coatings are intact, those steel members have remained protected from corrosion. Almost all other steel components are exhibiting corrosion.
- **No access chases:** Restroom wet walls do not have access chases, and there has already been one pipe rupture that resulted in major water damage to lower levels.
- **Water coolers not on emergency power:** Electric water coolers are not on emergency power in critical use areas.

Lighting/Electrical

- **Lack of task lighting:** Undercabinet and task lighting is lacking in in all areas: including open office areas, OPS, security guard areas, and food and coffee areas. Task lighting needs to be provided to assist people who require extra illumination for task visibility, especially when overhead lighting is dimmed, such as in the OPS area.
- **Flag lighting requires excess maintenance:** The in-grade recessed flag uplights have continuous water penetration and require constant replacement. These lights need to be replaced with out-of-grade lighting rated for severe weather conditions. The electrical cabling and connections need to have a moisture barrier between the cables and the soil to prevent water wicking into the luminaires.
- **No roof lighting:** No lighting was installed on the roof to light the mechanical equipment and rooftop area. Lighting for this area had to be added after occupancy, including electrical distribution and controls. Lighting must be provided for all areas where equipment is located, as maintenance may be required at any time of the night.
- **No emergency power in parts of the building:** The 1,500-kW generator and emergency power distribution does not serve significant portions of the building, although the peak building load is approximately 1,800 kW. The actual connected load is far less than the generator's capacity, which is an opportunity lost for those staff and functions not able to remain online. This has repeatedly affected tenant operations. For those systems that are connected to emergency power, there is a central UPS system that successfully carries the connected computer and control systems through the initial outage period while the generator comes online. It is very important to note that when utility power drops, the extended power feeds to the CCTV system's cameras are not maintained and manual means of surveillance are implemented until the cameras automatically restore.

Security

- **Wedge barrier issues:** The site security system's retractable wedge barriers break down relatively frequently due to water and debris collecting in the below-ground controllers and actuators. Maintenance of these barriers is challenging due to limited access and the fact that no local vendors are able to provide parts or repairs. Staff reported that there have been several accidents and near-misses because the barriers are not sequenced correctly. In some instances, the wedge barriers have raised too soon after the barrier arm gates open, or delays in the closure of the rolling gates has encouraged "piggy-backing" of vehicles entering or leaving.

Top Three Lessons Learned

Consider mechanicals and power supply as part of the hardening system for the building. The building's 1,500-kW generator and emergency power distribution does not serve significant portions of the building, although the peak building load is approximately 1,800 kW. The actual connected load is far less than the generator's capacity, which is an opportunity lost for those staff and functions not able to remain online. This has repeatedly affected tenant operations. For those systems that are connected

to emergency power, there is a central UPS system that successfully carries the connected computer and control systems through the initial outage period while the generator comes online. It is very important to note that when utility power drops, the extended power feeds to the CCTV system's cameras are not maintained and manual means of surveillance are implemented until the cameras automatically restore. Also, the electric water coolers are not on emergency power in critical use areas.

Emphasize system redundancy: Although the facility is secure, critical, and needs to be considered a remote installation in terms of the availability of local service expertise, the systems were provided with limited redundancy. There are also several logical single points of failure, further complicating and compromising operations. In the central plant, for instance, only one main chiller is connected to emergency power. There is a similar situation with the central plant pumps, and only one of the two cooling tower cells is on emergency power. Because there is a single common condenser water line from the chillers up to the towers, which allows either tower to be operated with either chiller, if the tower connected to emergency power is out-of-service—even for regular maintenance—the entire plant is non-operational.

Integrate roof and rooftop equipment protection: Unprotected rooftop air-handling-unit subcomponents. The cooling towers and supplemental air-cooled chiller, the primary air-handling systems are unprotected on the roof, exposed to the continuous coastal tropical marine environment. The project delivery team obtained a P100 waiver for this, citing project cost and space limitations as the driving factors. Several critical sub-components that are now demonstrated to not be equally durable as factory-assembled and -tested units, or are extremely difficult to field-install flawlessly, including the control valve actuators, vibration isolators, insulation and vapor barrier joints, and control device penetrations of vapor barriers. The insulation on the rooftop piping appears to be fully failed and is suspected to be completely wet on the inside. Because the chilled water piping is always operating below dewpoint, not only is rain entering the split seams, but ambient air water vapor must be condensing on the piping under the insulation and accelerating the corrosion process. Where galvanizing coatings are intact, those steel members have remained protected from corrosion. Almost all other steel components are exhibiting corrosion. Numerous leaks were traced back to roof membrane damage, and given the number of leaks that occurred, a comprehensive roof assessment is warranted to determine if the insulation remains dry. Furthermore, the amount of rooftop mechanical equipment has increased worker traffic on the roof and led to increased membrane damage. Much of the mechanical equipment required supplemental catwalks and ladders for access to be installed, which has also contributed to increased roof damage. There were also an insufficient number of walk pads installed to protect the roof membrane. Given the use of the roof for mechanical equipment has increased the risk of damage and made access to the roof membrane difficult, roof replacement will likely be required early in its service life and be more difficult to execute. A roof system with a longer service life should have been considered.

FBI Central Records Complex, Winchester, VA

POE Conducted August 21-22, 2024

Snapshot

Designed to streamline the Department of Justice's (DOJ) worldwide records management, the FBI Central Records Complex (CRC) in Winchester, VA, is a 256,000-square-foot, state-of-the-art facility that consolidates official records from 265 DOJ locations worldwide to enable the storage, retrieval, and management of mission-critical DOJ assets. The complex also includes secure, state-of-the-art Class A office space for 450 employees, a visitor screening center, operations support, and secure service areas.

The facility is operable 24/7, providing the technology and responsiveness to digitize records on-demand. The $135 million facility was initiated in 2016 and opened in 2020.

Requiring 100,000 square feet of document storage space, the record collection aspect of the project and its Automated Storage and Retrieval System (ASRS) are its central focus. Shutter doors provide fire-rated partition compliance while controlling access for the storage retrieval robots, ensuring records safety.

The project meets the facility standards for records storage as defined by the National Archives and Records Administration (NARA). Additionally, the building complies with Anti-Terrorism/ Force Protection regulations and physical security mitigation in accordance with DoD Minimum Anti-Terrorism Standards for Buildings. The project also meets GSA's stringent Design Excellence Program requirements. *

Built to the LEED Gold standard, the CRC is one of the very first projects in the country to also follow the Sustainable SITES Initiative. The design incorporated systems to utilize storm water, resilient landscaping, and ecologically-responsible protocols for interface with all of the natural resource components of the project. The archive area of the building was optimized for extremely efficient-energy consumption, as it can be kept at a constant temperature and is staffed by robots that do not require light to see, boosting the sustainability of the whole facility.

The civil design and structural system were finalized within the first six months of the project, even before the design development phase was completed. This allowed the project to move forward with facade design and accelerated delivery of the early site and construction package. By the end of the design development phase, the core and shell design were finished, and the project was well underway. This design-build model created a much more efficient process that saved time, money, and allowed closer collaboration between designers, the client, and the general contractor, enabling the entire team to stay on the same page.

Outstanding Design Features Affecting O&M

- **State-of-the-art storage and retrieval system:** The building offers an outstanding example of a state-of-the-art records storage facility, from both operational and maintenance standpoints. The ASRS is the first of its kind robotic records storage system, and the building provides a supportive environment for its successful implementation. The facility offers a very secure environment with no observable security concerns or issues. Security dictates that no internet access is allowed, which does create issues with the updating of building system operations and the notification of any system alerts after hours.
- **Ancillary spaces perform well and are well protected.** An exterior-accessed restroom next to the at-grade loading dock bay is available for delivery drivers and site maintenance personnel to use, so they do not have to go through building security. The building also houses a separate mail-screening room that is accessed only from the exterior next to the at-grade service bay. All mail and packages received are screened in the room prior to entering the building; scanners and biosafety hoods allow specialized inspections. After screening, the mail exits the room to the exterior, re-enters the building through the at-grade overhead doors, and then goes to the mailroom for distribution.
- **Ample storage space:** O&M supplies and attic stock storage space is right-sized, with a storage room adjacent to the shops on the main floor level. Additional storage is provided in the loading dock/warehouse on large open utility shelves. Housekeeping closets are appropriately sized and located throughout the building to meet the cleaning needs. There is a central storage for housekeeping supplies that is the right size for the facility. The loading dock/warehouse provides open floor storage for the larger service equipment such as floor scrubbers, floor buffers, and vacuum cleaners.

Major Issues

Site/Landscape

- **Need for irrigation:** The trees on site are struggling to grow, and some are dying due to lack of irrigation and poor soil conditions (pyritic soils). The turf is in fair condition but stressed due to lack of water. The need for some level of irrigation past the first-year establishment period should be considered using gray reclaimed water, otherwise disease and weeds will proliferate.
- **Wedge barrier frequent cycling:** Due to the concentrated use of the primary entrance, the wedge barrier at this location cycles with each car entry. This heavy amount of use has led to frequent repairs and down-time for maintenance.

Architecture/Interiors

- **Visitor processing space is too small:** The Visitor Center processes all visitors in a very small space that contains screening equipment and a guard station. When the lobby is full, individuals wait outside the building until there is space, or after post-screening, wait outside the building with their escorts once badged. There is no protection from inclement weather outside the building. Additionally, the building's main entrance and lobby dedicated for visitors is now an

open-space vestibule and room that is not utilized. Originally intended for visitor waiting and processing through a transaction window, it now simply serves as a pass-through space into the building.

- **Poor accessibility to the ASRS system storage area:** It is only accessible from above the silo stacks via a service wheelchair that rolls over the grid. A system of platform plates needs to be taken with the service wheelchair when work needs to be performed over the grid, which makes working in the space awkward, time-consuming, and difficult.

Mechanical

- **Chillers require special maintenance:** The air-cooled chillers were a relatively new design at the time of installation, and they have experienced numerous issues including frozen components, failed control boards, failed condenser fans, and other issues. One of the units was replaced under warranty; a temporary chiller needed to be brought on site while it was out of service. Maintenance of these units must be performed by a service contractor with specialized training.
- **No allowance for temperature balance:** The archival storage area is provided with redundant HVAC systems. The primary system is served by chilled water and heating water plants. The backup system is all-electric and served by the on-site generator, so it can be maintained at proper conditions during an extended power outage. A fabric duct was used for air distribution inside the archival storage area. Temperatures in the two control zones are different, and the fabric duct does not allow air balance adjustments to address this.
- **Inadequate conditioning of archival space:** The building has several areas with high ceilings and floor-to-ceiling glass. Supplemental fin-tube radiation heat was provided underneath the glass in some areas**.** Fin-tube radiation and sidewall HVAC supply grilles do not do an adequate job of conditioning the archival storage space. Additionally, the mezzanine used for maintenance of the archival storage retrieval system is not close enough to any of the air distribution, leading to uncomfortable working conditions. (6.2)
- **Only one occupancy sensor:** Terminal equipment serving multiple rooms is not only served by a single thermostat but a single occupancy sensor. This causes occupied rooms to become uncomfortable when the room with the occupancy sensor is unoccupied.
- **Excessive pressurization at door:** Excessive pressurization causes the outer door to remain open in the main entry vestibule. This may be caused by a lack of a return air path from the vestibule back into the building.
- **Scissor lift needed for routine maintenance:** A scissor lift is required to access fan-powered terminal units located above high ceilings for filter changes or other maintenance. In some cases, terminal units are located above systems furniture, which makes access difficult. This adds significant workload for building operations personnel, as the units require filter changes twice a year. (6.5)
- **Fan coil unit poorly placed:** The fan coil unit serving the uninterruptable power supply (UPS) room is located directly over the UPS equipment. Although drip pans were installed to avoid damage to equipment below, it is very difficult to access this unit for maintenance.
- **Lack of internet hampers maintenance control**. Because security protocols do not allow internet connections in the building, it has been difficult to provide updates for mechanical equipment control software. Because the security protocols do not allow internet connections, there is no way for the building automation system to alert building operators of alarms outside

of occupied hours. (Facilities personnel developed a workaround with a BAS terminal with a simplified interface located in a security office; however, this office is not manned 24/7 and relies on security personnel to place a telephone call to notify building operations personnel of any alerts.)

- **No pressuring reducing value:** Although the domestic water supply pressure is over 100 psi, no pressure reducing valve was provided on the incoming service. A pressure booster system was installed; however, it is not in use due to the high incoming pressure. There is no expansion tank on the domestic water supply, which leads to dramatic pressure fluctuations.

Lighting/Electrical

- **Luminaires in high ceilings:** The major issue with the lighting system is the luminaire locations in very high ceilings, sometimes in locations above sensitive equipment, which makes maintenance extremely difficult if not impossible.
- **Lack of task lighting:** There is a lack of undercabinet and task lighting in all areas, including the health-care area, open office areas, and food and coffee areas. Task lighting needs to be provided to assist people who require extra illumination for task visibility. This is especially important in the health care area, where counters are used to administer medications, take physical measurements, and write and read patient medical records.
- **Uninterruptable Power Supply (UPS) system not coordinated:** The UPS was initially not installed for the robot operations room, and smaller individual UPS units had to be added. UPS coordination of loads should have occurred during the design and construction phases.

Top Three Lessons Learned

Thorough commissioning pays off: Due to the sensitivity of this facility as a document storage center and archive, tolerance of uncontrolled water or air penetration was a major concern. The building enclosure was therefore commissioned to help ensure it would perform as designed and installed. The extremely comprehensive and successful commissioning process included design/pre-construction peer review, building enclosure testing of mockups both at a laboratory and in the field, construction documentation, and post-completion inspections.

Lack of full internet access hampers maintenance control. Because security protocols do not allow internet connections in the building, it has proved difficult to provide updates for mechanical equipment control software. Future projects with similar security requirements should allow equipment control software to be updated without an internet connection. Similarly, because the security protocols do not allow internet connections, there is no way for the building automation system to alert building operators of alarms outside of occupied hours. Facilities personnel developed a workaround with a BAS terminal with a simplified interface located in a security office; however, this office is not manned 24/7 and relies on security personnel to place a telephone call to notify building operations personnel of any alerts.

Integrate maintenance and access concerns when addressing security concerns: Due to the concentrated use of the primary entrance, the wedge barrier at this location cycles with each car entry. This amount of use has led to frequent repairs and down-time for maintenance. Security protocols currently do not allow the wedge barrier to stay in the down position during peak arrival times, which

would reduce the number of cycles the barriers go through. Having security barriers that are appropriately designed and manufactured for the particular use and environment is critical to avoid costly and frequent maintenance.

Likewise, the building's main entrance and visitors lobby is now an open-space vestibule and room that is not utilized. Originally intended for visitor waiting and processing through a transaction window, it now simply serves as a pass-through space into the building. The actual Visitor Center processes all visitors in a very small space that contains screening equipment and a guard station. When the lobby is full, individuals must wait outside the building until there is space, or, after post-screening, wait outside the building with their escorts once badged. There is no protection from inclement weather outside the building.