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Management Assistance Report: Building Deficiencies Identified at U.S. Embassy Kabul, Afghanistan Need Prompt Attention

MANAGEMENT ASSISTANCE REPORT

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Summary of Review

The Office of Inspector General (OIG) is finalizing an audit of the Bureau of Overseas Buildings Operations (OBO) construction and commissioning process of the New Office Annex (NOX) and Staff Diplomatic Apartment-1 (SDA-1) at Embassy Kabul, Afghanistan. Both the NOX and SDA-1 are part of a major office and residential expansion at the embassy. The purpose of this management assistance report is to prompt action to address the deficiencies identified in this report and to bring attention to weaknesses in the quality assurance (QA) process that allowed the deficiencies to go unaddressed during the construction and commissioning process.

To assist OIG auditors in evaluating whether the NOX and SDA-1 building facilities, components, and systems were constructed in accordance with contract specifications and international building code standards, OIG executed an interagency agreement with the U.S. Army Corps of Engineers (USACE) to provide technical support. Working in collaboration with USACE, OIG identified a number of ongoing deficiencies throughout the NOX and SDA-1 that, if left uncorrected, will have long-term implications for the effectiveness and efficiency of equipment and systems in both buildings. The deficiencies identified impact plumbing and electrical systems; heating, ventilation, and air conditioning (HVAC) systems; elevators; and fire-safety systems.

The deficiencies that OIG identified in the construction of the NOX and SDA-1 are due, in part, to weaknesses in OBO's oversight of this multi-million-dollar construction project. OIG found a lack of QA oversight during key phases of the project that contributed to many of the identified deficiencies. Questions remain regarding the extent to which identified deficiencies will be fully addressed under the terms of the general contractor's (Caddell Construction, Inc.) warranty, which expired 1 year after substantial completion and occupancy. The warranty for the NOX expired in June 2016 and the warranty for SDA-1 expired in January 2017. Under the terms of the contract, Caddell is responsible for addressing any identified deficiencies determined to be latent defects, gross mistakes, or fraud.[1] Ultimately, failure to adequately address these deficiencies will result in increased costs to OBO in carrying out corrective actions as well as in conducting additional medium- and long-term maintenance, repairs, and replacement in response to shortened life cycles of building equipment and systems.

OIG made 19 recommendations to OBO to address the deficiencies identified in this report. Based on OBO's actions taken and planned, OIG considers all 19 recommendations resolved pending further action. OIG will continue to monitor OBO's implementation during the audit compliance process until each recommendation is fully implemented and closed. A synopsis of OBO's response and OIG's reply follow each recommendation in the Results section of this report. OBO's response to a draft of this report is reprinted in its entirety in Appendix A.

[1] See Federal Acquisition Regulation (FAR) 52.246-21(j).

BACKGROUND

In September 2011, OBO and the Bureau of Administration contracted with Caddell to build the NOX and SDA-1 at Embassy Kabul. The NOX was designed to accommodate 917 desks, and SDA-1 was designed to accommodate 298 beds. Both buildings were part of a major office and residential expansion at the embassy. At the time of the award, Caddell already had a contract in place to build other facilities at Embassy Kabul. OBO and the Bureau of Administration modified Caddell's contract and added $222.5 million for the construction of the NOX, SDA-1, and other structures.[1] The completion date for all the construction projects at the embassy was initially set for November 2017, but a phased building schedule resulted in the NOX being substantially completed in June 2015 and SDA-1 being substantially completed in January 2016.[2] Embassy personnel began occupying the NOX in July 2015, and residents began moving into the SDA-1 apartments in February 2016.

As part of the audit work, OIG executed an interagency agreement with USACE to provide licensed, professional electricians and mechanical engineers to assist OIG auditors in evaluating whether the NOX and SDA-1 building facilities, components, and systems were constructed in accordance with contract specifications and international building code standards. The USACE team included mechanical engineers from USACE's Transatlantic Afghanistan District as well as USACE's Engineering and Construction Division. USACE also provided master electricians from Task Force Protect Our Warfighters and Electrical Resources (POWER).[3] OIG also contracted with the USACE Engineering Research and Development Center's Construction Engineering Research Laboratory in Champaign, Illinois to provide technical analysis of the closed-loop (hydronic) heating and cooling water treatment system at Embassy Kabul. USACE engineers conducted a site visit to the embassy in February 2016 and provided ongoing technical support, including an extensive review and analysis of project documentation conducted from February 2016 to December 2016.

In addition, OIG consulted with officials and personnel with first-hand knowledge of construction issues at the NOX and SDA-1. Among those officials and personnel were staff from Caddell; staff from Pacific Architects and Engineers, Inc. (PAE), Embassy Kabul's primary onsite

[1] According to Caddell, although the modification included a number of other facilities, including a warehouse expansion, perimeter walls, water tanks, and a utility building, the costs associated with the NOX and SDA-1 accounted for the majority of the $222.5-million contract modification. In total, the value of Caddell's construction contracts at Embassy Kabul is approximately $800 million. Caddell's work on the embassy include a classified office annex, two additional residential buildings, recreation and dining facilities, parking and vehicle maintenance facilities, a power plant, additions to the existing Marine Security Guard Residence, new perimeter walls, guard towers, and compound access control facilities.

[2] Substantial completion means the construction is sufficiently complete such that the facility may be used for the purpose intended. At the time a building is deemed substantially complete, only minor items remain to be completed, and it has been determined that these minor items will not interfere with occupancy.

[3] Task Force POWER in Afghanistan was created by Congress in response to the deaths of U.S. personnel in Iraq due to electrocution, as well as injuries to others due to shock. Its mission is to identify and correct electrical issues at all military facilities in Afghanistan.

operations and maintenance (O&M) contractor; staff from PMA, the consulting firm charged with commissioning the NOX and SDA-1; staff from OBO's Office of Facility Management; embassy facility managers; the embassy's fire department chief and deputy fire chief; and various OBO officials, including staff from OBO's Office of Construction Management working onsite at Embassy Kabul.

OBO's Roles and Responsibilities in Constructing New Embassy Buildings

Through its Capital Security Construction Program, the Department replaces and constructs diplomatic facilities that are intended to be safe, secure, and functional. Several offices within OBO carry out the Department's construction program.

OBO's Construction, Facility, and Security Management Directorate, Office of Construction Management (OBO/CFSM/CM) provides management oversight and onsite construction monitoring for OBO's worldwide construction program. OBO/CFSM/CM's project directors, who also serve as contracting officer's representatives (CORs), are responsible for the daily management of projects and monitor construction to ensure it meets with the approved and contracted design, scope, standards of quality, and safety requirements.[4] The project director has principal authority for ensuring that the project's scope, schedule, and budget are executed as approved by the OBO director and coordinates with other members of the core project team in Washington. The core project team—which includes the project manager, design manager, and construction executive—is charged with ensuring the quality of the project design and that the project is executed as approved and contracted.[5] For significant changes affecting scope, schedule, or budget, the project director obtains the required approvals from OBO management, with assistance from the core project team.

OBO/CFSM/CM is also responsible for managing commissioning agents—mostly third-party contractors who are subject-matter experts—responsible for observing, overseeing, and documenting the functional performance of building systems to verify that they meet the design intent and contract requirements. OBO currently works with eight different commissioning agents around the world. Three key building systems, however, do not fall under the responsibility of contracted commissioning agents but are instead directly overseen by OBO personnel. These include:

- OBO's Office of Fire Protection is responsible for testing and acceptance of fire protection and safety systems. The Office of Fire Protection conducts a range of fire-safety inspections and tests before the director of OBO can issue a certificate of occupancy and allow the newly constructed buildings to be occupied. Required inspections must be completed for fire alarms and fire detection systems, automatic sprinkler systems, fire pump systems, and emergency egress systems, among others.

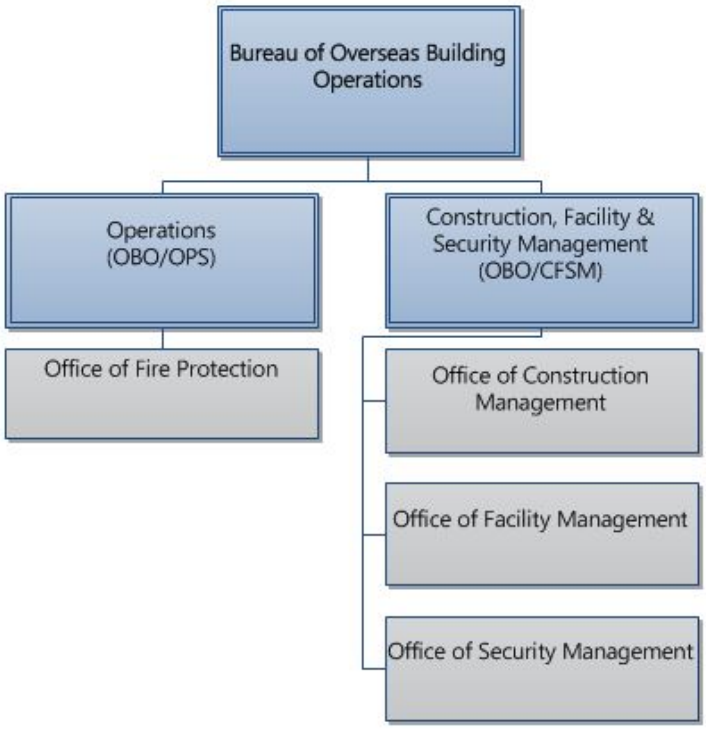
[4] Once offerors are under contract, AQM's contracting officers delegate their authority to OBO project managers during the design phase, and OBO project directors during the construction phase.
[5] "The Bureau of Overseas Buildings Operations Guide to Excellence in Diplomatic Facilities," July, 2016.

- OBO's Office of Facility Management's elevator management program is responsible for certifying vertical transportation. Program representatives are responsible for final acceptance of elevators, which includes validating equipment safety, performance, and compliance with specifications.
- OBO's Office of Security Management, in conjunction with the Bureau of Diplomatic Security, is the certification authority for all security systems.[6]

OBO's Operations Office of Facility Management oversees the day-to-day O&M needs of posts worldwide. The embassy facility managers that the office sends to overseas posts are responsible for conducting condition and maintenance inspections, developing and engineering preventative maintenance programs, and providing hands-on technical support. In addition, embassy facility managers and staff work with the OBO construction team on the transition and turnover of the newly constructed building. Specifically, once construction of a building is complete, embassy facility managers take over responsibility for operating and maintaining the building with some contractor support. Figure 1 shows some of the key offices in OBO that are responsible for carrying out the Department's construction program.

[6] "The Bureau of Overseas Buildings Operations Guide to Excellence in Diplomatic Facilities," July 2016.

Figure 1: Key Offices in OBO Responsible for the Department's Construction Program



Source: OIG generated figure based on information provided by OBO.

Construction Standards and Process

OBO's Standard Embassy Design establishes the process that OBO uses for planning, designing, and constructing the majority of its capital projects, as well as the standards that must be met to ensure new facilities are secure and functional. The Standard Embassy Design consists of a series of documents, including site and building plans, specifications, design criteria, an application manual describing its adaptation for a specific project, and contract requirements. Contract specifications, comprising 16 divisions, are incorporated into each construction project. Division 1 specifications, which prescribe the processes and procedures to be followed in carrying out a construction project, cover the following:

- Construction execution and coordination
- Project scheduling
- Construction submittals
- Contractor's quality control
- Temporary facilities and control
- Construction safety and occupational health
- Closeout procedures
- Operation and maintenance data
- Startup and commissioning
- Demonstration and training

Each of the remaining 15 divisions of the contract specifications establishes the requirements for a specific facet of the construction project, such as concrete (Division 3); doors and windows (Division 8); mechanical systems, including plumbing and HVAC (Division 15); and electrical

systems (Division 16). The contract specifications, in turn, incorporate by reference, applicable industry standards and codes, including the following:

- International Plumbing Code
- National Electrical Code (NEC)
- National Fire Protection Association (NFPA) codes
- European Standards (EN) 81 for elevators

According to OBO's "Guide to Excellence in Diplomatic Facilities," the construction process should follow an approved project execution schedule.[7] All OBO construction contracts worldwide require the contractor to update the schedule on a monthly basis as well as at key milestone dates as construction progresses. The schedule can be revised only with the approval of the OBO/CFSM/CM project director. The contract completion date is fixed and can only be changed with a contract modification.

The OBO project director must submit weekly and monthly performance reports to OBO's Office of Construction Facility and Security Management (OBO/CFSM). The weekly reports include contract information, project schedule and time elapsed, progress payments to date, modifications, photographs, milestones, OBO and contractor hours, and current construction updates and issues. Each month, the OBO project director and the site security manager jointly provide OBO/CFSM headquarters-based staff with a summary report on the general progress of construction and site security.

The OBO engineering staff must also approve submittals to ensure that they comply with the original contract drawings and specifications. Specifically, the contractor is required to provide technical submittals in order to ensure that the materials that are purchased and installed are in keeping with those specified in the design documents. Some items, such as exterior and interior finishes, are submitted as physical submittals, although other submittals may be fabrications or shop drawings. Items that differ significantly from the design documents, including proposals to use substitute materials, must be coordinated with OBO management. OBO determines the subject-matter experts needed to review each submittal, including the OBO team on the project site, the architect of record, the OBO design manager, or other OBO subject-matter experts.

According to OBO, at different points in the construction process, subject-matter experts—including architects, physical security experts, mechanical and electrical engineers, roofing experts, fire protection specialists, interior designers, and others—are responsible for inspecting the work. They evaluate the quality of the work and compliance with directives, authorized standards, and approved plans and contract specifications.

[7] Ibid.

Commissioning Process

According to OBO, the commissioning process focuses on verifying and documenting that (1) building systems were designed, built, tested, and adjusted to meet design intent and specified performance requirements; (2) U.S. Government personnel were trained in the operation and maintenance of building systems; and (3) building systems operate within the functional performance guidelines as required by the contract.[8] This description is consistent with guidelines provided by the National Conference on Building Commissioning, which similarly defines commissioning as the systematic process of assuring by verification and documentation—from the design phase to a minimum of 1 year after construction—that all facility systems perform interactively, in accordance with the design documentation and intent and with the owner's operational needs. [9] For example, a commissioning action may involve starting up and running a building's HVAC system for a set number of hours or days to ensure the system maintains a set temperature parameter throughout the building.

According to OBO, the commissioning process should address the following key objectives:

- Improving the building turnover process from contractor to operator
- Verifying that building systems perform in accordance with the design intent as required by the contract
- Reducing the need for contractor and designer call-backs
- Ensuring long-term proper operation of building equipment and systems
- Ensuring that U.S. Government operations and maintenance personnel are properly trained in the operation and maintenance of building systems

In addition, OBO's Policies and Procedures Directive on the Commissioning and Transition to Occupancy of Overseas Facilities states that most commissioning activities should be completed by the substantial completion date of the project. However, certain commissioning activities will occur after the facility is fully operational and under full load, such as seasonal equipment testing during certain times of the year and systems operational review prior to the expiration of the contractor's 1-year warranty period for the completed facility.[10]

Commissioning Agents

Commissioning agents working for OBO are third-party contractor subject-matter experts, independent from project architects and engineers. Each commissioning agent works for OBO

[8] The Bureau of Overseas Buildings Operations, Policy and Procedures Directive (P&PD CM 01) "Commissioning and Transition to Occupancy of Overseas Facilities," February 20, 2013.

[9] The National Conference on Building Commissioning is an annual event sponsored by the Building Commissioning Association and is designed to advance state-of-the-art building commissioning and the professionals who practice it.

[10] The Bureau of Overseas Buildings Operations, Policy and Procedures Directive (P&PD CM 01) "Commissioning and Transition to Occupancy of Overseas Facilities," February 20, 2013.

under an indefinite delivery, indefinite quantity (IDIQ) contract to perform commissioning services. Commissioning agents observe, oversee, and document commissioned systems' functional performance to ensure that they meet the design intent and contract requirements. Commissioning agents work independently from construction contractors and are responsible for verifying that building systems are designed, installed, and tested to operate and perform as intended.

Each commissioning agent's IDIQ contract with OBO typically covers a range of worldwide building projects and for each commissioning project, a statement of work serves to outline the commissioning agent's key commissioning responsibilities in that location.

Quality Assurance and Quality Control

Both OBO's Construction and Commissioning Guidelines and the construction contract with Caddell contain extensive guidance and requirements to ensure that OBO and the contractor take steps to verify that specified quality standards are met during the construction process. The contractor is responsible for quality control (QC), which encompasses those actions relating to overseeing the physical characteristics of the materials, systems, and services provided during a construction project and reviewing the inspection, testing, and reporting to ensure that predetermined quantitative criteria are met. OBO/CFSM/CM is responsible for quality assurance (QA), which involves monitoring the contractor's QC staff and their quality control plan to ensure that the completed buildings meet specified quality standards. The OBO/CFSM/CM project director has primary responsibility for QA. Taken together, the QA/QC program is the means by which the construction project meets an intended level of quality. QA/QC oversight is intended to verify and document that materials, equipment, and systems are installed to meet technical specifications and contract requirements. The contractor's QC manager as well as OBO staff charged with QA oversight are responsible for making sure that all material quality and installation requirements are met.

Construction Project Completion

Before residents are allowed to occupy newly constructed buildings, the Department must declare them substantially complete. The OBO/CFSM/CM project director prepares a schedule of defects (also referred to as a punch list) prior to substantial completion and updates it for final acceptance. The punch list serves as the basis for establishing and documenting items not completed in accordance with the contract documents. Typically, the project director will assemble all pertinent project information about areas of possible non-compliance from correspondence files, logs, checklists, and inspection and testing reports. The project director or staff members will also inspect all the work and record observed deviations from the contract documents. Final completion does not occur until the project director signs the certificate of final acceptance, confirming that all items on the punch list have been completed and all work is in accordance with contract requirements. The contracting officer then authorizes final payment.

Substantial Completion and Warranty Period

Substantial completion means that the facility is sufficiently complete for it to be used for its intended purpose. At the time a building is deemed substantially complete, only minor items remain to be completed, and it has been determined by the OBO project director and pertinent subject matter experts that those minor items will not interfere with occupancy and can be corrected in the time period before final acceptance. In 2008, OBO developed a Construction and Commissioning Guidebook intended to serve as a reference manual for project directors and project executives charged with carrying out the mission of constructing and commissioning safe, secure, and functional facilities.[11] The guidebook is almost 700 pages in length and includes information on a range of issues, including statutory authorities and regulations, contract relationships, cost management, project planning and design, construction and commissioning, and project completion and close-out. According to the guidelines, the contractor must notify the project director in writing that the work is substantially complete. The project director, in turn, verifies that the work is substantially complete through inspections and tests and confirms that all the required test reports, O&M deliverables, and as-built drawings have been submitted in accordance with contract requirements. The project director then furnishes the contractor a certificate of substantial completion and a list of the remaining minor unfinished items (punch list).

Following substantial completion, the Department issues the certificate of occupancy and the building becomes occupied. At this point, after the Department accepts the building from the contractor, embassy facility managers assume responsibility for upkeep of the building, including responsibility for initializing and executing the warranty provisions of the construction contract. Some problems may become evident after substantial completion, making it necessary for the facility manager to pursue the warranty provisions of the construction contract through the contractor. The warranty period is typically 1 year for the building but can last longer for certain systems and equipment. Under the terms of the warranty, the contractor is obligated to address and correct any warranty-covered issues. The NOX 1-year warranty period expired on June 22, 2016. The SDA-1 warranty period expired on January 16, 2017.

Caddell's contract specifies the closeout procedures that must be followed for all new construction projects. The specifications state that, "a warranty shall be provided per [Federal Acquisitions Regulation] FAR 52.246-21 for all facility components and systems." Under the terms of the FAR, "The contractor shall remedy at the contractor's expense any failure to conform, or any defect. In addition, the contractor shall remedy at the contractor's expense, any damage to Government-owned or controlled real or personal property, when that damage is the result of (1) The contractor's failure to conform to contract requirements; or (2) Any defect of equipment, material, workmanship, or design furnished." Although the warranty is only applicable for 1 year from the date that the Government takes possession of the facility

[11] The Bureau of Overseas Buildings Operations, Construction and Commissioning Division, "Construction and Commissioning Guidebook," July 2008.

(occupancy), the terms of the FAR also state that the warranty shall not limit the Government's rights under the Inspection and Acceptance clause of the contract with respect to latent defects, gross mistakes, or fraud.

Caddell's contract also incorporates by reference FAR 52.236-11, which provides the Government with the right to take possession or use of any completed or partially completed part of the work. Under FAR 52.236-11, the contacting officer is to provide a list of items of work remaining to be performed or corrected on those portions of the work of which the Government intends to take possession. However, the failure of the contracting officer to list any item of work shall not relieve the contractor of responsibility for complying with the terms of the contract. Under FAR 52.236-11(a), "The Government's possession or use shall not be deemed an acceptance of any work under the contract."[12]

Caddell's contract also specifies guidelines governing the "Inspection of Construction." The contract references FAR 52.246-12, which states that if, before acceptance of the entire work, the Government decides to examine already completed work by removing it or tearing it out, the contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work is found to be defective or nonconforming in any material respect, due to the fault of the contractor or its subcontractors, the contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet contract requirements, the contracting officer shall make an equitable adjustment for the additional services involved in the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.[13]

Finally, FAR 52.246-12 also states the contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price. The contractor shall promptly segregate and remove rejected material from the premises.[14]

Final Completion and Acceptance

Final completion and acceptance starts when the contractor notifies the project director in writing of the date the work will be fully complete and ready for the final inspection and any remaining testing. The project director then verifies that all tests have been completed; the contractor has addressed all items on the punch list; and the contractor has furnished all required submittals, guarantees, and releases. The project director furnishes the contracting officer with a signed certificate of final acceptance. After approval of final acceptance, the contracting officer gives the contractor a notice of final acceptance and authorizes final payment. OBO has not yet issued certificates of final acceptance or authorized final payment for

[12] See FAR 52.236-11 (a).

[13] See FAR 52.246-12 (h).

[14] See FAR 52.246-12 (f).

the NOX and SDA-1. According to OBO officials, the NOX and SDA-1 are part of Caddell's overall construction contract, which has a scheduled completion date of November 2017. As a result, final acceptance and payment for the NOX and SDA-1 will not proceed until all the facilities included in Caddell's contract are complete. Figure 2 shows the timeline of significant milestones in the construction process for the NOX and SDA-1.

Figure 2: Significant Milestones in the Construction of the NOX and SDA-1

NOX	9/2011	5/2015	6/2015	6/2015	6/2015	7/2015	6/2016
	Contract Award	Fire-Safety Certification	Diplomatic Security Completion	Substantial Completion	Start of Warranty Period	Occupancy	End of Warranty Period
SDA-1	9/2011	1/2016	1/2016	1/2016	1/2016	2/2016	1/2017

Source: OIG generated figure based on data provided by OBO.

RESULTS

Ongoing Building Deficiencies Were Not Corrected Prior to Occupancy of the NOX and SDA-1

OIG, in collaboration with USACE, identified a number of ongoing building deficiencies in the NOX and SDA-1 that affect a range of major building equipment and systems, including plumbing, electrical systems, HVAC systems, fire-safety systems, and elevators, among others. Despite concerns raised by commissioning agents, facilities managers, and personnel from PAE (the embassy's primary O&M contractor), OBO made the decision to move forward with substantial completion and occupancy of both the NOX and SDA-1 before many of these deficiencies could be fully mitigated. The deficiencies that OIG identified in the construction of the NOX and SDA-1 are due, in part, to weaknesses in OBO's oversight of this multi-million-dollar construction project. Specifically, OIG found that the lack of QA oversight during key phases of the project contributed to many of the identified deficiencies in the NOX and SDA-1. Multiple project stakeholders involved in the embassy's construction and commissioning process observed that the NOX and SDA-1 were built without sufficient OBO/CFSM oversight and, in some cases, problems were not identified until after the buildings were completed and turned over to the Facilities Management Office for preventive and emergency maintenance. The insufficient QA process may ultimately result in the need for significant repairs or replacement of equipment and may also result in the shortened life cycle of some building systems. Furthermore, any deficiencies not addressed under the terms of the warranty will become OBO's responsibility. Failure to adequately address these deficiencies will result in increased costs to OBO in carrying out corrective actions as well as in conducting additional medium- and long-term maintenance, repairs, and replacement in response to shortened life cycles of building equipment and systems.

Plumbing Systems in SDA-1 Are Not Compliant With International Plumbing Code

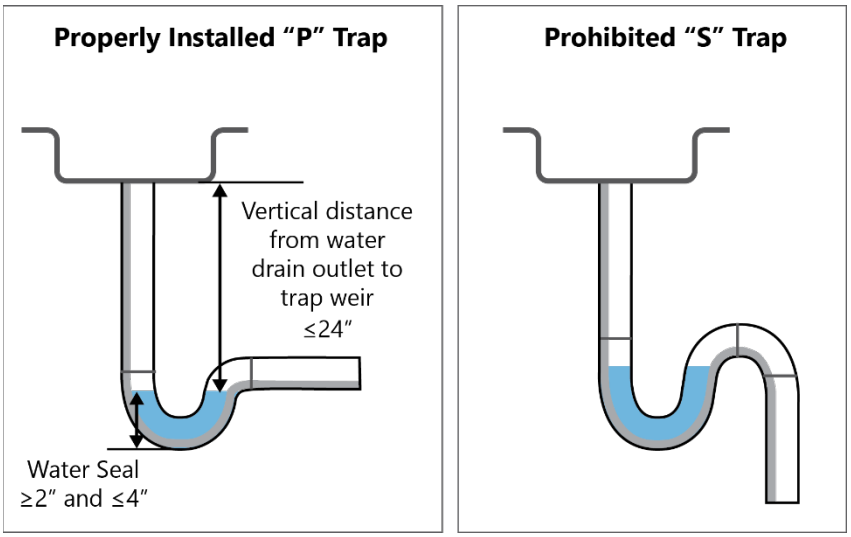
PAE, Embassy Kabul's primary onsite operations and maintenance (O&M) contractor, informed OIG that the plumbing system in SDA-1 was not installed in accordance with the terms of the construction contract or International Plumbing Code.[15] As a result, SDA-1 is experiencing slow and backed-up drains throughout the building.

Three master plumbers from PAE reviewed the integrity of plumbing systems in SDA-1 after the staff responded to multiple work orders in both common spaces and tenant apartments. Between May and August 2016, PAE staff responded to as many as 38 work orders stemming from complaints from residents about backed-up and slow tub and shower drains, odors coming from bathroom floor drains, and slow-draining, backed-up toilets. PAE staff stated that the number of work orders they have received for SDA-1 is out of proportion to other residential buildings at the embassy, which average one or two per month, and is especially unexpected in a new building.

After completing an assessment of plumbing systems, PAE reported that incorrect water-seal traps had been installed beneath fixtures in SDA-1. Specifically, they found that the contractor had installed "S" traps, rather than the more appropriate "P" traps throughout the building. USACE engineers reviewed the assessment completed by PAE and concurred that there were issues with the design and/or installation of plumbing systems. The purpose of a trap is to prevent sewer gases, and possibly vermin, from coming into the building; more specifically, when water sits in the trap, sewer gases stay out. The S traps that were used in SDA-1 do not accomplish this goal. In fact, the International Plumbing Code (Chapter 10, Section 1002.3) prohibits the use of "S" traps because they are not properly vented and have the potential to siphon water out of the trap as water flows down the drain. If enough water is siphoned out of an "S" trap, it can break the water seal and allow sewer gases to come into the residence. In contrast, on a properly installed "P" trap, there is a vent at the same place the drain turns downwards, which breaks the siphon. The vent prevents water from getting sucked out of the trap. Figure 3 compares these two types of traps.

[15] According to the contract specifications, all mechanical work must comply with the most recent version of the International Plumbing Code at the time of the contract award. Mechanical work is defined in the contract under Division 15 contract specifications. Section 15050, "Basic Mechanical Materials and Methods", Part 1.4 D. (Quality Assurance) states that all Division 15 work shall comply with the most recent version of the International Mechanical Code, the International Plumbing Code, and the International Fuel Gas Code. The 2008 International Plumbing Code was the most recent version applicable at the time of construction for SDA-1.

Figure 3: Properly Installed "P" Trap versus Prohibited "S" Trap



Source: Figure provided by PAE Consultants on August 7, 2016.

Section 901.2 of the International Plumbing Code requires that plumbing fixtures be properly vented, but the code allows for the use of a variety of methods to vent plumbing fixtures and traps. Circuit venting is one method that is widely used in the plumbing industry. The principle of circuit venting is that the flow of drainage through pipes should never exceed a half-full condition. Thus, the air for venting the fixtures circulates in the top half of the horizontal drain pipe, thereby preventing pressure differentials from affecting the connected fixtures. However, according to PAE, the use of "S" traps in SDA-1 means that plumbing fixtures throughout the building routinely exceed the half-full condition, causing improper drainage and backed-up drains throughout the building. When plumbing systems are not properly vented, a number of problems can occur, including the following:

- The fixture without a vent may drain slowly.
- The drain will also likely make gurgling noises.
- The water in a trap could siphon out, resulting in a potential sewer smell.
- Odors are emitted from an unsealed trap.

These problems that are commonly associated with improper venting are consistent with the problems that PAE has observed in SDA-1. Further, according to PAE, sewer gas seeping into apartments is not just malodorous; it also contains methane, which in sufficient quantities can explode. It may also contain pathogens that can cause illness.

In conjunction with embassy facility managers, PAE staff reported the identified plumbing deficiencies, including issues related to the multiple work orders submitted between May and August 2016, to Caddell so that they could be addressed under the terms of the existing warranty for the building, which expired on January 16, 2017. According to PAE and embassy facilities personnel, if Caddell does not correct these plumbing problems now, OBO will continue to incur significant labor and material costs to correct them in the future. According to USACE, the long-

term solution would be to commission an independent evaluation of the steps that would be required to achieve a functional and code-compliant waste and vent plumbing drainage system throughout SDA-1 and then to proceed with appropriate corrective measures. The plumbing issues were discussed in the 11-month warranty meeting for SDA-1 which was held on January 10–11, 2017.[16]

Caddell acknowledged that not all plumbing fixtures had been installed according to code. However, they disagreed with the number of plumbing issues reported. During the meeting, embassy facility managers discussed the difficulties with maintenance and the increase in plumbing-related work orders. A number of possible strategies regarding how to address the identified deficiencies were discussed. Caddell estimated that a fix would take as long as 9 months and may require residents to vacate their apartments while necessary repairs and renovations are executed. OBO concluded that the plumbing installation was subject to "poor interpretation and execution of the plumbing code." Despite its acknowledgement that not all plumbing fixtures had been installed according to code, Caddell maintained that OBO engineers responsible for QA signed off on the installation.

OBO concluded that "failure in quality control is evident" and that the current as-built condition is not compliant and is unacceptable to OBO. In a follow-up meeting, OBO reported that plumbing deficiencies in SDA-1 will be addressed through a phased plan to identify and address all plumbing deficiencies. According to OBO, the plan will include a total of seven phases and will take approximately 8 months to implement. However, the plan does not explicitly state that Caddell will be held responsible for addressing all identified deficiencies but notes that in phase 4 of the plan, a meeting will be held with stakeholders to determine responsibility for resolving the identified issues. Although OBO stated that some issues may be design errors, which would not be Caddell's responsibility, it also indicated that Caddell will be held responsible for any installation mistakes. However, if these repairs are not conducted under the terms of Caddell's 1-year warranty, the costs to OBO could be significant.

Recommendation 1: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the installation of plumbing systems conduct a full inspection, analysis, and recommissioning of waste and vent plumbing systems in the Staff Diplomatic Apartment-1. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response: OBO concurred with the recommendation, stating that it had informed Caddell that "any construction not in compliance with the contract must be mitigated at its expense." According to OBO, a senior mechanical engineer from OBO in Washington

[16] According to contract specifications 01771, "Closeout Procedures," the construction contractor's warranty agent must participate in an onsite warranty meeting between 8 and 11 months after substantial completion. The warranty agent shall review identified warranty-related items with the project director/COR, PAE staff, and OBO's commissioning agent. The warranty agent will use the meeting to identify those items that should be addressed under the terms of the warranty or the original construction contract.

"reviewed all submittals, plans, specifications, installation methods, and materials, and determined that the identified plumbing issues are not throughout SDA-1 and will not necessarily lead to maintenance problems." However, OBO stated that "Caddell will mitigate any issues that arise regarding waste and vent plumbing systems at its expense."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken to inspect the waste and vent plumbing systems in SDA-1, OIG considers this recommendation resolved, pending further action. Although OBO has stated that the identified plumbing issues will not necessarily lead to maintenance problems, OBO officials working onsite in Kabul have previously acknowledged the impact of the plumbing problems in SDA-1, including the "difficulties in maintenance and the growing increase in work orders." As a result, OIG will continue to monitor the steps OBO has taken to address this recommendation. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has completed a full inspection and analysis of waste and vent plumbing systems in SDA-1.

Recommendation 2: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all plumbing installations in the Staff Diplomatic Apartment-1 found not to conform to the contract requirements.

OBO Response: OBO concurred with the recommendation, stating that it had informed Caddell that "any construction not in compliance with the contract must be mitigated at its expense."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken and planned, OIG considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has completed actions to correct all plumbing installations in SDA-1 in accordance with contract requirements. This documentation should include detailed information on implementation of the phased plan OBO stated would be used to address all identified plumbing deficiencies, including milestones indicating when each of the phases was completed as well as the actions taken to correct plumbing installations.

Electrical System Deficiencies throughout the NOX and SDA-1 Could Result in Equipment Failures and Hazardous Conditions

Under OIG's direction, USACE's master electricians from Task Force POWER observed and documented a range of electrical system deficiencies during a 10-day inspection of the NOX and SDA-1 in February 2016. These deficiencies were attributed to poor workmanship and the installation of incorrect electrical materials throughout both the NOX and SDA-1. The construction contract specifications state that all electrical systems must be installed in accordance with NEC requirements, and many of the identified deficiencies represent NEC violations. According to Task Force POWER, left unresolved, many of these deficiencies could worsen over time and damage electrical systems and equipment. In some cases, the deficiencies may also result in potential health or safety hazards, depending on the severity of the failure.

With Task Force POWER's technical support, OIG issued a Management Alert in April 2016 identifying safety risks to occupants of the NOX and SDA-1 due to a type of hazardous electrical current known as objectionable current.[17] In addition to objectionable current, Task Force POWER also identified a number of other deficiencies impacting the electrical system, which are described in the following sections.

Improper Identification of Grounding Conductors

In multiple locations throughout the NOX and SDA-1, USACE identified equipment grounding conductors that were not properly identified and labeled in accordance with the NEC. NEC 2008 Article 250.119 states that individually covered or insulated equipment grounding conductors must have a continuous outer finish that is either green or green with one or more yellow stripes. This is important because the improper identification of the grounding conductor could result in the conductor being mistaken for a phased conductor (a "hot" conductor with current running on it). Improper identification of grounding conductors can result in maintenance mistakes or even electric shock if maintenance workers mistake a hot conductor for a grounded conductor. Nevertheless, USACE identified instances, as shown in Figure 4, when black conductors were used as equipment grounding conductors and were labeled with a single piece of green tape.

Figure 4: Improper black conductor in NOX labeled with small piece of green tape.
Source: Photo taken by Task Force POWER on February 15, 2016, and verified by OIG on November 1, 2016.

[17] *Management Alert: Hazardous Electrical Current in Office and Residential Buildings Presents Life, Health, and Safety Risks at U.S. Embassy Kabul, Afghanistan* (AUD-MERO-16-01, April 2016).

Improper Terminations and Connections

In multiple locations in the NOX and SDA-1, Task Force POWER identified electrical terminations and connections that did not meet the requirements in NEC 2008 Article 110.14 (A), including the following:

- Mechanical lugs with loose terminations to equipment grounding bus bars[18]
- Two conductors terminated in one port
- Improper terminations to circuit breakers
- Loose equipment grounding conductor connections

In some instances, Task Force POWER identified loose connections between conductors and terminal parts, which can result in an inadequate electrical connection. In other instances, Task Force POWER found that multiple conductors were connected under a termination designed for a single wire. This could result in the termination not achieving the proper torque required to ensure a sound connection. Without a sound connection, the circuit may not function as it should during a fault condition.

In addition, Task Force POWER found multiple instances of loose connections on terminals, lugs, bonding bushings, conduit, and conductors on both small and large conductors. According to NEC 2008 Article 300.11, loose conductors do not have the ability to carry amperage back to the source, which can cause equipment to overheat. Moreover, loose conductors may allow amperage to remain on the metal. Because there is normal voltage associated with the amperage, loose conductors also raise the risk of shock or electrocution.

Damaged Equipment

Despite the fact that both the NOX and SDA-1 are newly constructed buildings, Task Force POWER identified multiple instances of damaged electrical equipment, including a broken anchor on the support rack for the NOX rooftop chiller and multiple instances of circuit breakers with damaged or missing parts. According to NEC 2008 Article 110.12 (B), in order to function properly, all electrical equipment must be free of damaged, deteriorated, broken, corrosive, or cut parts.

Other Examples of Substandard Electrical Work

In the course of its inspection, Task Force POWER identified a range of other examples of substandard electrical work and NEC violations, including the following:

[18] In electrical power distribution, a bus bar is a metallic strip or bar, typically housed inside switchgear, panel boards, and enclosures for local high-current power distribution.

Junction Box Suspended from the Ceiling is Not Secured Properly

As shown in Figure 5, USACE electricians found multiple locations where junction boxes suspended from the ceiling were not secured properly. According to NEC 2008 Article 300.11, raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place.

Figure 5: Junction box suspended from the ceiling is not secured properly.
Source: Photo taken by Task Force POWER on February 21, 2016.

Improper Outdoor Electrical Installations

In multiple locations in the NOX and SDA-1, Task Force POWER identified instances of conduit not rated for wet locations that were nonetheless installed outdoors and without proper weatherproof fittings. As stated in NEC 2008 Article 314.15 and 406.8(B)(2), a receptacle installed in a wet location must have an enclosure that is listed for use in a wet location or that is weatherproof. Failure to properly protect receptacles during wet weather may result in connected devices experiencing a trip fault or maintenance personnel receiving an electrical shock. Figure 6 shows an unattended plugged-in device without a waterproof enclosure.

Figure 6: Unattended, plugged-in device without a waterproof enclosure in SDA-1.
Source: Photo taken by Task Force POWER on February 22, 2016, and verified by OIG on November 1, 2016.

Conductors Not Protected From Abrasion

According to NEC 2008 Article 300.4(G), where raceways contain 4 AWG, or larger, insulated circuit conductors and these conductors enter a cabinet, box, enclosure, or raceway (an enclosed

channel), the conductors must be protected by a substantial fitting that provides a smoothly rounded insulating surface. Otherwise, when it is pulled over the sharp edges of an unprotected connector, the conductor may be damaged, possibly resulting in a catastrophic short circuit or equipment failure. As shown in Figure 7, Task Force POWER found that not all conductors were protected from abrasion where they pass through metal.

Figure 7: Unprotected raceways in NOX.
Source: Photo taken by Task Force POWER on February 19, 2016, and verified by OIG on November 1, 2016.

Inadequate Access to Equipment

In multiple locations in the NOX and SDA-1, electrical equipment does not have adequate work space for maintenance. NEC 2008 Articles 110.32 and 110.26 require that all doors and hinged panels be able to open to at least a 90-degree angle and that sufficient access and working space be provided and maintained around all electrical equipment to permit ready and safe O&M of such equipment. Figure 8 shows an obstructed electrical panel on the NOX rooftop.

Figure 8: Obstructed electrical panel on NOX rooftop.
Source: Photo taken by Task Force POWER on February 19, 2016, and verified by OIG on November 1, 2016.

Use of Non-Conductive Coatings

Task Force POWER found that non-conductive coatings (such as paint) were present on equipment. According to NEC 2008 Article 250.12, non-conductive coatings on equipment to be grounded must be removed to ensure good electrical connectivity. If non-conductive coatings are not removed from the equipment prior to installation of bonding clamps to pipes, good electrical connectivity is compromised.

Figure 9: Paint compromises electrical connection with bonding clamp.
Source: Photo taken by Task Force POWER on February 15, 2016, and verified by OIG on November 1, 2016.

Recommendation 3: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the installation of electrical systems conduct a full inspection, analysis, and recommissioning of electrical systems in both the New Office Annex and Staff Diplomatic Apartment-1. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response: OBO concurred with the recommendation, stating that its electrical engineers reviewed all submittals, plans, specifications of the project, installation methods and materials, and determined the electrical installations were installed per the contract requirements.

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken to assess the electrical systems in both the NOX and SDA-1, OIG considers this recommendation resolved, pending further action. Although OBO has stated that electrical engineers determined that all electrical installations were installed per the contract requirements, OBO officials acknowledged some of the examples of improper electrical

installations highlighted in this report during OIG's exit conference, which was held on April 19, 2017, to discuss the audit findings presented in this report. As a result, OIG will continue to monitor the steps OBO has taken to address this recommendation. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has conducted a full inspection and analysis of electrical systems in both the NOX and SDA-1 since receiving this report from OIG.

Recommendation 4: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all electrical system installations in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements.

OBO Response: OBO concurred with the recommendation, stating that it had informed Caddell that "any installations not in compliance with the contract must be mitigated at its expense."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions planned, OIG considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has completed actions to correct all electrical system installations in the NOX and SDA-1 in accordance with contract requirements.

Heating, Ventilation, and Air Conditioning System Deficiencies Could Degrade System Performance and Damage Equipment in the NOX and SDA-1

In February 2016, a USACE mechanical engineer, serving as a subject-matter expert for OIG, conducted a 7-day onsite inspection of the HVAC systems in the NOX and SDA-1 after each building had been certified as substantially complete and approved for occupancy. In addition, engineers from the USACE Engineering Research and Development Center's Construction Engineering Research Laboratory analyzed the treatment of the hydronic heating and cooling water systems in the NOX and SDA-1. Those engineers reviewed documentation, including, but not limited to, periodic testing data on treated hydronic heating and cooling water, potable water testing data, mechanical drawings of the facility, relevant email communications, contract specifications, and information regarding the chemical treatment currently in use. USACE observed and documented a range of HVAC deficiencies, including improper monitoring and maintenance of the closed-loop hydronic water system and poor workmanship affecting the installation of HVAC systems in both the NOX and SDA-1. Many of these deficiencies can affect the efficiency of HVAC systems and, in some cases, may damage equipment over the long term.

Use of Unauthorized Chemicals and Improper Monitoring of Closed-Loop Hydronic Water System

In large commercial buildings such as the NOX and SDA-1, the HVAC systems use hydronic piping systems. In hydronic systems, water is circulated in a chilled and hot water loop that is used to provide heating and air conditioning. These systems rely on the use of chemical stabilizers

added to the water to inhibit corrosion, prevent freezing of the water in the system, increase the boiling point of water in the system, inhibit the growth of mold and bacteria, and allow for the detection of potential leaks. USACE found that the hydronic water systems were not properly monitored and were not maintained within parameters outlined in contract specifications, which can result in damage to the pipes and equipment over time.

Unauthorized Use of Nitrites

Although Section 15189 of the mechanical contract specifications (Division 15) requires the use of molybdates to stabilize the HVAC water in the NOX and SDA-1, Caddell instead used nitrites as chemical stabilizers in the closed-loop water system. After consulting with its own technical experts in the United States, Caddell provided OBO with a submittal outlining the formula it planned to use for the chemical stabilizers in the hydronic water system but failed to comply with contract requirements regarding the use of substitutions. Specifically, Caddell did not highlight the fact that it planned to substitute nitrites for molybdates in its submittal to OBO, which was a change from the original contract specifications. Specification 01331 governing construction submittals states that proposals for substitutions of materials or products required by the contract specifications must include a written, specific description of each proposed substitution, along with a justification for the substitution. OBO approved the submittal, even though the planned use of nitrites as an exception to the original contract specifications was not explicitly noted in the submittal.

According to USACE engineers, molybdates are classified as an anodic, oxidizing inhibitor. Molybdates work in conjunction with oxygen to form a protective oxide layer on ferrous metals (for example, on steel piping). According to OBO's environmental specialist, OBO required the use of molybdates rather than nitrites in the hydronic water system in Kabul because molybdates, though more expensive than nitrites, are easier to use. Specifically, the use of nitrites requires an experienced technician to test and maintain the proper balance of chemicals. According to OBO's environmental specialist, it is difficult to ensure the availability of an experienced technician in Kabul because security concerns in Afghanistan limit the number of staff that can be easily moved in and out of the embassy.

In addition to requiring the use of molybdates, Section 15189 of the contract specifications identifies additional parameters for HVAC water treatment. The specifications state that water quality for HVAC systems should be maintained to control corrosion and the build-up of scale and biological growth in order to ensure the maximum efficiency of installed equipment without posing a hazard to operating personnel or the environment. The specifications define the allowable range for the pH of the water and the required levels of molybdates that should be maintained (in terms of parts per million).[19] However, since the NOX closed-loop water system came online in December 2014 and the SDA-1 came online in August 2015, the chemical

[19] The specifications state that the system must be maintained to be essentially free of scale, corrosion, and fouling in order to sustain a pH of 7.0 to 10.0, a chilled water corrosion inhibitor of between 50 and 100 parts per million as molybdate, and hot water corrosion inhibitor between 100 and 150 parts per million as molybdate.

composition of the water in both systems has consistently been out of balance and outside of manufacturer and contract-specified parameters.

Tests conducted in May 2015 revealed excessive pH levels, alkalinity levels that were far greater than what they should have been, and total dissolved solids that were almost triple what they should have been. Failure to maintain water levels within specified ranges can result in corrosion of the hydronic piping, which can ultimately damage the hydronic water system over the long term. As of September 2016, according to OBO, the hydronic water chemistry was still not within proper ranges. USACE concluded that the execution of the water treatment program at the NOX and SDA-1 did not meet the parameters outlined in the contract specifications.

USACE agreed that a new treatment containing nitrites and tolytriazole that was introduced in the NOX by Caddell in August 2016 (though not yet introduced in SDA-1) provided a viable means to meet the required operating pH level. However, USACE raised concerns that the new formula might cause sodium tolytriazole, which is a copper corrosion inhibitor, to fall below recommended levels. These lower levels might not be sufficient to effectively protect copper piping in accordance with industry best practices. USACE further noted that the original contract specifications did not specify a concentration for sodium tolytriazole.

Improper Monitoring of Closed-Loop Hydronic Water System

USACE also noted that periodic testing of the hydronic water systems by Caddell was irregular and that results were often reported with too little detail or else disregarded entirely. Quarterly QA testing by an external laboratory would have detected the pH problem early on, but this testing was performed only once, 6 months after startup. USACE also noted that the hydronic water systems in the NOX and SDA-1 should have had copper and steel corrosion coupons installed in the test loop upon startup and that these coupons should have been tested and replaced every 3 months.[20] The USACE team concluded that "predictions concerning the likelihood of copper corrosion and life expectancy impact therefore cannot be quantitatively verified without removing and analyzing samples from the existing copper pipe system because no corrosion coupons were installed during the high pH period of December 2014–October 2015," in accordance with contract specification and industry best practices.

Other Examples of Poor Workmanship

OIG and USACE mechanical engineers also found numerous other examples of poor workmanship throughout the NOX and SDA-1 affecting HVAC systems, including piping and equipment configurations that are not installed correctly or that do not permit adequate access for maintenance.

[20] Corrosion coupons are pieces of metal that are available in various shapes, sizes, and materials. They are composed of the same materials (metals) as the equipment to be monitored (in this case, hydronic water piping). A weighed sample (coupon) of the metal or alloy in question is introduced into the hydronic water system and later removed after a pre-determined time interval. The coupon is then cleaned of all corrosion and re-weighed. The weight loss is then converted to a corrosion rate as a means of determining the impact of corrosion on the metal in question.

Improper Placement of Chilled Water Line on the NOX Roof

The chilled water supply pipe on the rooftop of the NOX is placed too close to the chiller, restricting access to the compressors for maintenance. The main chiller supply line is installed roughly 18 inches in front of the compressor access panels. The manufacturer recommends a clearance of 42 inches, and the contract drawings show that the supply line should have been installed 50 inches from the chiller. As a result of the installation, access to the compressors for O&M is significantly impaired. As shown in Figure 10, the supply line runs the entire length of the chiller, making it difficult to access the compressors for repair or maintenance.

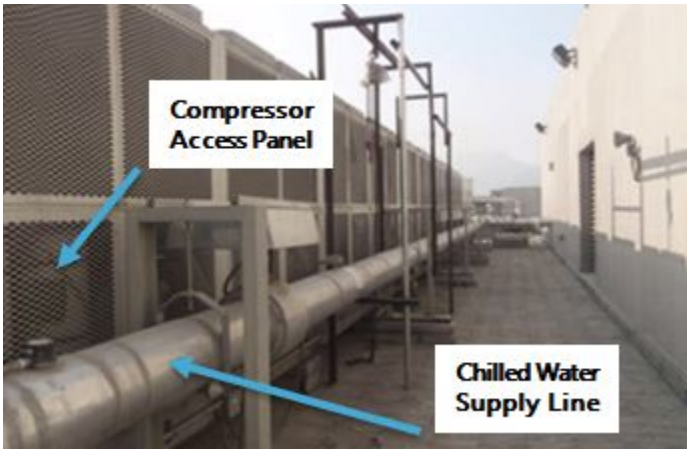


Figure 10: Chilled water line on NOX rooftop.
Source: Photo taken by USACE on February 15, 2016, and verified by OIG on April 9, 2017.

Insufficient Clearance around Boiler in the 7th Floor Mechanical Room of the NOX

The hot water unit heater in the mechanical room on the 7th floor of the NOX is installed too close to boiler box 7-2. Contract drawings show the boiler should have adequate clearance on all sides to allow for routine maintenance. However, as shown in Figure 11, access to the boiler is obstructed by the placement of the unit heater.

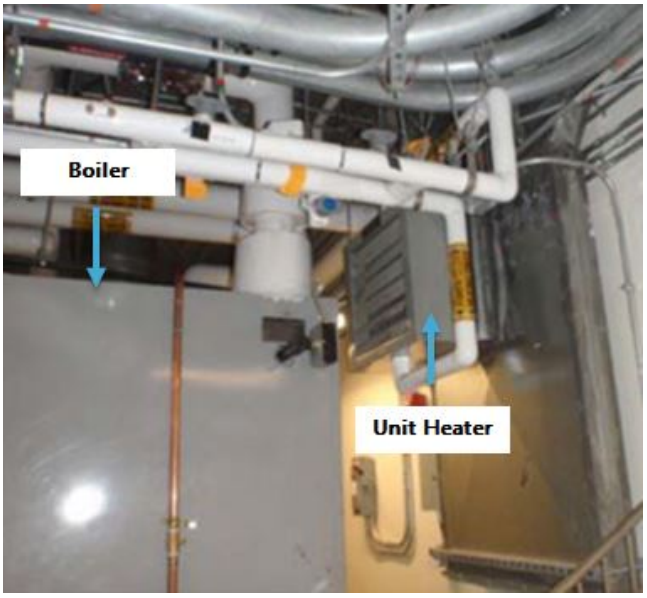


Figure 11: Boiler in 7th floor mechanical room of the NOX.
Source: Photo taken by USACE on February 15, 2016, and verified by OIG on April 9, 2017.

Inconsistent Use of Dielectric Fittings

OIG found that dielectric fittings were not installed consistently throughout the NOX and SDA-1. Division 15 of the contract specifications requires that dielectric fittings be used to connect piping materials made of different metals. Typically, in a dielectric fitting, a non-conducting washer, usually made of rubber, prevents two dissimilar metals from interacting and helps to prevent accelerated corrosion. USACE and OIG found that dielectric fittings were used as required by the contract specifications in some cases, but not in others. Figure 12 shows piping used in HVAC systems in SDA-1 with no dielectric fittings between black iron and brass connections.

Figure 12: Piping used in HVAC systems in SDA-1 installed without dielectric fittings.
Source: Photo taken by OIG on May 2, 2017.

Elevated Air Temperature in SDA-1 Boiler Room

According to PAE, the air temperature in the boiler room in SDA-1 consistently exceeds 100 degrees Fahrenheit. Industry experts state that temperatures higher than 80 degrees Fahrenheit are not consistent with standard engineering practice and may compromise boiler efficiency. While the equipment in the boiler room is currently functioning properly, the elevated air temperatures in the boiler room may result in shortened life-cycles of the equipment over the long term.

Figure 13: Thermostat in SDA-1 boiler room displaying temperature of 38.8° Celsius (101.8° Fahrenheit).
Source: Photo taken by OIG on May 2, 2017.

Improper Pipe Hanger Installation

Both the NOX and SDA-1 rooftop mechanical equipment rooms have numerous improperly installed pipe hangers. USACE observed pipe hangers, such as the one shown in Figure 14, that are very loose and can be moved by hand. (USACE only inspected exposed piping but, because of the extensive amount of piping installed in the buildings, surmised that it is likely that non-exposed pipes may also have the same deficiency.) These improper installations create serious risks to life, health, and safety because of the high probability of significant seismic events occurring in Kabul. Even without a seismic event, it is possible that overloaded pipe hangers could eventually fail. This could lead to pipes breaking and releasing 160–180°F water from the hot water hydronic system.

Figure 14: Improper pipe hanger installation.
Source: Photo taken by USACE on February 20, 2016, and verified by OIG on November 1, 2016.

Recommendation 5: OIG recommends that, prior to issuing the certificate of final acceptance for the New Office Annex and Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations establish guidance for hydronic water systems in both buildings, including specifying recommended concentrations of tolytriazole (40–50 parts per million) and nitrite (600–1,000 parts per million).

OBO Response: OBO concurred with the recommendation, stating that its facilities staff has "been engaged on this issue since before the buildings were turned over to [p]ost. OBO stated that the issues impacting the hydronic water treatment systems "are primarily due" to the limited "availability of the necessary chemicals in the local market in Afghanistan," as well

as the fact that "[i]mporting chemicals into the country is problematic." OBO stated that it and post "have identified sources for obtaining the proper chemicals and believe that this will resolve the issue." Finally, according to OBO, Kabul facilities personnel "conduct weekly testing of the water systems and found them to be within parameters."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken and planned, OIG considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has established guidance for hydronic water systems in both the NOX and SDA-1 that includes recommended concentrations of tolytriazole and nitrite.

Recommendation 6: OIG recommends that, prior to issuing the certificate of final acceptance for the New Office Annex and Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations require Caddell to conduct an examination of existing copper pipe in both buildings by removing samples of the piping or by ultrasound testing and submit the results for independent laboratory analysis to verify whether scaling, corrosion, or other life-expectancy impacts are detected from the high pH operating conditions.

OBO Response: OBO concurred with the recommendation, stating that it is requiring Caddell to "conduct an examination of existing copper pipe in the NOX and SDA-1." According to OBO, corrosion coupon racks are being used to monitor corrosion and scaling issues, and, when needed, "these corrosion coupons will be submitted for laboratory analysis, in accordance with OBO Facilities worldwide water treatment program." OBO stated that the "initial set of corrosion coupons analyzed showed nominal amounts of corrosion, which is normal and not system adverse."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken and planned, OIG considers this recommendation resolved, pending further action. However, corrosion coupons only show damage that occurs during the time period in which they are installed and are not sufficient to detect damage to hydronic piping that may have occurred in the past. This is why OIG's recommendation specifically provided that the examination should be conducted by removing samples of the piping or by ultrasound testing. This recommendation will be closed when OIG receives and accepts documentation that OBO has completed a full examination of existing copper pipe in the NOX and SDA-1 using one of these methods, including having an independent laboratory conduct analysis to verify whether scaling, corrosion, or other life-expectancy impacts are present due to the high pH operating conditions between December 2014 and October 2015.

Recommendation 7: OIG recommends that if the independent laboratory analysis verifies the existence of pipe scaling or corrosion in the New Office Annex or Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations implement actions to remedy any damage to hydronic pipes.

OBO Response: OBO concurred with the recommendation, stating that "[l]aboratory analysis of corrosion coupons indicated that the corrosion was nominal." OBO stated that it will continue the testing regimen "to monitor and prevent any damage to the hydronic pipes."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken and planned, OIG considers this recommendation resolved, pending further action. However, as previously discussed in relation to Recommendation 6, reliance on corrosion coupons alone is insufficient to detect prior damage to hydronic piping. It is therefore imperative that OBO either remove samples of the piping or conduct ultrasound testing in order to verify whether there is scaling, corrosion, or other life-expectancy impacts. This recommendation will be closed when OIG receives and accepts documentation demonstrating that an independent laboratory has reviewed samples of the piping or the results of ultrasound testing to determine whether pipe scaling or corrosion has occurred in the NOX and SDA-1 and actions have been completed to remedy any identified damage to the hydronic pipes.

Recommendation 8: OIG recommends that the Bureau of Overseas Buildings Operations develop and implement protocols to verify that its water treatment programs are in compliance with industry best practices, including (a) determining the best possible treatment to effectively protect copper piping, (b) conducting regular testing based on the specialized requirements of each system, (c) conducting quarterly quality-assurance testing performed by an independent industrial water treatment lab, and (d) installing a corrosion testing system.

OBO Response: OBO concurred with the recommendation, stating that "if OIG requires further information on OBO Facilities' worldwide corrosion treatment program, OBO will provide a full briefing."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions planned, OIG considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO's worldwide corrosion treatment program complies with industry best practices, including determining the best possible treatments to protect copper piping and requiring regular testing of hydronic water systems.

Recommendation 9: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified technician conduct an inspection of the New Office Annex and Staff Diplomatic Apartment-1 to identify poor workmanship and incorrect installations affecting heating, ventilation, and air conditioning systems. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response: OBO concurred with the recommendation, stating that "Caddell has qualified professionals on site in Kabul . . . with frequent oversight by qualified professionals from OBO-Washington. In this case, OBO professionals reviewed all submittals, plans,

specifications of the project, as well as all installation methods and materials, and determined that the installations were installed per the contract." OBO further stated that, at the time of the OIG inspection (conducted by USACE engineers in February 2016), "there were many punch list items left to be completed, and any installations that did not comply with the contract were brought to Caddell's attention for mitigation at its expense."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken, OIG considers this recommendation resolved, pending further action. Although OBO has stated that OBO professionals determined that all HVAC installations were installed per the contract, several of the examples highlighted in this report, including the inconsistent use of dielectric fittings and the elevated temperature in the SDA-1 boiler room, remained unaddressed as of April 2017. As a result, OIG will continue to monitor the steps OBO has taken to address this recommendation. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has completed a full inspection and analysis of heating, ventilation, and air conditioning systems to identify poor workmanship and incorrect installations in the NOX and SDA-1 since receiving this report from OIG.

Recommendation 10: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to correct all heating, ventilation, and air conditioning system installations in the New Office Annex and Staff Diplomatic Apartment-1 that do not conform to the contract requirements, including the specific examples OIG cited in this report.

OBO Response: OBO concurred with the recommendation, stating that it "has informed Caddell that any installations not in compliance with the contract must be mitigated at its expense." OBO also commented on several of the examples cited in this report. First, while OBO concurred that the placement of the chilled water supply line on the rooftop of the NOX is "not optimal," it stated that relocating the chilled water line would require shutting down the system and would be disruptive. "The current placement meets code and manufacturer's requirements for minimum clearances." Second, OBO stated that it had verified that the heater was not obstructing the boiler's access panel on the seventh floor NOX mechanical room. Third, with respect to improper use of galvanized pipe fittings, "[i]f there are examples of dissimilar metals without dielectric unions, OBO will inform Caddell that any installations not in compliance with the contract must be mitigated at its expense." Finally, OBO stated that based on a recent inspection that post-dated the draft report, it had verified that no loose pipe hangers were found in either building, suggesting that the errors may have been corrected prior to the issuance of a draft of this OIG report.

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken and planned, OIG considers this recommendation resolved, pending further action. With respect to the placement of the chilled water pipe, if OBO determines that moving the chilled water line is too disruptive to embassy operations, it should seek an appropriate adjustment in contract price from Caddell because, according to USACE, the placement of the chilled water pipe was not done in accordance with contract drawings or the

manufacturer's recommended specifications. With respect to the inspection conducted by USACE in collaboration with OIG in February 2016, the inconsistent use of dielectric fittings and the elevated temperature in the SDA-1 boiler room were also detected in a follow-up inspection conducted by OIG in April 2017. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has completed actions to correct all heating, ventilation, and air conditioning system installations in the NOX and SDA-1 in accordance with contract requirements.

Fire Safety Compromised in the NOX and SDA-1 by Inaccessible Smoke Detectors and Possibly Non-Compliant Doors

In assessing the status of fire-safety systems in both the NOX and SDA-1, OIG consulted with Embassy Kabul's Fire Department and PAE, which conducted an initial condition assessment of the NOX prior to occupancy. OIG found numerous smoke detectors cannot be accessed for maintenance and that lobby doors in both buildings as well as suite connector doors in SDA-1 may not comply with National Fire Protection Association standards.

Smoke Detectors in the NOX and SDA-1 Inaccessible for Maintenance

In their initial condition assessment of the NOX, PAE technicians identified 12 smoke detectors that were installed amid other building piping, duct work, and equipment, making them inaccessible to maintenance staff. The contract specifications state that, among other standards, NFPA 72, the National Fire Alarm Code, should be considered applicable to the fire alarms installed in the NOX and SDA-1.[21] Furthermore, according to OBO's Policies and Procedures Directive on the Commissioning and Transition to Occupancy of Overseas Facilities, final testing and commissioning of fire alarm and detection systems shall be performed per NFPA 72 and associated codes.[22] NFPA 72 17.4.4 states that smoke detectors should "be installed in a manner that provides accessibility for periodic inspection, testing, and maintenance."

According to the director of OBO's Office of Fire Protection, there is no specific guidance regarding what makes a smoke detector accessible, and accessibility can be loosely interpreted. The director acknowledged, however, that 10 of the smoke detectors in the NOX should be relocated if possible to allow maintenance personnel adequate access. In fact, the director identified similar problems during the fire- and life-safety inspection of SDA-1, which was conducted between December 9 and 14, 2015. In that inspection, the director (who had responsibility for final inspection and acceptance of the residential building) identified a number of additional inaccessible smoke detectors.[23] The director required that those smoke detectors

[21] Requirements for fire alarm systems are defined under Division 13 of the contract specifications. Section 13851, "Fire Alarm Systems," Part 1.4 A. (Definitions) states that NFPA 72 National Fire Alarm Code definitions should be applied to work done under this section.

[22] The Bureau of Overseas Buildings Operations, Policy and Procedures Directive (P&PD CM 01) "Commissioning and Transition to Occupancy of Overseas Facilities," February 20, 2013.

[23] Testing and acceptance of fire protection and safety systems does not fall under the responsibility of the contracted commissioning agent. Instead, OBO's Office of Fire Protection conducts a range of fire-safety inspections and tests

he found to be inaccessible (which were similar to the smoke detectors in Figure 15) be relocated before he would sign off on fire safety.[24] However, in February 2016, following substantial completion and occupancy of both the NOX and SDA-1, USACE mechanical engineers identified additional smoke detectors in the mechanical rooms of both buildings that were blocked by HVAC and electrical equipment and thus were inaccessible for maintenance. One year later, in February 2017, OIG also observed a number of smoke detectors in mechanical rooms in the NOX that had not been relocated and remained inaccessible for maintenance. PAE estimated that approximately 10 to 15 smoke detectors in the NOX do not comply with NFPA 72 because they are inaccessible for maintenance.

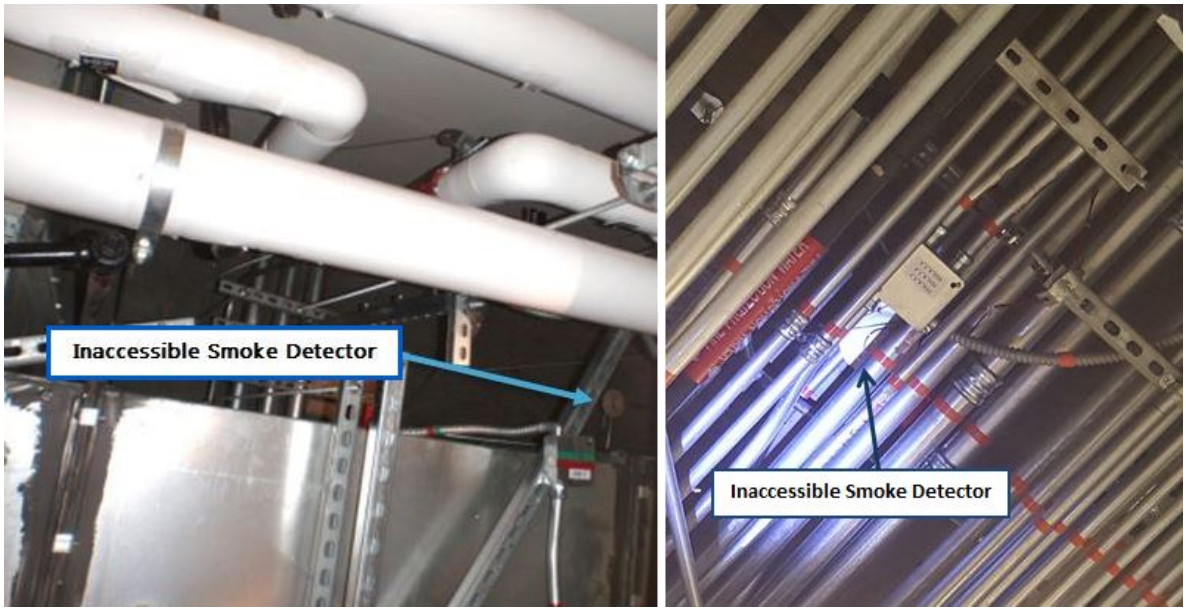


Figure 15: Smoke Detectors in NOX inaccessible for testing and maintenance.
Source: Photo on left taken by USACE, February 2016. Photo on right taken by OIG, January 2017.
Note: Photo on left shows smoke detector in the 7th floor maintenance room of the NOX. Photo on right shows smoke detector located in maintenance room in the basement of the NOX.

Possibly Non-Compliant Fire Doors in the NOX and SDA-1

Lobby Fire Doors

SDA-1 comprises two apartment wings that are joined at the midpoint by a lobby servicing three elevators. Each apartment wing is protected by a fire-rated integrated door system that will automatically close in the event of a fire alarm. Similarly, each floor of the NOX has two sets of fire doors on either side of its elevator lobby. Attached to each of the elevator lobby fire doors is a piece of hardware known as an astragal—a long metal piece attached along the length of the edge of the door. An astragal may be used to protect against weather; to minimize

and must document acceptance of those systems before the Department can issue a certificate of occupancy and allow the newly constructed buildings to be occupied.

[24] OBO's Director of Fire Safety signed off on SDA-1 on January 14, 2016.

the passage of light between the doors; to reduce sound transmission; or to retard the passage of smoke, flame, or gases during a fire. Figure 16 shows examples of elevator lobby doors in the NOX and SDA-1 with astragals.

Figure 16: SDA-1 and NOX fire-safety doors with astragal modifications. **Source:** Photos taken by OIG December 28, 2016, and January 3, 2017.

It is unclear, however, whether the astragals attached to the fire doors in SDA-1 and the NOX were part of the original fire-rated assembly or if they were added later. According to documents provided by Caddell for SDA-1 ("Integrated Door System," Section 08170 for Hardware), none of the integrated door systems for SDA-1 provided by the manufacturer (Adamsrite) included astragals as part of the original hardware. Embassy Kabul's fire department chief and deputy fire chief both noted that, based on the materials used and the installation, it appeared as though the astragals in both buildings were not part of the original door assembly and had been added later. According to the fire department chief, any modifications to the doors and frames (including astragals that are not part of the original hardware) are a violation of NFPA code.[25] If an astragal was not part of the original fire-rated assembly, the modification effectively decertifies the fire door.[26]

Apartment Connector Doors

The south wing of SDA-1 contains a number of efficiency apartments that include connecting doors between apartments. According to the contract specifications, these connector doors and frames should consist of 45-minute fire-rated hollow metal frames and hollow metal doors.[27]

[25] Field modifications are addressed in section 5.1.4 of NFPA 80. For changes made in the field, which are above and beyond those allowed as job site preparations, permission must be requested in advance by contacting the manufacturer of the component being modified; the manufacturer must then contact the appropriate listing laboratory with a written or graphic description of the modifications.

[26] According to NFPA 80, 5.1.5.1, in cases where a field modification to a fire door or a fire door assembly is desired, the laboratory with which the product or component is being modified is listed shall be contacted through the manufacturer and a written or graphic description of the modifications shall be presented to that laboratory.

However, during inspections of several apartments in SDA-1, OIG found that none of the frames contained the mandatory Underwriter Laboratories fire-rating labels certifying that the frames are fire rated as required by NFPA.[28]

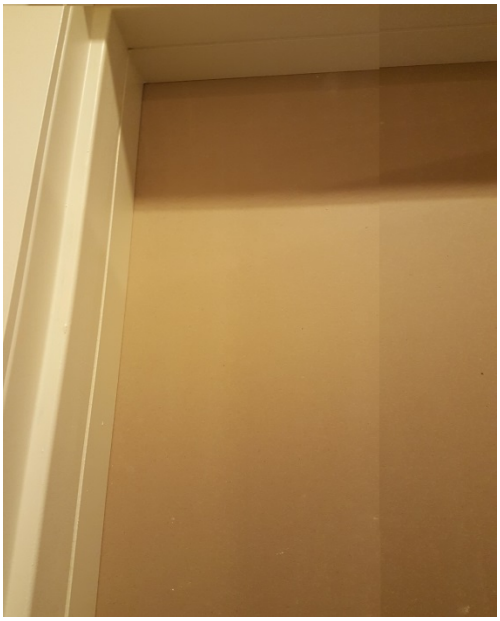


Figure 17: Door connecting two suites in SDA-1 not labeled as having a fire-rated frame.
Source: Photo taken by OIG December 28, 2016.

OIG was unable to obtain documentation from Caddell or OBO that the lobby and suite connector doors were installed consistent with contract specifications and per NFPA fire code standards.[29] In addition, OIG sought, but did not receive, clarification on the fire-safety status of the elevator lobby fire doors and the efficiency suite connector door frames from OBO's fire safety director. Given the potential life-safety issues involved, OIG is concerned about the lack of documentation establishing that the doors in question meet fire code standards.

Recommendation 11: OIG recommends that the Bureau of Overseas Buildings Operations identify and relocate all inaccessible smoke detectors in the New Office Annex and Staff Diplomatic Apartment-1 so that they can be accessed for periodic testing and maintenance.

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[27] FY09 – SDA1 – Suite Connector Doors, 08346 – Sound Control Door Assemblies.

[28] According to NFPA 80, 4.2.1 all listed items shall be identified by a label. According to Section 4.2.1.4, the label for fire door frames shall contain information, including the words "fire door frame," the manufacturer's company name or code, the marking of a third-party certification agency, the fire protection rating of the fame, and the fire test standard designation to which it was tested.

[29] OIG contacted both OBO and Caddell multiple times for clarification on whether the lobby and suite connector doors were installed in accordance with contract specifications. Caddell stated it would contact the manufacturer to confirm whether the astragals attached to the lobby doors were part of the original hardware, but to date, Caddell has not provided OIG with its response. In response to OIG's inquiry about the doors, OBO requested additional information from OIG, including photographs. OIG provided that information, but did not receive a definitive response from OBO regarding the status of the doors. OBO's failure to respond to OIG's original request for information has been escalated with senior management

OBO Response: OBO concurred with the recommendation, stating that OBO personnel in Kabul relocated all smoke detectors in the NOX and SDA-1 as requested by the OBO Office of Fire Safety. OBO further stated that the contractor will relocate smoke detectors identified by contract maintenance staff as inaccessible and OBO's Office of Fire Safety will confirm that the relocations meet NFPA 72 requirements during future visits later this calendar year.

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions taken and planned, OIG considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation demonstrating that all inaccessible smoke detectors in the NOX and SDA-1 have been relocated and are in compliance with NFPA 72 requirements.

Recommendation 12: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the certification of fire safety systems conduct a full inspection of the New Office Annex and Staff Diplomatic Apartment-1 elevator lobby fire doors and the Staff Diplomatic Apartment-1 efficiency suite connector door frames to determine whether they meet National Fire Protection Association code standards. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response: OBO stated that the Office of Fire Protection evaluated the recommendation and, as the authority having jurisdiction, determined that the elevator lobby doors, as installed, meet the intent of International Building Code (IBC) Section 707.14.1. According to OBO, "this allows the doors to be installed as smoke partitions in lieu of fire partitions in buildings protected by an approved automatic fire sprinkler system. Therefore, the doors do not have any fire rating requirement and the astragals do not degrade the fire rating of the door." OBO further stated that the astragals were installed at the request of OBO's Office of Fire Protection to ensure that the doors met the smoke partition requirements of the IBC. OBO also stated that the efficiency suite connector doors and frames meet current fire protection requirements, and upon further inspection, it found that the fire rating labels for the frames were obscured by moldings. OBO provided photos, which show that the suite connector doors and frames do have the required ratings and meet NFPA 80 requirements.

OIG Reply: OIG considers this recommendation resolved, pending further action. Based on the information and photographs enclosed with its response, no further action is required regarding the efficiency suite connector door frames. This recommendation will be closed when OIG receives and accepts documentation demonstrating that the elevator lobby doors do not have a fire rating requirement, notwithstanding that Caddell and PAE reported that they did have such a requirement, and that OBO's Office of Fire Protection confirms that the astragals have been installed in a manner that meets smoke partition requirements of the International Building Code.

Recommendation 13: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all elevator lobby doors and efficiency suite

connector doors in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements or National Fire Protection Association standards.

OBO Response: OBO stated the Office of Fire Safety determined that the elevator and efficiency suite connector doors do not require replacement and referred back to its response to Recommendation 12.

OIG Reply: On the basis of OBO's actions to inspect the elevator lobby doors and efficiency suite connector doors, OIG considers this recommendation resolved, pending further action. Because both Caddell and PAE informed OIG during the audit that the elevator lobby doors were fire-rated doors and were labeled as such, OIG requires supporting documentation that supports OBO's statement that the doors do not have any fire rating requirement. This recommendation will be closed when OIG receives and accepts such documentation or that all the elevator lobby doors in the NOX and SDA-1 have been installed in a manner that complies with contract requirements and the National Fire Protection Association standards.

Lax Certification Process and Ongoing Mechanical Issues Create Doubts about Elevator Compliance with Contract Specifications

The NOX has a total of six elevators that service seven floors, and SDA-1 has three elevators that service nine floors. According to OBO's elevator specialist, none of the elevators had been fully certified prior to substantial completion. Additionally, the elevators in both buildings have had a number of ongoing mechanical issues.

Elevators Not Fully Certified Prior to Substantial Completion

OBO's Office of Facility Management's elevator management program is the certification authority for all elevators installed in the Department's overseas properties. It is responsible for final acceptance of all elevators, which includes validation of equipment safety, performance, and compliance with specifications. However, since OBO/CFSM/CM declared the NOX and SDA-1 to be substantially complete—in June 2015 and January 2016, respectively—neither building's elevator set has been fully certified by OBO's elevator management program. According to OBO's elevator specialist, who is the agent responsible for certifying the safety and functionality of the elevators, even though all safety requirements were met, he would not sign off and accept the NOX and SDA-1 elevators because the elevators did not fully meet industry standards and contract specifications.[30] According to the elevator specialist, although the elevators did not fully meet industry standards, in his opinion the outstanding deficiencies to be addressed would not interfere with the basic functionality of the elevators and would not present a safety risk to building occupants.

[30] Within the Office of Facilities Management, the Elevator Management Program is responsible for reviewing and certifying all elevators at posts abroad.

OIG obtained and analyzed copies of the "Periodical Examinations and Test Reports" that were completed by the elevator specialist during his inspections. According to the elevator specialist, he recorded the majority of outstanding issues in informal punch lists rather than in the test reporting template. As a result, the test reports and punch lists do not align with one another. For example, a punch list for the NOX, dated June 2015, has a longer list of items to be addressed than the final acceptance forms for the NOX elevators, which were completed between April 1 and April 9, 2015. According to the elevator specialist, he recorded the majority of items on the punch list because the inspection form does not have enough space to list all outstanding items that need to be addressed. He stated that, in the case of the NOX, all of the elevators passed the safety part of the inspection in April 2015 but a number of punch list items still remained. The elevator specialist further reported that the standards used to develop punch lists for both the NOX and SDA-1 elevators were based on EN 81 standards as well as applicable contract specifications.[31] Although the punch lists include all the outstanding items to be addressed for each elevator, OBO could not provide documentation regarding the specific code or contract specification violations that prevented the elevators from being fully certified. As a result, it is unclear whether or to what extent each elevator met required industry standards or contract specifications at the time of substantial completion.

Mechanical and Design Issues

Although the OBO elevator specialist responsible for testing and certifying the elevators told OIG that no specific safety concerns prevent the elevators from being fully certified, OIG identified a number of ongoing mechanical and design issues that affected the day-to-day operations of the elevators. These ongoing issues may have implications for the maintenance needs of the elevators over the long term. Embassy facility managers have received ongoing complaints about the elevators in both the NOX and SDA-1, with concerns about rough elevator rides and being stuck in an elevator cab being the most frequent customer service complaints. Table 1 outlines key elevator issues identified by embassy maintenance personnel.

[31] According to OBO's elevator specialist, EN 81 (the European elevator installation and maintenance standards) was used for installing the NOX and SDA-1 elevators instead of American elevator standards prepared by the American Society of Mechanical Engineers (ASME). Division 14 of the contract specifications outlines requirements for installation of conveying systems including elevators. Specifically, section 14210 of the specifications references a total of 10 regulatory requirements that should be applied to the installation and testing of elevators, including ASME safety codes and inspection guides as well as EN 81 standards.

Table 1: Elevator Service Issues

Elevator Issue	Description of Issue	Impact of Issue
Car Roller Guides	Poorly functioning roller guides.[a]	Causes excessive vibration in the elevator cabs and bumpy rides for passengers.
Door Operations	Poorly functioning door parts, including operator belts and belt sprockets.	Causes the doors to jerk open, stop in the middle of the opening or closing cycle, or slam shut.
Hoist Ropes	The tension on the main hoist ropes is not consistently calibrated.	Creates rough cab rides and has required the replacement of hoist ropes and main drive sheaves after less than 1 year of service.
Braking	The brakes for holding an elevator in the stopped position, including the electrical coil and related circuit boards, are located in an area that is only accessible from the top of the elevator cabs.	Creates a safety concern as there is no means to manually release the elevator brake in the event of an electrical failure because the brake assembly is at the top of the elevator shaft without any way to safely access the area.
Response Times	The elevators' "artificial intelligence"—controls whereby the elevators anticipate the flow of traffic and adjust appropriately during periods of heavy traffic—may not be functioning properly.	Causes long elevator response times and wait periods for passengers; in some instances, passengers have waited as long as 5 minutes.

[a] Roller guides are rollers that rotate on guide rails in order to guide the elevator car and counter-weight along the path of the guide rails.

Source: Generated by OIG on the basis of documentation review of elevator maintenance records and interviews with Embassy Kabul personnel.

OIG's analysis of the embassy's elevator maintenance logs also showed a significant number of maintenance requests for the embassy's elevator installation contractor (Uzay Inc.) including times when elevators were taken out of service for repairs.[32] For example, two NOX elevators were shut down because of seismic software issues and one of the elevators was offline for a full day to replace the response board and reload the required software. Elevator outages due to maintenance issues continue to be a fairly regular occurrence in both buildings. In the case of the NOX, because only 3 elevators service a building with more than 917 desks, any time an elevator is offline for more than a few hours, there are significant effects on service.[33]

According to embassy facilities personnel, the large number of service calls is unusual given the elevators' recent installation and limited time in service. As a result of the large number of

[32] Uzay is a subcontractor of Caddell and is responsible for elevator installation and maintenance under the terms of Caddell's contract.

[33] The NOX has a total of six elevators, only three of which service all six of the floors where embassy offices are located.

service calls, OBO purchased an extended warranty on the NOX and SDA-1 elevators that covers elevator maintenance through January 18, 2018.[34] Despite the fact that the elevators were never fully certified prior to substantial completion, the cost for this extended warranty is being borne by OBO. Embassy facilities managers reported that they were not sure whether the extended warranty was a more cost-effective option for the U.S. Government but felt it was the most practical means to allow embassy facilities staff to control the service process, given the large number of ongoing complaints about elevators in both buildings. However, according to OBO's elevator specialist, the extended warranty was determined to be a more cost-effective alternative to having embassy facilities staff take over the maintenance of the elevators. Further, although the terms of the extended warranty state that no elevator shall be out of service for more than 24 hours, in April and May 2017, one of the three elevators in SDA-1 was out of service for more than 6 weeks.

Figure 18: In April and May 2017, one of the three elevators in SDA-1 was out of service for more than 6 weeks.
Source: Photo taken by OIG April 30, 2017.

[34] The extended warranty was purchased from Caddell at a total cost of $147,985.

OIG is concerned about the differing opinions regarding the performance of the NOX and SDA-1 elevators. The elevator specialist responsible for inspecting and certifying the elevators stated that, in his opinion, all the elevators were functioning at acceptable levels and that the minor issues remaining at substantial completion were common and would not impact the life cycle of the elevators. However, embassy facilities and O&M personnel are of a different opinion, noting that the volume of service calls is unusual and that the current service issues may decrease the expected life cycle of the elevators. The status of the SDA-1 elevators was again discussed at the 11-month warranty meeting, which was held January 10–11, 2017.

During the meeting, the elevator specialist reported that he planned to issue a separate report on the status of the elevators, including a punch list of all outstanding items to be addressed under the extended elevator warranty, which runs through January 2018. During the meeting, embassy facility managers reported that, although communication with Uzay (the elevator contractor) is improving, it has been an ongoing struggle because not all the representatives from Uzay speak English. Facility managers emphasized to Caddell that having an English-speaking representative is imperative and a contract requirement. Given the differing viewpoints and informal certification documentation recorded by the elevator specialist, the extent to which the NOX and SDA-1 elevators have fully met the EN 81 standards and contract specifications remains unclear.

Recommendation 14: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the certification of elevators to meet EN 81 standards conduct a full inspection, analysis, and recertification of the New Office Annex and Staff Diplomatic Apartment-1 elevator sets. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response: OBO neither concurred nor disagreed with this recommendation. OBO stated that a qualified OBO professional with experience in the certification of elevators to meet EN 81 standards conducted a full inspection, analysis, and certification of the NOX and SDA-1 elevator sets. OBO stated that this inspection "included a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials." OBO further stated that, "[a]t the time of the OIG inspection, there were many punch list items left to be completed." According to OBO, the elevators are "currently operational and safe," and "most punch list items have been resolved and verified by OBO." Finally, OBO stated that the original equipment manufacturer is currently under contract to provide maintenance under an extended warranty agreement.

OIG Reply: Based on actions taken by OBO, OIG considers this recommendation resolved, pending further action. Although OBO stated that the elevators are currently operational and safe, at the time that OBO provided this response, one of the elevators in SDA-1 had been out of service for two months. As a result, OIG will continue to monitor the steps OBO has taken to address this recommendation. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has conducted a full

inspection and analysis of the NOX and SDA-1 elevator sets since receiving this report. This documentation should include verification that both elevator sets have been fully certified and accepted as meeting safety, performance, and specification compliance by OBO's Office of Facility Management's Elevator Management Program.

Recommendation 15: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to correct all work related to the elevator sets in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements.

OBO Response: OBO concurred with the recommendation, stating that "[a]ny issues that do not comply with the construction contract will be corrected at the contractor's expense." OBO further stated that the elevators are "still under warranty and all issues are being mitigated at the contractor's expense."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions planned, OIG considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation demonstrating that all work related to the elevator sets in the NOX and SDA-1 is completed in accordance with contract requirements.

Inadequate Department Oversight Contributed to Ongoing Building Deficiencies in the NOX and SDA-1

The deficiencies that OIG identified in the construction of the NOX and SDA-1 are due, in part, to weaknesses in OBO's oversight of the construction process. Specifically, OIG found that the lack of QA oversight during key phases of the project contributed to many of the identified deficiencies in the NOX and SDA-1. Multiple project stakeholders involved in the embassy's construction and commissioning process observed that the NOX and SDA-1 were built without sufficient OBO/CFSM/CM oversight, and in some cases problems were not identified until after the buildings were completed and turned over to the Facilities Management Office for preventive and emergency maintenance. These stakeholders told OIG that the insufficient QA process may ultimately result in the need for significant repairs or replacement of equipment and may also result in the shortened life cycle of some building systems, the cost of which will be borne by the Department.

According to USACE, OBO did not have an adequate number of qualified staff available to provide oversight on the project. According to staffing data provided by OBO/CFSM/CM, the total Kabul project team (director, managers, and engineers) ranged from 4 to 14 personnel from the beginning of NOX construction in November 2012 to the occupancy of SDA-1 in February 2016. During the 2013–2014 time period, the entire OBO/CFSM/CM presence consisted of a project director and three to four locally hired staff. According to a commissioning official who worked alongside the locally employed staff, these staff members, though hard working and willing, received no official OBO training on U.S. construction standards. Moreover, the training that they did receive was obtained while carrying out their inspection duties. It was not

until June 2015 (with the evacuation and transfer of OBO's Embassy Yemen U.S. direct-hire engineering staff to Kabul) that the project team reached its maximum number of 14 personnel.

Given the size and complexity of the embassy's construction projects to design-build major vertical facilities, carry out site clearance and development, and develop support utilities and roadways, USACE estimated that the construction management and QA staff should have included approximately 41 trained personnel. According to USACE, not all of these staff would have to be onsite for the entire length of the project; 60 percent of the 41 full-time-equivalent staff would constitute adequate onsite QA coverage. Therefore, an average staffing presence should have consisted of 24 U.S. Government personnel over the course of the 8-year project—approximately 2 to 6 times the number of staff OBO had onsite at any given time during the construction of the NOX and SDA-1.

In a test of OBO/CFSM/CM's QA procedures, OIG obtained several concrete pour inspection forms completed during the early stages of the NOX construction from Caddell's QC manager. The forms are designed to document that a number of key items have been inspected, including base preparation, rebar steel layout, and completion of forming systems. Several of these forms obtained by OIG contained signatures and dates from Caddell's construction supervisors or Caddell's QC manager but did not include corresponding signatures from OBO/CFSM/CM's QA representatives. According to the Caddell QC manager, it was Caddell's standard practice to inform the OBO/CFSM/CM QA staff every time that a construction item or step (such as a concrete pour or a wall closure) was ready for their review. However, according to the QC manager, it was not uncommon for the OBO/CFSM/CM staff to forgo the opportunity to conduct a physical inspection or to sign off on items that were never inspected.

According to OBO's Construction and Commissioning Guidelines, the project director should also use embassy facility managers and key O&M staff as additional support during the project director's QA efforts, working with the commissioning team in validating the contractor's proper installation, startup, and functional testing of equipment and systems. However, according to project stakeholders, the OBO/CFSM/CM project director missed opportunities to actively engage available commissioning agents and facilities staff to assist with QA inspections and, in some cases, specifically directed commissioning agents and O&M staff not to comment on QA issues they observed in the course of their work.

The inadequate QA process, including the failure to utilize and leverage commissioning agents and O&M staff in the process, has meant that a number of deficiencies that should have been identified as part of the QA review and inspection process have gone unaddressed. Consequently, a range of potential problems will likely confront embassy facility managers in the future.

> **Recommendation 16:** OIG recommends that the Bureau of Overseas Buildings Operations establish and implement standards for quality assurance and oversight for construction projects, including (a) a minimum number of staff members assigned to provide management oversight, administration, and quality assurance on the basis of the size and complexity of the project and (b) minimum requirements for quality assurance staff regarding years of experience and technical qualifications.

OBO Response: OBO concurred with the recommendation, stating that it "typically" assigns three to six American engineers and architects to "major capital security construction projects, complemented by a number of locally employed staff engineers." OBO cited information from its Construction Management Guidebook regarding staffing requirements; specifically, that the composition and number of technical personnel on the staff depends on the requirements of the project and typically includes civil or structural, mechanical, and electrical disciplines. OBO stated that it prefers experienced engineers on the QA staff but also has a position classification for construction inspectors, who are typically experienced tradesmen without technical degrees. OBO further stated that when it advertises for onsite technical personnel, it requires candidates to be qualified in 1 of 11 technical or engineering categories and to have a minimum of 7 years of experience working on active construction sites.

Finally, OBO stated that staffing "remote, dangerous posts" such as Kabul remains a "constant challenge" due to one-year tours for Americans and frequent turnover of locally employed staff. OBO stated that it is working with Embassy Kabul and the Bureau of Near Eastern Affairs to join the Third Country National program to reduce the impact of locally employed staff turnover. OBO also stated that it sends regular Department requests for volunteers for specialty engineers to go to Kabul on temporary duty assignments and has also requested commissioning agent contracts "be expanded to augment site technical staff, when needed."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions planned, OIG considers this recommendation resolved, pending further action. OIG recognizes that OBO's Construction Management Guidebook includes broad guidance regarding the numbers and types of personnel that should be used to staff major capital security construction projects; OIG also recognizes OBO's efforts to work with Embassy Kabul and the Bureau of Near Eastern Affairs to address staffing needs in Kabul as a high-threat post. However, OBO's Guidebook does not include detailed information required by this recommendation, including information describing what constitutes a "major capital security construction project" or corresponding staffing levels depending on the size of the project. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has developed detailed guidance regarding the minimum number of staff members that should be assigned to provide management oversight, administration, and QA based on the size and complexity of the project, as well as minimum requirements for QA staff to not only include years of experience but also technical qualifications.

Recommendation 17: OIG recommends that the Bureau of Overseas Buildings Operations assign a project manager to oversee all efforts related to the inspection, analysis, recommissioning, and required repairs of existing installations in the New Office Annex and Staff Diplomatic Apartment-1. This project manager should help to prioritize corrective actions to address identified deficiencies and coordinate with key stakeholders in order to ensure that they are completed in a timely, cost-effective, and efficient manner.

OBO Response: OBO did not concur with the recommendation, stating that all items listed as defects in a draft of this report "have been resolved or are actively being pursued by OBO's field staff." OBO stated that it conducted a senior-level review of the NOX and SDA-1 and did not find any issues "out of the ordinary" for a very large capital project, given its remote location. OBO also stated that its Mechanical Engineering Branch "has detailed a senior mechanical engineer to review ongoing mechanical coordination on the Kabul compound" and to actively engage in addressing punch list items in the NOX and SDA-1. "The primary construction contract is not finished and the contractor remains on site and fully engaged on the issues." OBO, however, acknowledged OIG's larger point that some punch list items have lingered too long and stated that it instructed Caddell to direct resources to complete this work, since the contractor remains onsite and fully engaged in addressing identified issues.

OIG Reply: Although OBO did not concur with the recommendation, it stated that it has detailed a senior mechanical engineer to review ongoing mechanical coordination on the Kabul compound and to actively engage in addressing punch list items in the NOX and SDA-1. This alternative action meets the intent of the recommendation, and OIG therefore considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation indicating the date that OBO conducted the senior-level review of the NOX and SDA-1 as well as documentation demonstrating that the inspection, analysis, recommissioning, and required repairs of existing installations in the NOX and SDA-1 have been completed.

Recommendation 18: OIG recommends that the Bureau of Oversees Buildings Operations either a) require Caddell Construction, Inc. to replace and correct all work in the New Office Annex and Staff Diplomatic Apartment-1 found to be defective or non-conforming to contract requirements or b) seek an appropriate adjustment in contract price for all instances where, in the public interest, the Bureau of Overseas Buildings Operations consents to accept work that is defective or does not conform to contract requirements.

OBO Response: OBO concurred with the recommendation, stating that it has notified Caddell of all "lingering punch list issues" in the NOX and SDA-1 that have not been corrected in a timely manner. OBO further stated that if the contractor fails in its contractual duties, it will seek the Bureau of Administration, Office of Logistics Management's assistance "to adjust the contract price to cover the cost of the U.S. Government performing this work via alternative methods." According to OBO, "thus far, Caddell has not refused to meet any of its contractual responsibilities in either the NOX or SDA-1."

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions planned, OIG considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation demonstrating that all work in the NOX and SDA-1 found to be defective or non-conforming to contract requirements has been corrected. In those instances where OBO consents to

accept work that is defective or does not conform to contract requirements, OBO should provide documentation that it has sought an appropriate adjustment in price from Caddell.

Recommendation 19: OIG recommends that, in all cases where the Bureau of Overseas Buildings Operations conducts an inspection, analysis, or recommissioning of existing installations in the New Office Annex and Staff Diplomatic Apartment-1 and finds the work to be defective or nonconforming in any material respect due to the fault of the contractor or its subcontractors, the Bureau of Overseas Buildings Operations should a) determine the cost of all inspections, analysis, or recommissioning of existing installations and b) recover this amount from Caddell Construction, Inc.

OBO Response: OBO concurred with the recommendation, stating that it has conducted a senior-level review of the NOX and SDA-1 and did not find any construction defects "out of the ordinary" for a very large capital project. OBO further stated that the contract language "provides ample provisions to seek recompense from the contractors for repeated re-inspections, negligence, or outright failure to complete work under contract." OBO stated that it had reviewed the deficiencies in both buildings and did not find any workmanship that rises to these levels; however, should any arise, OBO indicated that it will invoke this contract language and seek recompense.

OIG Reply: On the basis of OBO's concurrence with the recommendation and actions planned, OIG considers this recommendation resolved, pending further action. This recommendation will be closed when OIG receives and accepts documentation demonstrating that OBO has recovered the costs from Caddell of any inspections, analysis, or recommissioning of existing installations found to be defective or nonconforming.

OBO General Comments and OIG Replies

In addition to providing comments related to each recommendation offered in this report, OBO provided other general comments. Below is a synopsis of those comments and OIG's replies.

OBO Comment: OIG's use of information provided by PAE "presents a conflict of interest" because, at the time of OIG's inspection, PAE was actively engaged in negotiating a maintenance contract with the U.S. Government and would benefit from identifying any maintenance issues that required mitigation.

OIG Reply: Information obtained from PAE, as the O&M contractor in Kabul, was corroborated with other evidence collected at post, including assessments conducted by independent USACE engineers and embassy facilities personnel. This included assessments of plumbing issues in SDA-1, which were also corroborated with information provided by embassy facilities personnel and observations made by OBO/CFSM/CM personnel in the 11-month warranty meeting. Other issues noted by PAE were corroborated by visual evidence that OIG collected during physical inspections conducted at both the NOX and SDA-1. These included issues such as inaccessible smoke detectors, HVAC equipment that is inaccessible for maintenance, the inconsistent use of

dielectric fittings, and the elevated air temperature in the SDA-1 boiler room. Each of these issues was also subsequently subject to review and analysis by USACE engineers. OIG made no changes to the report on the basis of this comment.

OBO Comment: Page 12 of the draft report says, with respect to plumbing issues, "PAE staff stated that the number of work orders received for SDA-1 is out-of-proportion to other residential buildings at the embassy, which average one or two per month, and is especially unexpected in a new building." This statement is "factually incorrect," and again, the source was "actively pursuing a maintenance contract at the time of the OIG inspection. The reality is, if you take into consideration the number of occupants compared to other residential buildings, SDA-1 is actually performing better, which is as it should be, given its new occupancy date. OBO requests that this comment be removed from the report."

OIG reply: PAE provided OIG with copies of each of the 38 work orders submitted between May and August 2016 related to the plumbing issues described in the report. OIG reviewed and analyzed those work orders and confirmed the recurring documented complaints from residents regarding backed-up and slow tub and shower drains, odors coming from bathroom floor drains, and slow-draining, backed-up toilets. OIG also discussed SDA-1's plumbing issues on multiple occasions with embassy facility managers and reviewed the 11-month warranty meeting minutes provided by OBO. In that meeting, one of the embassy facility managers concurred with PAE's assessment of the plumbing issues in SDA-1, noting "difficulties in maintenance and the growing increase in work orders." Warranty meeting minutes also included comments by OBO that "the install was subject to poor interpretation and execution of the plumbing code," "failure in quality control is evident," and "[t]he current construction as-built condition is not compliant and is not acceptable to OBO." OIG made no changes to the report on the basis of this comment.

OBO Comment: The title of the OIG Management Assistance Report and many of the headers are editorial comments and opinions. OBO requests that OIG simply present its findings.

OIG Reply: The titles and headers are not "editorial." They correctly describe issues found during the audit and do so in a manner consistent with OIG reports more generally. OIG made no changes to the report on the basis of this comment.

OBO Comment: "Liberal use of pejorative expressions and subjective phrases such as 'several and many deficiencies' and 'throughout the building' are misleading and dilutes the objectivity of the report. OBO requests that such phrases be replaced with factual data such as 'x [number] out of xx [number] of specific items were found to be deficient.' This will ensure the objectivity of the findings, put the OIG conclusions in proper context, and help OBO and the contractor to address the specifically identified deficiencies."

OIG Reply: OIG used the phrase "many of the deficiencies identified in the report" in the Summary of Review section, as well as in the introduction to the Results section of the report, to describe the cause of the deficiencies found. For example, the introduction to the Results section

states, "OIG found that the lack of QA oversight during key phases of the project contributed to many of the identified deficiencies in the NOX and SDA-1." In both cases, the phrase is appropriately used to summarize the cause of the audit findings. In addition, OIG provided specific information related to the deficiencies identified, including photographs, to facilitate resolution of the defects found.

Further, OIG referred to the plumbing deficiencies in SDA-1 as occurring "throughout the building," but as noted previously, the plumbing issues identified in SDA-1 were corroborated by PAE, USACE, embassy facilities managers, and OBO/CFSM/CM personnel who participated in the 11-month warranty meeting. In addition, OBO's senior mechanical engineer, charged with assessing the plumbing issues in SDA-1, also confirmed the presence of S-traps in SDA-1 during OIG's exit conference with OBO, which was held on April 19, 2017, to discuss the audit findings presented in this report. OIG used the identified phrase appropriately to sum up its conclusions and to describe widespread deficiencies that are enumerated throughout the report. OIG made no changes on the basis of this comment.

OBO Comment: The title states, "Need Prompt Attention." The OIG inspection was conducted in February 2016. If any issue required prompt attention, OIG should have notified OBO immediately.

OIG Reply: OIG notified OBO of issues impacting the construction and commissioning of the NOX and SDA-1 as we identified them. Moreover, as part of its ongoing audit work of new construction at the U.S. Embassy in Kabul, OIG previously highlighted issues that required immediate attention by OBO. This is the third in a series of OIG reports that focus on the construction and commissioning of the NOX and SDA-1. Each product has been issued based on the immediacy of the issue and the potential threat to embassy residents in terms of life, health, and safety. The two earlier reports identified issues that required more immediate attention than the issues set forth in this report. In particular, in April 2016, OIG issued a management alert that identified life-health-safety issues related to the presence of hazardous electrical current in the two buildings.[35] In March 2017, OIG reported that two security doors in SDA-1 were improperly altered and that weaknesses with the security certification process allowed the improper alterations to go unaddressed for more than a year.[36]

With regard to the issues outlined in this report, while USACE conducted its primary inspection of the NOX and SDA-1 in February 2016, fieldwork to assess the status of issues identified in this report was ongoing through December 2016. Further, OIG conducted follow-up inspections of issues such as inaccessible smoke detectors and HVAC installations in February and April 2017. OIG understands that, until recently, OBO had the opportunity to address the deficiencies under

[35] *Management Alert: Hazardous Electrical Current in Office and Residential Buildings Presents Life, Health, and Safety Risks at U.S. Embassy Kabul, Afghanistan* (AUD-MERO-16-01, April 2016).

[36] *Management Assistance Report: Improvements Needed to the Security Certification Process to Ensure Compliance with Standards at Embassy Kabul, Afghanistan* (AUD-MERO-17-28, March 2017).

the terms of the general contractor's warranty, which expired 1 year after substantial completion and occupancy. Because the deficiencies remained unaddressed more than a year after occupancy and after both buildings' warranties had expired, OIG has correctly concluded that these deficiencies need "prompt" attention at this point. Further, OBO in its comments to a draft of this report acknowledged many of these issues have "lingered too long." OIG made no changes to the report on the basis of this comment.

OBO Comment: Since the OIG inspection was conducted while the project was still under construction and warranty, many issues identified in the report were punch list items and have already been mitigated or are in the process of being mitigated.

OIG Reply: While USACE conducted its primary inspection in February 2016, fieldwork to assess the status of the issues identified in this report was ongoing through December 2016. OIG also conducted follow-up inspections of smoke detectors and HVAC installations in February and April 2017. Further, a number of issues remained unaddressed after the warranty period expired for both the NOX and SDA-1. The warranty periods for the NOX and SDA-1 expired on June 22, 2016, and January 16, 2017, respectively. OIG summarizes below various issues identified after the expiration of one or both of the warranties.

- In September 2016, OBO/CFSM/CM personnel informed OIG that hydronic water was still not meeting parameters outlined in contract specifications, more than a year after occupancy of the NOX and 7 months after occupancy of SDA-1.
- As of October 2016, both elevator sets in the NOX and SDA-1 had not been fully certified by OBO's elevator specialist.
- As of January 2017, OIG identified smoke detectors in the NOX and SDA-1 that remained inaccessible for maintenance.
- As of April 2017, several of the issues affecting HVAC systems remained unaddressed, including equipment that is inaccessible for maintenance, inconsistent use of dielectric fittings, and elevated temperature in the SDA-1 boiler room.
- As of June 2017, one of the elevators in SDA-1 had been out of service for more than 2 months, despite the fact that OBO purchased an extended warranty from the contractor. The terms of this extended warranty, purchased before the elevators had been fully certified by OBO's elevator specialist, state that no elevator should be out of service for more than 24 hours.

OIG is reporting these deficiencies in accordance with generally accepted government auditing standards and believes that the evidence obtained provides a reasonable basis for the findings and conclusions presented in this report.[37] OIG trusts that it will be useful in assisting the Department to identify and correct ongoing building deficiencies in Embassy Kabul's newly constructed NOX and SDA-1 buildings.

[37] This report relates to the overseas contingency operation, Operation Freedom's Sentinel, and was completed in accordance with the OIG oversight responsibilities described in Section 8L of the Inspector General Act of 1978, as amended.

RECOMMENDATIONS

Recommendation 1: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the installation of plumbing systems conduct a full inspection, analysis, and recommissioning of waste and vent plumbing systems in the Staff Diplomatic Apartment-1. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

Recommendation 2: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all plumbing installations in the Staff Diplomatic Apartment-1 found not to conform to the contract requirements.

Recommendation 3: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the installation of electrical systems conduct a full inspection, analysis, and recommissioning of electrical systems in both the New Office Annex and Staff Diplomatic Apartment-1. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

Recommendation 4: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all electrical system installations in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements.

Recommendation 5: OIG recommends that, prior to issuing the certificate of final acceptance for the New Office Annex and Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations establish guidance for hydronic water systems in both buildings, including specifying recommended concentrations of tolytriazole (40–50 parts per million) and nitrite (600–1,000 parts per million).

Recommendation 6: OIG recommends that, prior to issuing the certificate of final acceptance for the New Office Annex and Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations require Caddell to conduct an examination of existing copper pipe in both buildings by removing samples of the piping or by ultrasound testing and submit the results for independent laboratory analysis to verify whether scaling, corrosion, or other life-expectancy impacts are detected from the high pH operating conditions.

Recommendation 7: OIG recommends that if the independent laboratory analysis verifies the existence of pipe scaling or corrosion in the New Office Annex or Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations implement actions to remedy any damage to hydronic pipes.

Recommendation 8: OIG recommends that the Bureau of Overseas Buildings Operations develop and implement protocols to verify that its water treatment programs are in compliance with industry best practices, including (a) determining the best possible treatment to effectively protect copper piping, (b) conducting regular testing based on the specialized requirements of

each system, (c) conducting quarterly quality-assurance testing performed by an independent industrial water treatment lab, and (d) installing a corrosion testing system.

Recommendation 9: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified technician conduct an inspection of the New Office Annex and Staff Diplomatic Apartment-1 to identify poor workmanship and incorrect installations affecting heating, ventilation, and air conditioning systems. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

Recommendation 10: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to correct all heating, ventilation, and air conditioning system installations in the New Office Annex and Staff Diplomatic Apartment-1 that do not conform to the contract requirements, including the specific examples OIG cited in this report.

Recommendation 11: OIG recommends that the Bureau of Overseas Buildings Operations identify and relocate all inaccessible smoke detectors in the New Office Annex and Staff Diplomatic Apartment-1 so that they can be accessed for periodic testing and maintenance.

Recommendation 12: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the certification of fire safety systems conduct a full inspection of the New Office Annex and Staff Diplomatic Apartment-1 elevator lobby fire doors and the Staff Diplomatic Apartment-1 efficiency suite connector door frames to determine whether they meet National Fire Protection Association code standards. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

Recommendation 13: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all elevator lobby doors and efficiency suite connector doors in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements or National Fire Protection Association standards.

Recommendation 14: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the certification of elevators to meet EN 81 standards conduct a full inspection, analysis, and recertification of the New Office Annex and Staff Diplomatic Apartment-1 elevator sets. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

Recommendation 15: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to correct all work related to the elevator sets in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements.

Recommendation 16: OIG recommends that the Bureau of Overseas Buildings Operations establish and implement standards for quality assurance and oversight for construction projects, including (a) a minimum number of staff members assigned to provide management oversight, administration, and quality assurance on the basis of the size and complexity of the project and

(b) minimum requirements for quality assurance staff regarding years of experience and technical qualifications.

Recommendation 17: OIG recommends that the Bureau of Overseas Buildings Operations assign a project manager to oversee all efforts related to the inspection, analysis, recommissioning, and required repairs of existing installations in the New Office Annex and Staff Diplomatic Apartment-1. This project manager should help to prioritize corrective actions to address identified deficiencies and coordinate with key stakeholders in order to ensure that they are completed in a timely, cost-effective, and efficient manner.

Recommendation 18: OIG recommends that the Bureau of Oversees Buildings Operations either a) require Caddell Construction, Inc. to replace and correct all work in the New Office Annex and Staff Diplomatic Apartment-1 found to be defective or non-conforming to contract requirements or b) seek an appropriate adjustment in contract price for all instances where, in the public interest, the Bureau of Overseas Buildings Operations consents to accept work that is defective or does not conform to contract requirements.

Recommendation 19: OIG recommends that, in all cases where the Bureau of Overseas Buildings Operations conducts an inspection, analysis, or recommissioning of existing installations in the New Office Annex and Staff Diplomatic Apartment-1 and finds the work to be defective or nonconforming in any material respect due to the fault of the contractor or its subcontractors, the Bureau of Overseas Buildings Operations should a) determine the cost of all inspections, analysis, or recommissioning of existing installations and b) recover this amount from Caddell Construction, Inc.

APPENDIX A: BUREAU OF OVERSEAS BUILDINGS OPERATIONS RESPONSE

United States Department of State

Washington, D.C. 20520

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MAY 2 3 2017

TO: OIG/AUD – Norman Brown

FROM: OBO/RM – Jürg Hochuli

SUBJECT: Draft Management Assistance Report: *Building Deficiencies Identified at U.S. Embassy Kabul, Afghanistan Need Prompt Attention,* AUD-MERO-17-XX, May 2017

As requested, attached is OBO's response to the draft Management Assistance Report: *Building Deficiencies Identified at U.S. Embassy Kabul, Afghanistan Need Prompt Attention.*

Attachment:
As stated.

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Office of Inspector General
Management Assistance Report: Building Deficiencies Identified at U.S. Embassy Kabul, Afghanistan Need Prompt Attention
(Report No. AUD-MERO-17-XX, May 2017)

General Comments:

- **The use of comments from PAE presents a conflict of interests. At the time of the OIG inspection, PAE was actively negotiating a maintenance contract with the U.S. government and would benefit monetarily from identifying any maintenance issues that required mitigation.**

- **Page 12 of the draft report says, "PAE staff stated that the number of work orders received for SDA-1 is out-of-proportion to other residential buildings at the Embassy, which average one or two per month, and is especially unexpected in a new building". This statement is factually incorrect, and again, the source was actively pursuing a maintenance contract at the time of the OIG inspection. The reality is, if you take into consideration the number of occupants compared to other residential buildings, SDA-1 is actually performing better, which is as it should be, given its newer occupancy date. OBO requests that this comment be removed from the report.**

- **The title of the OIG Management Assistance Report and many of the headers are editorial comments and opinions. OBO requests that OIG simply present its findings.**

- **Liberal use of pejorative expressions and subjective phrases such as "several and many deficiencies" and "throughout the building" are misleading and dilutes the objectivity of the report. OBO requests that such phrases be replaced with factual data such as "x number out of xx number of specific items were found to be deficient". This will ensure the objectivity of the findings, put the OIG conclusions in proper context, and help OBO and the contractor to address the specifically identified deficiencies.**

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- **The title states, "Need Prompt Attention" – the OIG inspection was conducted in February 2016. If any issue required prompt attention, OIG should have notified OBO immediately.**
- **Since the OIG inspection was conducted while the project was still under construction and warranty, many issues identified in the report were punch list items, and have already been mitigated or are in the process of being mitigated.**

OBO Response to Recommendations:

OIG Recommendation 1: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the installation of plumbing systems conduct a full inspection, analysis, and recommissioning of waste and vent plumbing systems in the Staff Diplomatic Apartment-1. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response, May 2017: OBO concurs with this recommendation and informed Caddell that any construction not in compliance with the contract must be mitigated at its expense.

Caddell has qualified professionals on site in Kabul for the NOX and SDA-1 projects, with frequent oversight by qualified professionals from OBO- Washington. In this case, a Senior Mechanical Engineer from OBO- Washington reviewed all submittals, plans, specifications, installation methods, and materials, and determined that the plumbing issues are not throughout SDA-1, as stated by the OIG, and do not necessarily lead to maintenance problems. However, Caddell will mitigate any issues that arise regarding waste and vent plumbing systems at its expense.

OIG Recommendation 2: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all plumbing installations in the Staff and Dependent Apartment-1 found not to conform to the contract requirements.

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OBO Response, May 2017: OBO concurs with this recommendation and informed Caddell that any construction not in compliance with the contract must be mitigated at its expense.

OIG Recommendation 3: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the installation of electrical systems conduct a full inspection, analysis, and recommissioning of electrical systems in both the New Office Annex and Staff Diplomatic Apartment-1. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response, May 2017: OBO concurs with this recommendation. Caddell has qualified professionals on site in Kabul for the NOX and SDA-1 projects, with frequent oversight by qualified professionals from OBO- Washington. In this case, OBO Electrical Engineers reviewed all submittals, plans, specifications of the project, installation methods and materials, and determined the electrical installations were installed per the contract.

OIG Recommendation 4: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all electrical system installations in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements.

OBO Response, May 2017: OBO concurs with this recommendation and informed Caddell that any installations not in compliance with the contract must be mitigated at its expense.

OIG Recommendation 5: OIG recommends that, prior to issuing the certificate of final acceptance for the New Office Annex and Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations establish guidance for hydronic water systems in both buildings, including specifying recommended concentrations of tolytriazole (40-50 parts per million) and nitrite (600-1,000 parts per million).

OBO Response, May 2017: OBO concurs with this recommendation. OBO Facilities has been engaged on this issue since before the buildings were turned over to Post. The issues for the hydronic water treatment systems are primarily due to availability of the necessary chemicals on

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the local market in Afghanistan. Importing chemicals into the country is problematic. However, OBO and Post have identified sources of proper chemicals and believe that this will resolve the issue. Kabul Facilities conducts weekly testing of the water systems and found them to be within parameters.

OIG Recommendation 6: OIG recommends that, prior to issuing the certificate of final acceptance for the New Office Annex and Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations require Caddell to conduct an examination of existing copper pipe in both buildings by removing samples of the piping or by ultrasound testing and submit the results for independent laboratory analysis to verify whether scaling, corrosion, or other life-expectancy impacts are detected from the high pH operating conditions.

OBO Response, May 2017: OBO concurs with this recommendation and is requiring Caddell to conduct an examination of existing copper pipe in the NOX and SDA-1. In this case, corrosion coupon racks are being utilized to monitor corrosion and scaling issues. When needed, these corrosion coupons will be submitted for laboratory analysis, in accordance with OBO Facilities worldwide water treatment program. The initial set of corrosion coupons analyzed showed nominal amounts of corrosion, which is normal and not system adverse.

OIG Recommendation 7: OIG recommends that if the independent laboratory analysis verifies the existence of pipe scaling or corrosion in the New Office Annex or Staff Diplomatic Apartment-1, the Bureau of Overseas Buildings Operations implement actions to remedy any damage to hydronic pipes.

OBO Response, May 2017: OBO concurs with this recommendation. Laboratory analysis of corrosion coupons indicated the corrosion was nominal. OBO will continue its testing regimen to monitor and prevent any damage to the hydronic pipes.

OIG Recommendation 8: OIG recommends that the Bureau of Overseas Buildings Operations develop and implement protocols to verify that its water treatment programs are in compliance with industry best practices, including (a) determining the best possible treatment to effectively protect copper piping, (b) conducting regular testing based on the specialized

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requirements of each system, (c) conducting quarterly quality-assurance testing performed by an independent industrial water treatment lab, and (d) installing a corrosion testing system.

OBO Response, May 2017: OBO concurs with this recommendation. If the OIG requires further information on OBO Facilities' worldwide corrosion treatment program, OBO will provide a full briefing.

OIG Recommendation 9: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified technician conduct an inspection of the New Office Annex and Staff Diplomatic Apartment-1 to identify poor workmanship and incorrect installations affecting heating, ventilation, and air conditioning systems. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response, May 2017: OBO concurs with this recommendation. Caddell has qualified professionals on site in Kabul for the NOX and SDA-1 projects, with frequent oversight by qualified professionals from OBO- Washington. In this case, OBO professionals reviewed all submittals, plans, specifications of the project, as well as all installation methods and materials, and determined the installations to be installed per the contract. At the time of the OIG inspection, there were many punch list items left to be completed, and any installations that did not comply with the contract were brought to Caddell's attention for mitigation at its expense.

OIG Recommendation 10: OIG recommends that the Bureau of Overseas Building Operations implement actions to correct all heating, ventilation, and air conditioning system installations in the New Office Annex and Staff Diplomatic Apartment-1 that do not conform to the contract requirements, including the specific examples OIG cited in this report.

OBO Response, May 2017: OBO concurs with this recommendation and informed Caddell that any installations not in compliance with the contract must be mitigated at its expense.

OBO addressed specific HVAC issues listed in the draft OIG report below. Each OIG comment is in red followed by the OBO response:

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- **The chilled water supply pipe on the rooftop of the NOX is placed too close to the chiller, restricting access to the compressors for maintenance.**

  - **OBO concurs that the placement is not optimal. However, relocating the chilled water line would require shutting down the system. The compressor is accessible and still receives adequate airflow. Moving the chilled water line at this point would give little benefit and would cause substantial disruption to the occupants. The current placement meets code and manufacturer's requirements for minimum clearances.**

- **The hot water unit heater in the mechanical room on the 7th floor of the NOX is installed too close to boiler box-7-2.**

  - **Field verification shows that the heater is not obstructing the access panel of the boiler. The bottom of the heater is above the top of the access panel. OBO verified and removed the access panel with no issues.**

- **USACE identified multiple incidents of the use of galvanized pipe fittings in ductwork for HVAC systems in the NOX and SDA-1.**

  - **OBO concurs that, if dissimilar metals are connected together, i.e. copper and steel, a dielectric union must be used to prevent any galvanic action. There is no galvanic action between a steel pipe and galvanized steel. If there are examples of dissimilar metals without dielectric unions, OBO will inform Caddell that any installations not in compliance with the contract must be mitigated at its expense.**

- **Both the NOX and SDA-1 rooftop mechanical equipment rooms have numerous improperly installed pipe hangers.**

  - **OBO concurs that pipe hangers must be securely fastened with little to no movement. However, since the release of this report, OBO has field-verified both NOX and SDA-1 mechanical rooms, and did not find any loose hangers in either building. The issue may have been corrected prior to issuance of the OIG report.**

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OIG Recommendation 11: OIG recommends that the Bureau of Overseas Buildings Operations identify and relocate all inaccessible smoke detectors in the New Office Annex and Staff Diplomatic Apartment-1 so that they can be accessed for periodic testing and maintenance.

OBO Response, May 2017: OBO concurs with this recommendation and OBO Kabul relocated all smoke detectors requested by OBO Fire in the NOX and SDA-1. Detectors identified by contract maintenance staff will be relocated by the contractor and confirmed to meet NFPA 72 requirements by OBO Fire during future visits this calendar year.

OIG Recommendation 12: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the certification of fire safety systems conduct a full inspection of the New Office Annex and Staff Diplomatic Apartment-1 elevator lobby fire doors and the Staff Diplomatic Apartment 1 efficiency suite connector door frames to determine whether they meet National Fire Protection Association code standards. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response, May 2017: OBO Fire evaluated this recommendation and, as the authority having jurisdiction (AHJ), determined the elevator lobby doors, as installed, meet the intent of International Building Code (IBC) Section 707.14.1. This allows the doors to be installed as smoke partitions in lieu of fire partitions in buildings protected by an approved automatic fire sprinkler system. Therefore, the doors do not have any rating requirement and the astragals do not degrade any fire rating of the door. The astragals were installed at the request of the AHJ to ensure the doors met the smoke partition requirements of the IBC. The astragals do not need to be removed and should be considered a part of the door hardware.

The efficiency suite connector doors and frames meet current fire protection requirements. Upon further inspection, the fire rating labels for the frame were found to have been obscured by moldings. Attached photos show the door and frame do have the required ratings and meet NFPA 80 requirements.

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OIG Recommendation 13: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to replace and correct all elevator lobby doors and efficiency suite connector doors in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements or National Fire Protection Association standards.

OBO Response, May 2017: OBO does not concur with this recommendation. As noted in OBO's response to Recommendation 12, the AHJ determined the elevator and efficiency suite doors did not require replacement. The efficiency suite doors were recently discovered to have had their fire door labels obscured by moldings.

OIG Recommendation 14: OIG recommends that the Bureau of Overseas Buildings Operations have a qualified professional experienced in the certification of elevators to meet EN 81 standards conduct a full inspection, analysis, and recertification of the New Office Annex and Staff Diplomatic Apartment-1 elevator sets. This inspection should include a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials.

OBO Response, May 2017: Caddell has qualified professionals on site in Kabul for the NOX and SDA-1 projects, with frequent oversight by qualified professionals from OBO- Washington. In this case, a qualified

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OBO professional with experience in the certification of elevators to meet EN 81 standards conducted a full inspection, analysis, and certification of the NOX and SDA-1 elevator sets. This inspection included a comprehensive review of all submittals, plans, and specifications, as well as all installation methods and materials. At the time of the OIG inspection, there were many punch list items left to be completed. The elevators are currently operational and safe. Most punch list items have been resolved and verified by OBO. The original equipment manufacturer is currently under contract to provide maintenance under an extended warranty agreement.

OIG Recommendation 15: OIG recommends that the Bureau of Overseas Buildings Operations implement actions to correct all work related to the elevator sets in the New Office Annex and Staff Diplomatic Apartment-1 found not to conform to the contract requirements.

OBO Response: May 2017: OBO concurs with this recommendation. Any issues that do not comply with the construction contract will be corrected at the contractor's expense. The elevators are still under warranty and all issues are being mitigated at the contractor's expense.

OIG Recommendation 16: OIG recommends that the Bureau of Overseas Buildings Operations establish and implement standards for quality assurance and oversight for construction projects, including (a) minimum number of staff members assigned to provide management oversight, administration, and quality assurance on the basis of the size and complexity of the project and (b) minimum requirements for quality assurance staff regarding years of experience and technical qualifications.

OBO Response, May 2017: OBO concurs with this recommendation. While OBO varies technical staff based on individual project needs, in practice, OBO typically assigns 3-6 American engineers and architects to major capital security construction projects, complemented by a similar number of locally employed (LE) staff engineers.

From OBO's Construction Management guidebook:

> **The composition and number of technical personnel on the Project Directors staff depends on the requirements of the project. The staff typically includes civil/structural, mechanical, and electrical disciplines. Staffing of one senior and one junior**

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> Foreign Service employee is recommended for these projects. Larger projects may include a Construction Manager, an administrative coordinator, and other technical consultants. In addition to the technical staff, the office may be supplemented by appropriate administrative personnel.

These engineers may be Personal Service Contractors (PSCs), American third-party contractors (TPCs), or LE staff. OBO prefers experienced engineers on the quality assurance staff, but also has position classifications for Construction Inspectors, which are typically experienced tradesmen without technical degrees.

While the qualifications of these worldwide positions have changed somewhat over the years, OBO currently uses this language to advertise for onsite technical personnel:

> Qualified personnel shall be provided in the following disciplines: Architect, Civil Engineer, Mechanical Engineer, Electrical Engineer, Project Controls Engineer, Civil Inspector/Technician, Mechanical Inspector/Technician, Electrical Inspector/Technician, Safety Inspector/Officer, Construction Manager, and Field Technician/Tradesman. Candidates must have a minimum of seven (7) years of experience working on active construction sites. Candidates proposed for Field Tradesman/Tradesman labor category must have a minimum of seven (7) years of experience working on active construction sites.

Staffing remote, dangerous posts, such as Kabul, remains a constant challenge for OBO, particularly given the one-year length of tours or contracts for Americans and frequent turnover of LE staff. OBO is working with Embassy Kabul and NEA-SCA/EX to be included in the Third Country National program, similar to the program in Iraq, to reduce the impact of LE Staff turnover. Also, in coordination with NEA-SCA/EX, OBO sends regular Department requests for volunteers for specialty engineers to go to Kabul on TDY assignments. In some cases, OBO has requested that Commissioning Agent contracts be expanded to augment site technical staff.

Technical staff employed by OBO for quality assurance supplement the staff OBO requires for contractors to have on site for quality control or

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direct control of compliance with the contract's technical requirements. Quality assurance staff oversee the contractor's quality control efforts and provide an additional layer of control over the construction process.

OIG Recommendation 17: OIG recommends that the Bureau of Overseas Buildings Operations assign a project manager to oversee all efforts related to the inspection, analysis, recommissioning, and required repairs of existing installations in the New Office Annex and Staff Diplomatic Apartment-1. This project manager should help to prioritize corrective actions to address identified deficiencies and coordinate with key stakeholders in order to ensure that they are completed in a timely, cost-effective, and efficient manner.

OBO Response, May 2017: OBO does not concur with this recommendation. All items listed as defects in the OIG report have been resolved or are actively being pursued by OBO's field staff. Additionally, OBO conducted a senior-level review of these facilities and did not find any issues out of the ordinary for a very large capital project, particularly given its remote location. OBO's Mechanical Engineering Branch has detailed a senior mechanical engineer to review ongoing mechanical coordination on the Kabul compound, and has been actively engaged with punch list issues in the SDA-1 and NOX buildings. The primary construction contract is not finished and the contractor remains on site and fully engaged on the issues.

As stated in a previous OIG report response, OBO acknowledges the OIG's larger point that some punch list items have lingered too long. OBO has informed Caddell that it is to direct resources to complete this work, and that OBO will pay particular attention to punch list issues in the SDA 2/3 buildings that may affect occupants after move-in.

OIG Recommendation 18: OIG recommends that the Bureau of Overseas Buildings Operations either a) require Caddell Construction, Inc. to replace and correct all work in the New Office Annex and Staff Diplomatic Apartment-1 found to be defective or non-conforming to contract requirements or b) seek an appropriate adjustment in contract price for all instances where, in the public interest, the Bureau of Overseas Buildings

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Operations consents to accept work that is defective or does not conform to contract requirements.

OBO Response, May 2017: OBO concurs with this recommendation. OBO notified Caddell of all lingering punch list issues in the NOX and SDA-1 that have not been corrected in a timely manner. If the contractor fails in its contractual duties, OBO will seek A/LM's assistance to adjust the contract price to cover the cost of the U.S. government performing this work via alternative methods. Thus far, Caddell has not refused to meet any of its contractual responsibilities in either SDA-1 or the NOX.

OIG Recommendation 19: OIG recommends that, in all cases where the Bureau of Overseas Buildings Operations conducts an inspection, analysis, or recommissioning of existing installations in the New Office Annex and Staff Diplomatic Apartment-1 and finds the work to be defective or nonconforming in any material respect due to the fault of the contractor or its subcontractors, the Bureau of Overseas Buildings Operations should a) determine the cost of all inspections, analysis, or recommissioning of existing installations and b) recover this amount from Caddell Construction, Inc.

OBO Response, May 2017: OBO concurs with this recommendation. OBO conducted a senior-level review of the facilities and did not find any construction defects out of the ordinary for a very large capital project. The contract language provides ample provisions to seek recompense from the contractors for repeated re-inspections, negligence, or outright failure to complete work under contract. OBO reviewed the contractor's deficiencies in SDA-1 and the NOX buildings and did not find any workmanship that rises to these levels; however, should any arise, OBO will invoke this contract language and seek recompense.

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ABBREVIATIONS

COR	Contracting Officer's Representative
FAR	Federal Acquisitions Regulation
HVAC	Heating, Ventilation, and Air Conditioning
NEC	National Electrical Code
NFPA	National Fire Protection Association
NOX	New Office Annex
OBO	Bureau of Overseas Buildings Operations
OBO/CFSM	Bureau of Overseas Buildings Operations, Construction, Facility, and Security Management
OBO/CFSM/CM	Bureau of Overseas Buildings Operations/Construction, Facility, and Security Management/Construction Management
O&M	Operations and Maintenance
PAE	Pacific Architects and Engineer
SDA-1	Staff Diplomatic Apartment-1
QA	Quality Assurance
QC	Quality Control
USACE	U.S. Army Corps of Engineers

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