Smith Aquatic & Fitness Center Condition Assessment Report

March 13, 2020

Prepared for:
City of Charlottesville, Virginia
Facilities Maintenance
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VAE Project No. 20001

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EXECUTIVE SUMMARY

Virginia A&E (VAE) has completed a systems level condition assessment of the Smith Aquatic & Fitness Center in Charlottesville, Virginia. The City plans to use this report as a basis to determine additional repairs to implement in conjunction with a Natatorium HVAC improvement project currently being designed by Lawrence Perry Associates (LPA) to improve indoor air quality.

Figure 1

PROJECT BACKGROUND

The Smith Aquatic and Fitness Center is a 27,000 SF indoor aquatics and fitness facility that opened in 2010. The City has worked to improve indoor air quality in the building since original construction. Improvements to the pool chemistry water treatment systems and HVAC systems serving the Natatorium have been made. Efforts have been taken to minimize infiltration around window openings and doors of the building envelope as well as through the wall and doors between the Natatorium and Second Floor Lobby, Fitness Center, and Mechanical Room.

VAE previously made recommendations in 2015 to seal openings in the dividing wall between the Natatorium and other areas of the building, seal openings in the Mechanical Room envelope to other areas of the building, and seal openings in the exterior envelope of the Natatorium. This was to support HVAC modifications to provide appropriate make-up air and ventilation as part of a Paddock Evacuation system in the Natatorium designed by LPA and reduce the potential for chlorine vapor transmission to other portions of the building. Once those HVAC modifications were implemented and performance validated, the City planned to clean and/or paint surfaces with visible corrosion.

Complaints of chemical smells continue from pool and office staff. City staff indicates the office area does not always maintain a positive pressure relative to the Natatorium as part of original design. A design to

replace the original pool dehumidification units (PDUs) and increase air changes within the Natatorium is currently in process with LPA. The City plans to use this report as a basis to determine other repairs that should be performed in conjunction with the building closure for the PDU replacement.

The City requested assistance from VAE in 2020 to perform a visual, non-destructive condition assessment of the building systems to remain post implementation of the LPA design in progress. VAE visually assessed the major building system components including:

- Exterior building condition including foundation/structure, walls, roof, windows/doors, and trim,
- Interior building condition including floors, walls, and ceilings,
- Mechanical systems condition relative to heating, cooling, exhaust, ventilation, controls, and instrumentation,
- Plumbing fixtures, equipment, water distribution, sanitary collection, and special systems,
- Electrical service, distribution panels, branch circuit panels, circuit breakers, dry type transformers, interior lighting, exterior lighting, receptacles, data outlets, cables, telecommunications, backup power, and lightning protection,
- Fire Protection/Life Safety relative to fire sprinkler, fire alarm, fire stopping, emergency/egress lighting, and fire extinguishers,
- Safety/building code relative to accessibility, egress, stairs, fire control capability, and fire resistance; and
- Provisions for handicapped.

Specific items identified by the City prior to the initial site visit included:

- Natatorium light fixtures and electrical wiring,
- Ballasts or starters of lighting systems,
- BAS wiring and control components,
- Step down transformers,
- Pool control equipment as found in the boiler room,
- Audio equipment and wiring,
- Any AV equipment and wiring,
- Electrical duplex or receptacles,
- Electrical panel boxes and circuit interrupters,
- Door and door hardware,
- Window systems and seals,
- Drinking fountains,
- Restroom and locker room fixtures and furnishings,
- Chemical closets,

- Janitor closets; and
- Domestic water heaters or transfer lines from solar heaters.

On Tuesday, February 25, 2020, Bill Allen, Wyatt Torrence, Steve Hovis, Sherard Karunaratne, and Keith Hudson visited the site to observe existing conditions. Bill Allen visited again March 11, 2020. Specific concerns identified by the City during the initial site visit included:

- Air tightness and sealing of wall between the Natatorium and Fitness Center,
- Sealing of upper level mechanical room walls and lower level pump room,
- Exhaust for above mentioned mechanical rooms,
- Solar on roof (in need of repair),
- New lighting for Natatorium as well as accessibility for maintenance,
- Upgrade of BAS,
- Possible generator installation; and
- Assessment of cleaning storage rooms and better ways to promote cleanliness and organization.

The City indicates the UV light system previously used for water treatment had been replaced with a Clear Comfort Advanced Oxidation Process system.

GENERAL BUILDING DESCRIPTION

The Smith Aquatic & Fitness Center fits into the hilly terrain of Central Virginia with grades sloping east to west. The main building entrance from the upper parking lot, located on the east side of the building, accesses the second floor of the building including a lobby, reception area, two offices, spectator seating for the Natatorium, single-use male and female restrooms, fitness center, multi-purpose room, and mechanical room with HVAC equipment, ductwork, water heaters, and electrical panels. There are two (2) doors to the Natatorium spectator seating area, one from the lobby area and the other from the fitness center.

Figure 2

Figure 3

The first floor of the building, approximately 16' lower, includes a lobby, male and female lockers/showers/toilet rooms, family changing area with two single-use restrooms attached, janitor/supply closet, wet instructional classroom, pool equipment room, mechanical room for solar hot water heater storage tanks and ground source filtration system (formerly the recycling room), electrical room, filter/water/sprinkler room, office space for the aquatics director and lifeguards, and the Natatorium. An open stair and elevator connect the lobbies on each floor.

The Natatorium area is approximately 12,800 SF with a low roof height top of steel of 32'-0" and high roof height top of steel of 36'-8". There are three (3) exterior doors in the Natatorium area: one (1) of the doors is a double-door on the west wall near the southwest corner of the space to the lower parking lot and two (2) on the north exterior wall toward the northwest building corner.

Figure 4

The wall between the Natatorium and the remainder of the aquatic center is a finished face CMU wall with an air barrier membrane that continues up the entirety of the wall except around louver entrances. There is a blank off panel that continues the air barrier to the roof in the mechanical room at the louver opening. The exterior walls of the Natatorium include ground face CMU, storefront, curtain walls, and sunshade elements.

OBSERVATIONS AND DISCUSSIONS

The following observations were noted by VAE during the limited visual inspection of the structure:

General

Building was sparsely occupied during both visits; patrons peaked with scheduled activities in the pool. Several swimmers were observed using the pool. Several family groups were observed in the family changing area. Several people were observed in the Men's Locker Room. Staff included two at the reception desk, one in the fitness center, the pool equipment maintenance supervisor, the aquatics director and

approximately four lifeguards. Air quality, air balance, and air infiltration are ongoing questions with this building. City staff indicates the office area does not always maintain a positive pressure relative to the Natatorium as part of original design.

A second floor egress door on the south side of the building near the restroom corridor was propped open upon arrival of both visits. On the initial visit, staff indicated propping the door was routine to resolve odor and fresh air complaints from the reception desk. The door was closed for a limited period to see what impacts closure would have on pressure within the building. Building pressures were planned to be observed (or felt) with pressure differentials on doors throughout the second floor. VAE staff suspended this operation and reopened the door within a couple minutes in response to commentary and coughing overheard from staff at the reception desk.

Figure 5

Double doors 116B and 109 had a minimum of one leaf propped open upon arrival both visits. Doors were closed for a limited period on the follow-up visit. A piece of paper was used around the perimeter of several doors to detect air flow generally in the direction of the Natatorium. Exterior doors on the north wall of the Natatorium were propped open both visits.

Figure 6

Figure 7

Large circulation fans are present on the pool decks within the Natatorium. The Aquatics Director indicated the fans promoted a feeling of fresh air to the lifeguards. The fans are sometimes used to increase exhaust at by propping open the two doors on the north end of the Natatorium. A Paddock Evacuator system was added to the Natatorium approximately five years ago. A small fan and evacuator are placed near the water slides in the northeast corner of the Natatorium. The larger component of the system includes fans that blow air against and down the north wall of the Natatorium with the return excavator located near the floor at the opposite end of the space. The intent is draw air at low velocity across the top of the pools to remove chlorine. Circulation fans located at floor level and discharging perpendicular to the Paddock Evacuator air flows most likely disrupt functionality of the evacuator system.

Figure 8

Figure 9

Chemical odors varied throughout the building with common observations both visits. Generally, lobbies on the first and second floor and the stairwell generally appeared fresher when migrating between spaces. The first floor corridor outside the wet classroom appeared to have a higher concentration of odor as did the second floor corridor leading to the fitness center. Concentrations appeared higher on the second visit than the first, likely due to changes in ambient conditions.

Architectural Systems

Building finishes generally appear to be in good condition. Floors are wearing well, including the polished concrete in the second floor lobby, restroom, and fitness area. The ceramic floor tile in the first floor locker rooms, corridors, restrooms, wet classroom, and lobby are in good condition; grout lines are darkening in some areas more than others. A diagonal crack is present in approximately every fourth 2x2 tile originating from the southwest corner of Family Changing Room 102. The cracking is most likely from a shrinkage crack in the underlying concrete floor slab. Some marks are present on the ceramic tile from relocation of the vending machines in the first floor lobby. The ceramic tile on the pool deck appears to be in good condition.

A few 2x2 tiles are missing at the threshold of the Natatorium egress door in the southwest corner of the building.

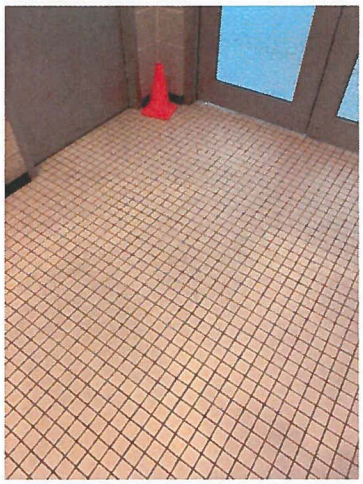

Figure 10

Figure 11

Figure 12

Acoustical ceiling systems are intact with no noticeable staining or deflection. Exposed structural and acoustical roof deck appears sound; areas painted approximately five years ago with epoxy based paint in the fitness center and lobby appear in good condition without recurrence of rust staining.

Interior walls are generally in good condition. Marks are apparent on walls from use throughout the building. Marks are apparent on the ground face CMU walls of Wet Classroom 110 apparently from storage of tables and chairs against the wall. Gypsum wall board appears wet behind the mop sink in Janitor/Supply Room 106.

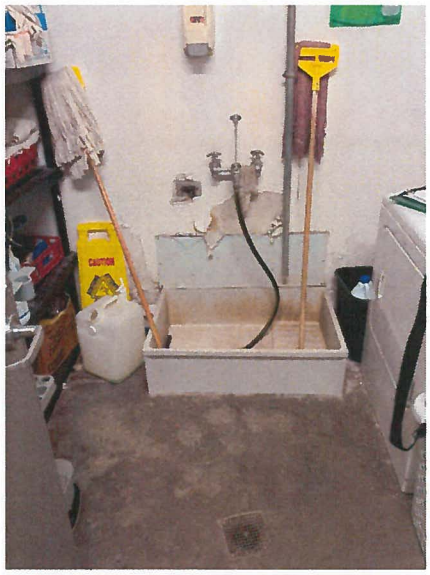

Figure 13

Stainless steel electrical device cover plates appear corroded in some areas, mainly in the restrooms on both levels of the building. Stainless steel trash cans in Changing Rooms 103 and 104 off located Family Changing Area 102 also appear corroded. In addition, stainless steel brackets supporting handrails along the stair between both floors appear corroded. ADA grab bars are corroded at the wall connection point in ADA showers in both the men's and women's toilet rooms within the locker rooms.

Figure 14

Figure 15

Figure 16

Figure 17

Specific areas of concern relative to air tightness include sealing of openings in the dividing wall between the Natatorium and other areas of the building and sealing of openings in the envelope of mechanical and pool treatment equipment rooms to other areas of the building. The following observations relate to air tightness and sealing of these areas:

- Numerous mechanical and electrical penetrations in the north and east walls of the Filter/Water/Sprinkler Room 112 are open to the adjacent spaces. Openings are apparent to the above ceiling space of the Wet Classroom and into Electrical Room 111. In addition, the door between Filter/Water/Sprinkler Room 112 and Electrical Room 111 was propped open during both site visits. Openings are apparent from Electrical Room 111 to the above ceiling space of Corridor 109 at pipe penetrations and along the top of wall. The exhaust fan within Filter/Water/Sprinkler

Room 112 was observed running with the control set to high. Anything not exhausted out of Filter/Water/Sprinkler Room 112 may migrate into the above ceiling area on the lower level of the building. This may also migrate through any penetrations not properly sealed in the second floor slab.

Figure 18

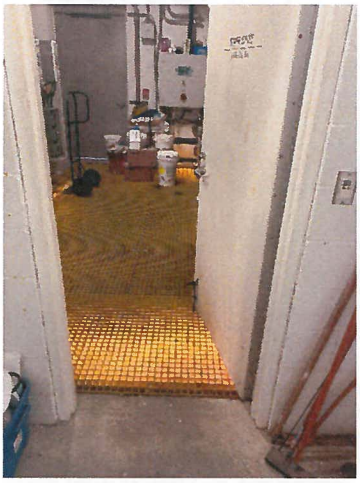

Figure 19

Figure 20

- It appears the second floor mechanical room is generally sealed off from the remainder of the second floor. A piece of paper was used along the base of the entrance doors during the second visit to observe air flow generally into the mechanical room. No apparent openings around duct and piping penetrations in the mechanical room floor slab to above ceiling space below. Top of mechanical walls appear to have been sealed with foam pipe insulation between the top of masonry wall and underside of acoustical deck per prior recommendations. Daylight was observed along the top of both the east wall toward the lobby and west wall toward the fitness room; prior foam insulation placement may have loosened. There is acoustical deck in the mechanical room that extends into adjoining spaces of the Second Floor. There is nothing to indicate that inserts were placed in the acoustical deck to prohibit air transfer through the deck between adjoining spaces. The space is highly congested with equipment, ductwork and piping inhibiting a complete view; additional observation should be feasible when the existing PDUs are removed.
- The dividing wall between the Natatorium and office areas has the potential for leakage around doors to the spectator seating area, louvers and ductwork into the second floor mechanical room, miscellaneous piping and electrical penetrations in the wall, and along the top, sides, and bottom of the wall. Prior work to seal the louver and duct penetrations appears to be holding. Piping and electrical penetrations in the wall generally appear sealed. An escutcheon on a pipe near the west end of the wall was loose, demonstrating the piping is not sealed to the gyp board wall finish. The ends of the dividing wall terminate to masonry on the west side of the building. Sealant may have been installed between the wall track and masonry wall, but no sealant is apparent between the gyp board and CMU. The top of the dividing wall is also subject to air transfer through the acoustical roof

deck. It appears a thin sheathing was previously added to cover the acoustical deck between the wall and a structural framing line approximately 16" off the wall into the Natatorium, however there are gaps in the sheathing and between the sheathing and the wall and steel beams that may allow air to transfer.

Figure 21

Figure 22

Figure 23

- The Pool Equipment Room does not house any pool treatment equipment and therefore sealing of penetrations is not as critical. There are openings at the top of walls to adjoining spaces and around pipe penetrations. The exhaust fan was observed to be running and set to high.
- Interior doors 112A and 112B between Filter/Water/Sprinkler Room 112 and Electrical Room 111 have no weatherstripping or seals to inhibit air movement to adjoining spaces. This may prove important if Door 112A is not routinely propped open for ease of access.
- Daylight is visible and sweeps are not present along the bottom of most interior doors. Jamb and head seals are present on most interior doors. Seals along the heads of Doors 116A and 116B are tacky and appear compromised. Double doors 116A, 116B, 102 and 109 have brush type seals where the doors join, but daylight is apparent between the doors.

Figure 24

Figure 25

The Natatorium generally appears in good condition. The following items were noted:

- Spray foam insulation used to seal openings between steel beams and columns along exterior west wall near top of the low level windows is crumbling to touch and at end of service life. This is likely the result of chemical attack.
- Braces for the Natatorium slide structure penetrate the masonry walls without any type of closure or sealant. This appears to be more of an aesthetic concern versus building performance based concern.

Figure 26

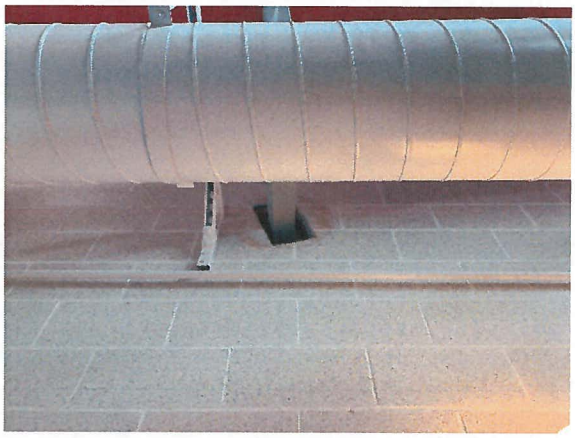

Figure 27

- There is moderate rusting on Natatorium slide access stair structure. In addition, the slide is faded.
- Storefront systems that separate the Natatorium 116 from other spaces include 1/4" laminated (non-insulated) glazing. This appears to be design intent per the original drawings. Glazing seals appear in good condition.

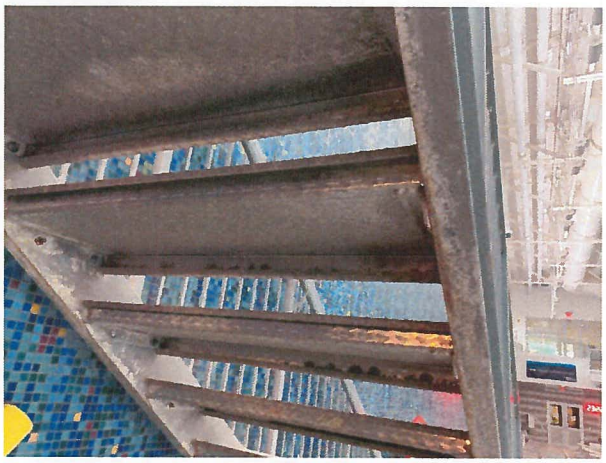

Figure 28

Figure 29

Additional observations from interior of the building are outlined below:

- Control wiring for the automatic door opener is exposed in the ceiling of Vestibule 200.
- The eyewash station in Filter/Water/Sprinkler Room 112 is not readily observable above the mop sink in the southwest corner of the space. The portable eyewash bottles are covered with dust. Shelf life of most portable eyewash stations is two to three years.

Figure 30

Figure 31

- AV equipment is limited within the building. There are several TV monitors in the fitness center, a message board TV in the lobby, and score board/message board in the Natatorium. All appeared in good condition.
- A cleaning agent spill is located under a shelving unit in the Janitor/Supply Room 106. A conduit rough-in through the metal deck/exposed structural ceiling of Janitor/Supply Room 106 is not sealed to the metal deck and open with pull string and no wiring. This may connect to an unused electrical box under the reception desk.
- Elevator appears to be in good condition. No indication of problems with elevator operation from City staff.

Figure 32

Figure 33

The building exterior generally appears in good condition. Observations are summarized below:

- Safety cones are located along the wooden walkway to the main building entrance. Boards appear rotten. In addition, black non-slip mats along the walkway may contribute to decay of the wood by retaining moisture beneath and give off heat and smells, particularly during warmer months.

Figure 34

Figure 35

- Exterior wood cladding, primarily associated with window, storefront, and curtain wall at various locations around the building exterior is aged.

Figure 36

Figure 37

Figure 38

- Exterior metal cladding generally appears in good condition. Dirt and debris have collected on the horizontal siding installation. Generally caulking for this system is concealed. Caulk is showing some wear where exposed in a few joints above the horizontal sunshade at the union of Natatorium and main entrance lobby on the building front (east side).
- Exterior ground face CMU walls appear in very good condition. A small area of efflorescence was noted on the north wall near the northeast building corner, but this tends to blend with the ground face CMU color.

Figure 39

Figure 40

- Cables to support vertical vine growth along the west exterior wall have limited use. Only one is in use for vertical vine growth. One cable is missing and at least two others are loose at the bottom and hanging free.

Figure 41

Figure 42

Figure 43

- A sloped exhaust cover on the south exterior wall and very near the southwest building corner is not properly sealed to the CMU. The cover appears to have shifted outward, possibly, when the interior duct was cut off and capped as one of the boilers was relocated exterior of the building.

Figure 44

- Window glazing, frames, and sealant generally appear in good condition. The windows are dirty, specifically, the windows associated with the Wet Classroom. No sealant is present along the base of most window units by design to avoid damming up the drain pan sill flashing; however, dirt and other debris collecting in the joint have the potential of damming up the sill flashing.

Figure 45

- A significant amount of caulk was used between exterior wall finishes and brackets supporting the sunshades around window, storefront, and curtain wall opening. Caulking is cracked in numerous locations.

Figure 46

Figure 47

- Daylight observed along jamb of exterior door 201B at the end of Corridor 211A. Door frame appears to be bent.

Figure 48

- Trim observed laying on the roof and loose in another location along the windows in the clerestory above slide area of Natatorium.

Figure 49

Figure 50

- A pipe penetration through roof membrane on west side of roof hatch is currently duct taped to prevent further leaks.
- Area of exposed perimeter insulation on northeast corner of building.

Structural Systems

The building's structural system consists of metal roof deck on a structural steel framing system of tube columns, pipe columns, wide flange beams, bar joist girders, and bar joist. The building foundation system consists of shallow spread footings based upon original construction documents. No cracks were observed in the exterior masonry veneer or elsewhere in the building indicative of settlement. No structural members appeared overloaded. Paint on exposed roof framing in the Natatorium, fitness center, and lobby steel appeared in good condition; no apparent signs of rust observed.

A fiberglass grating panel at access ladder for pump area beneath Filter/Water/Sprinkler Room 112 is only supported on three sides of the panel; side parallel to ladder is not supported. Panel deflects when walking on it.

Figure 51

Mechanical Systems

The building is currently served by ground source heat pumps. A pair of pool dehumidification units (PDUs) serve the Natatorium. The original water-to-water heat pumps feeding the PDUs have been replaced with a gas-fired boiler. The exhaust fans in the PDUs have been disabled and a separate exhaust system has been provided for the Natatorium. Seven (7) water-to-air heat pumps serve the remainder of the building. Rooms 114 and 115 (Aquatics Director & Lifeguard Offices) have been provided with ductless mini split system heat pumps. It is not known whether these are supplemental to or in lieu of the ground source heat pump system. An energy recover ventilator brings in fresh air and regains energy from bathroom and utility area exhaust. There are two pool water heaters. One has been replaced and relocated outdoors. The other is original and remains suspended in the first floor mechanical room. The current BAS is a Trend system which the facility is in the process of converting to Alerton. The wiring at the BAS panels was observed to be in good condition.

The building has had an ongoing problem with air from the Natatorium migrating to the other areas of the building. The facility has determined that the current systems are unable to maintain a negative pressure in the Natatorium relative to the remainder of the building. A design effort is currently in progress by LPA to replace the ground source heat pump system with a water source heat pump system with closed circuit cooling tower; to replace the (2) PDUs with (4) PDUs; and to replace the original pool water heater and relocate it outdoors. The building loop pumps, pool water pumps, air separator, and expansion tank are also being replaced. As part of this effort, the building airflow balance will be modified to produce the desired pressure relationship between the two sides of the building. Air changes per hour in the Natatorium will be increased.

The Natatorium relies on transfer air from the other side of the building per original drawings. The facility has stated that the damper in the transfer duct above the Family Changing Room has been closed. We also understand that the energy recovery unit turns off during unoccupied hours and the exhaust fan in the PDUs (which are no longer used) spin backwards. Since the Natatorium is relying on transfer air from the other side of the building (per original drawings), turning off the ERV will cause the Natatorium to draw its makeup air from wherever else it can. One of these paths may be the unused exhaust ductwork at the PDUs. This situation will be eliminated with the new PDUs which do not have exhaust, but the overall balance issue in the space will remain unless the operation of exhaust air and makeup air is coordinated.

The second floor lobby and reception area have had comfort and odor complaints. The return grille and thermostat for this zone are located at the reception desk. The receptionists are propping the exterior door open, and the resulting draft of ambient air at the reception desk prevents the thermostat from being satisfied. Spaces within this HVAC zone are overheated in the winter and under cooled in the summer. It has been proposed to cap the return duct at the reception area and provide a new grille high on the wall, and to relocate

the thermostat to the wall between Offices 202 and 203. While this may provide relief to other spaces within this HVAC zone; the building's HVAC system will never perform to design operation with exterior doors continually propped open.

Another potential source of odor migration is through the wheel on the energy recovery unit, although it is unlikely that the amount bleeding through the wheel would account for the extent of the problems being **reported**. There was also discussion of the common outside air intake for the PDUs and the ERV; however, we do not believe this is an issue in a properly balance building with the Natatorium maintained at a negative pressure. It appears more critical to remedy other areas first before looking at this. A more probable source of odor migration is the fresh air intake on the roof. While the City has increased the distance between the intake and the Natatorium exhaust well beyond the code minimum of 10 feet, it's possible that under certain wind conditions the exhaust air is being drawn back into the building.

Equipment in the second floor mechanical room appears in good condition for its age. It does not appear that chlorine migration has caused corrosion. The same cannot be said for the first floor mechanical room. Corrosion was observed on metal pipe and fittings along with support hangers. Some of the pipe could be brushed cleaned and painted with a rust inhibiting primer and paint system, such as the steel gas and sprinkler pipe. Some flange bolts, pipe hangars, and iron pipe fittings are badly corroded. Some of the insulation on the domestic water has been damaged. The carbon dioxide cylinder is badly corroded.

Figure 52

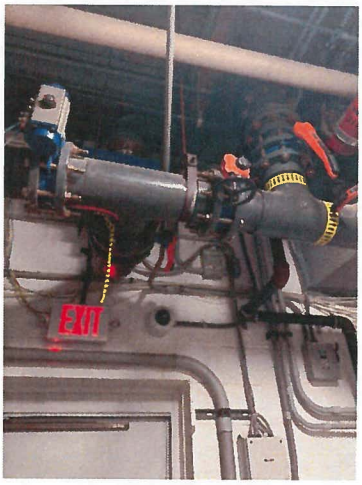

Figure 53

Figure 54

Another issue observed is in the Men's Locker / Shower room. There is a 6x6 exhaust grille at the showers with a 24x24 diffuser directly adjacent to it. It is likely that the supply air is short circuiting to the exhaust grille and the humidity is not being removed. According to the drawings, these two devices in the Women's Locker/ Shower room have slightly more separation but probably not enough to prevent a similar concern.

Air devices are generally dusty throughout the building; some worse than others including the wet classroom.

Figure 55

Plumbing

The domestic water heating system consists of (4) solar water storage tanks which feed through (5) gas-fired instantaneous heaters which in turn feed through a 30-gallon electric water heater. The solar panel arrays have broken tubes and the solar heaters are not in use. This is not the first time the facility has experienced broken tubes and the cause has not been identified. The sketch available for the solar heating system does not indicate the use of glycol or show a glycol tank, but the facility mentioned that glycol is used. The flexible sections of the outer conduit for the transfer lines on the roof are aging and have cracked and split in places; however, the copper pipe that could be observed inside appears to be intact. The 30-gallon electric water heater sits in a drain pan and appears rusted.

Figure 56

Figure 57

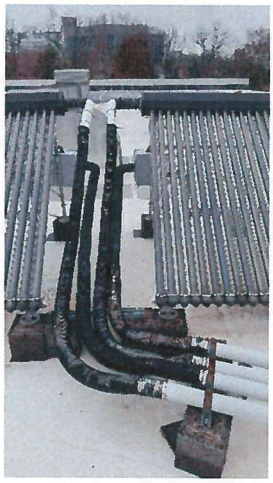

Figure 58

The plumbing fixtures throughout the building appear to generally be in good condition. The sensor flush valve in one of the second floor restrooms is not working and requires manual flush. A couple water closet seats are not aligned with the water closet. Lavatory mounted in Family Room 104 appears to be loose and pull away from the wall. Corroded pipe and fittings were observed beneath the lavatories on the second floor

and first floor family restrooms. The lavatory piping in the Men's and Women's Locker Rooms was not observable. Some of the strainers at lavatory drains have rust.

Figure 59

Figure 60

All showers except for two ADA units are fed from a thermostatic mixing valve. Drawings state that the valves are set to discharge 100°F. The facility has stated that there are ongoing occupant complaints regarding water temperature being too cool. According to the drawings, hot water lines are heat traced throughout the building to within 15' feet of plumbing fixtures and not after the thermostatic mixing valves. LEED certification requires such to reduce water usage. All showers except for two ADA and two family have push button metering valves to initiate a shower. The metering valves were observed to only operate for about 5 seconds before turning off, compared to the 45 seconds claimed in the basis-of-design literature. The short cycle may also contribute to cold water complaints. The facility has stated that these metering valves are going to be replaced.

Figure 61

Figure 62

The pool filter and treatment equipment in the first floor mechanical room varies in condition. Plastic components appear to be in good condition. Metal pipe shows corrosion. The worst conditions are in the pump room below the grating. Components in this area show significant corrosion and the pump casings are rusting. These elements will likely require replacement within 5-10 years.

Figure 63

Figure 64

Figure 65

The original UV treatment system for the pool has been converted to a hydroxyl-based advanced oxidation process system. Pool maintenance staff indicate this has reduced the amount of chemical treatment required for the pools and associated chlorine concentrations that develop within the water.

Fire Protection

The building is non-combustible construction. No wood elements were observed interior of the building. Wood cladding is present exterior of the building.

Figure 66

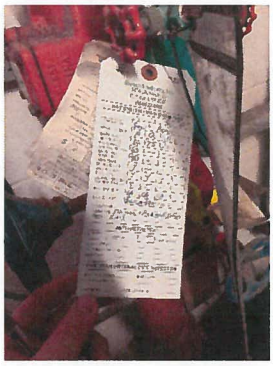

Figure 67

Figure 68

The building is protected by an automatic fire sprinkler system with piping and heads located throughout the building. Piping, specifically the fittings, exhibit more signs of corrosion than typical of a building of this age. The fittings on the blow down at the sprinkler riser are highly corroded. Inspection cards on the sprinkler riser assembly demonstrate annual testing with last inspection in 1/14/20. Sprinkler heads and escutcheons are painted white and generally appear in good condition throughout acoustical ceiling areas. It appears a plain finished head and escutcheon was used in the ADA shower of Women's Toilet Room 108B as both are highly corroded. Sprinkler heads to mechanical spaces were not readily observable.

The building is protected by an automatic fire detection. The fire alarm system includes visual and audible devices, smoke detectors and heat detectors throughout. The fire alarm system is tied into a remote system that notifies the fire department in the event of a smoke or sprinkler system alarm. The existing fire alarm system appears to be in good condition and audible, visual and manual pull stations appear to meet present codes.

Fire extinguishers are located typically near primary entrances with one in the lobby and three in the Natatorium as well as one in the fitness center and filter/water/sprinkler room. Photo Inspection cards on the fire extinguishers are typically dated 10/19.

Electrical

The building has a 208/120-volt, 3 phase, 1,600 amp service entrance switchboard and main circuit breaker that appear to be in good condition. The service equipment is protected by transient voltage surge protection equipment located near the service entrance switchboard. The switchboard feeds several branch circuit breaker panelboards located throughout the facility that all appear to be in good condition with no apparent over-dutied branch circuit breakers. One of the branch circuit breaker panels adjacent to PDU-1 was observed to have a cable entering the panel without the proper fitting to protect the cable insulation from the sharp edges of the panel penetration. The electrical service switchboard and branch circuit panelboards all appear to be in good condition, parts and circuit breakers are still available; there are no recommendations for these panels.

Figure 69

Figure 70

Figure 71

The facility has no provisions currently for a backup standby generator. Facilities Maintenance staff referred to looking into a standby natural gas fired generator for freeze protection of exterior boiler installation, backup heat, and emergency egress lighting during extended power outages. This would provide backup power for extended length emergency egress lighting and minimal building heating to protect the facility during freezing weather conditions. Modifications to the service entrance would be required to install an automatic transfer switch and an enclosed service entrance rated disconnect ahead of the automatic transfer switch. The

installation of a natural gas fired generator will not meet the VCC code for start time for life safety loads. Battery backup power system is required within 10 seconds to carry the life safety code loads during the generator start up time. Natural gas fired generators can take up to two (2) minutes to transfer loads to the generator.

The existing branch circuit receptacles and data outlets appear to be in good condition and in quantities as required by the facility. No extension cords were observed to be used for branch circuits. The need for additional receptacles was not readily observable.

The facility lighting is mostly fluorescent lighting. The lighting levels and lighting controls all appear to be in good condition except for the Natatorium lighting. The Natatorium lighting was originally high intensity discharge (HID) metal halide type lighting. The HID metal halide lighting fixtures have been upgraded to light emitting diode (LED) type lighting technology. The low lighting levels and distribution does not meet the Illuminating Engineering Society (IES) lighting levels and distribution standards. There are dimly lit areas within the pool that could create a safety hazard. The existing light fixtures are pendant mounted along the pool deck approximately 23' to 24' above the finished floor. The light fixtures are very difficult to access for maintenance purposes due to minimal width of pool deck and proximity to the pool edge. Chlorine concentrations in the Natatorium has resulted in corrosion of light fixtures, lamps, and lamp holders. It is not clear if the existing light fixtures were rated for Natatorium use or if high chlorine levels damaged the original fixtures.

Figure 72

Figure 73

Figure 74

Minimal emergency egress lighting is provided throughout the facility. Since the facility was occupied during the assessment, light levels of the emergency lighting system could not be obtained. The Natatorium egress lighting consists of quartz restrike lamps in approximately every other fixture. The quartz restrike fixtures have remote battery backup units in the second floor mechanical room. Each fixture has its own battery

backup control box. During the building observation, at least one of the quartz restrike lamps along the east side of the Natatorium continuously flickered.

Exit signs generally appear to be installed where required to lead the occupants to the egress path. It appears an exit sign above the Natatorium egress door toward center of the south wall was previously removed and not reinstalled. The original mounted remains in place. This may have occurred when temporary fans were affixed to this door opening and removed when the Paddock Evacuation System was installed. An exit sign near Door 115A (from Family Changing Room 102 into the Natatorium) and pointing toward the double egress doors on the east side of the Natatorium does not appear illuminated. Light from a nearby recessed can light appears to be illuminating the exit sign.

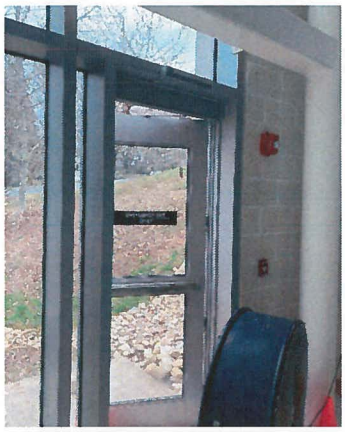

Figure 75

Figure 76

The building has minimal exterior building mounted general lighting. The original construction of the building did not have any building mounted general lighting. The city added two (2) LED type light fixtures installed at the roof level to light up the main entrance and side entrance. These two light fixtures are on a manual time switch control device. Ground mounted bollard light fixtures are installed near the building exit egress doors on the sides and rear of the building, but do not appear to be on any backup power system as required by the Virginia Construction Code (VCC). On the left side of the building the bollard light fixtures appear to have been installed on non-compacted soil and concrete bases. One fixture is leaning downslope, approximately 30 degrees from vertical.

Figure 77

Figure 78

Figure 79

The main entrance on the front of the building has two recess mounted compact fluorescent light fixtures with only one of them on a battery backup. These two light fixtures do not provide the VCC required emergency light level to a safe dispersal area or the public way during a power outage. Obstacles in the way of the safe area include passing over a wood bridge with a ditch on both sides. This area has no emergency egress lighting from the building to a safe dispersal area or the public way.

Egress on the north end of the Natatorium discharges onto a sidewalk along that end of the building, however the sidewalk does not connect to the parking lot. Egress components typical connect the public way exterior of the building per the VCC.

Figure 80

Figure 81

Figure 82

The building is protected by an automatic fire sprinkler system with piping and heads located throughout the Lightning protection is not present on the roof of the building. Calculations would most likely require lightning protection for a building of this size and use with current building code.

CONCLUSION AND RECOMMENDATIONS

General Recommendations

Building HVAC equipment including Natatorium ventilation equipment must be permitted to operate according to design intent. Airflows are intended to follow design path to maintain air balance. Exterior doors must remain closed and only opened for ingress or egress. Laminar airflow across the top of indoor aquatic facilities is typically a critical design element to remove chlorines. Fans specifically dedicated to move air for lifeguards may need to be more localized to the lifeguard stations and raised above the pool deck to minimize disruptions to the evacuator system. The design intent should be validated through a commissioning process including support of the design firm, contractor, mechanical, plumbing, and electrical subcontractors and verified by a third party commissioning agent provided by the City. The commissioning process should include validation above and beyond a simple testing and air balance report reviewed by the design firm. Commissioning should include on-site support and observation of equipment startup, testing, and performance monitoring through the building automation system.

Due to the history and sensitivity of air quality in this building, the City should monitor chlorine and/or other chemical levels pre and post renovations. Monitoring should be done at various locations throughout the building with an emphasis in the lobby, reception area, Aquatic Director Office, Lifeguard office, the Natatorium, and other areas where complaints are rampant. Post renovation monitoring should only be performed after the commissioning process has been successfully completed. This information would provide a qualitative baseline for evaluating performance pre and post renovations. This may also be used to educate staff and reduce complaints regarding air quality.

The quality of the existing ductwork construction should be evaluated once the PDUs are removed to provide better access. Poor quality ductwork will require sealing and/or replacement. Leak testing of new and existing ductwork associated with Natatorium HVAC would also substantiate air quality improvements being made with the renovations.

Once demolition is completed, the City should evaluate areas for air to transfer through the floor, walls, or ceiling of the second floor mechanical room. Any openings should be sealed.

Architectural Recommendations

1. Missing or cracked ceramic floor tile in Family Changing Room 102 and at threshold of the Natatorium egress door in the southwest corner of the building could be replaced while the facility is closed for renovations.
2. Provide storage racks in Wet Classroom 110 for table and chair storage to minimize marks on the walls.
3. Remove moisture-laden gyp board behind the mop sink in Janitor/Supply Room 106, remove any mold found, install moisture resistant gyp board, and expand the extent of fiberglass protective wall panels above the mop sink.
4. Clean corrosion from stainless steel surface including electrical device cover plates in restrooms, trash cans in family restrooms, and handrail brackets on interior stair and/or replace devices as required.
5. Seal all penetrations through walls and along the top of walls associated with Filter/Water/Sprinkler Room 112 and Electrical Room 111.
6. Perform smoke testing or other visual means to properly evaluate the leakage around the mechanical room. Reinforce prior closure along top of masonry walls around second floor mechanical room. Seal acoustical deck above walls around perimeter of second floor mechanical room. Further evaluation open in the perimeter walls and floors of the second floor mechanical room once all equipment and ductwork are demolished in pending renovations.
7. Perform smoke testing or other visual means to properly evaluate the leakage along the dividing wall between the Natatorium and second floor spaces. Reinforce prior closure of acoustical deck and/or replace as needed. Seal ends of wall ground face CMU in the fitness center.

8. Provide weatherstripping seals on Doors 112A and 112B between Filter/Water/Sprinkler Room 112 and Electrical Room 111 to reduce air movement between spaces.
9. Replace door seals along the heads of Doors 116A and 116B. Replace brush type seals in Double doors 116A, 116B, 102 and 109 to better seal the doors for air movement.
10. Remove spray foam insulation used to seal openings between steel beams and columns along exterior west wall near top of the low level windows. Replace with a chemical resistant grade sealant or foam insulation and/or a product that is paintable with a chemical resistant paint.
11. Clean the Natatorium slide access stair structure and paint with a rust inhibiting paint.
12. Confirm HVAC models for planned renovation incorporate non-insulated glazing in the storefront systems that separate the Natatorium 116 from other spaces.
13. Support control wiring for the automatic door opener in Vestibule 200 within the joint between the curtain wall and metal ceiling panels to conceal wiring to the greatest extent feasible.
14. Confirm portable eyewash bottles are not expired throughout the building. Confirm staff are educated on location of portable eyewash stations, specifically the station not readily observable above the mop sink in the southwest corner of Filter/Water/Sprinkler Room 112.
15. Seal conduit penetration to metal deck/exposed structural ceiling in Janitor/Supply 106. Seal exposed end of conduit with pull string. Add cover plate to associated electrical box under reception desk.
16. Several boards on wooden walkway to the main building entrance need to be replaced. All boards new and existing need to be cleaned and sealed. Consider replacing the non-slip mats along with the wall with a non-slip coating system installed on top of the wooden walkway members.
17. Clean and seal exterior wood cladding, primarily associated with window, storefront, and curtain wall at various locations around the building exterior, including the end of each member.
18. Clean the building exterior.
19. Add vines to grow vertically on cables on west side of building. Replace missing cables and hardware to reconnect other cables.
20. Reset the sloped exhaust cover on the south exterior wall and very near the southwest building corner to close the wall opening or remove and infill with ground face CMU to match existing.
21. Clean windows including removal of dirt and debris from the joint in the drain pan sill flashing along the bottom of the windows.
22. Remove and replace cracked caulking between exterior wall finishes and brackets supporting the sunshades around window, storefront, and curtain wall opening.
23. Exterior Door 201B at the end of Corridor 211A and/or associated door frame may require replacement to close air gaps at top of door if additional seals cannot be added to close gaps between door and bent door frame.

24. Exterior Door 201B at the end of Corridor 211A and/or associated door frame may require replacement to close air gaps at top of door if additional seals cannot be added to close gaps between door and bent door frame.
25. Reinstall trim on window units in clerestory above the slide area of the Natatorium.
26. Connect exterior sidewalk along north end of the Natatorium to the sidewalk along the rear parking lot.

Specific recommendations for storage in Janitor/Supply 106 follow:

27. Install one or two more mop/broom holders to help remove mops/brooms/cleaning equipment that aren't already hung up off floor.
28. Install/build wall mounted shelving on north, west, and south walls at various heights which supplies more storage and relocates remaining items off floor for easier ability to keep floors clean.
29. Use open grid boards/shelves on bottom most shelf to allow spills to get to floor unencumbered for easier clean up.
30. Store supply chemicals and other liquids on bottom most grid style shelving so there are less spills onto other supply items.

Structural Recommendations

31. Provide support parallel to ladder for fiberglass grating panel at access ladder for pump area beneath Filter/Water/Sprinkler Room 112.

Mechanical Recommendations

32. The City and LPA should discuss overall building air balance inclusive of exhaust air and makeup air before the PDU replacement design in process is finalized. This is a first step to determine if other pathways have been modified as part of efforts to mitigate chlorine odor migration.
33. A comprehensive TAB effort should be undertaken as part of commissioning that project to verify the airflow rate at every supply, return, exhaust, and transfer opening. All air transfer pathways shall be returned to their intended functionality.
34. The sequence of operations should be evaluated to determine if the correct pressure relationships are always maintained.
35. It has been proposed to cap the return duct at the reception area and provide a new grille high on the wall, and to relocate the thermostat to the wall between Offices 202 and 203.
36. Other improvements the facility is pursuing to mitigate migration of air from the Natatorium include sealing the wall between the Natatorium and the rest of the building and sealing the mechanical rooms. We suggest that exhaust airflow in utility areas be further evaluated, particularly where chemicals are stored.

37. If the rebalanced building continues to experience odor migration, it may be beneficial to engage an air quality vendor to determine the feasibility of installing a low level chlorine detector at any or all the following locations:
    a. In the outside air intake duct,
    b. At the reception desk,
    c. In the fitness center; and
    d. In the wet classroom.
38. Investigate Rooms 114 and 115 to determine whether they are still being served by the water source heat pumps system in addition to the ductless mini systems. The rooms are required to have occupant ventilation, and this excess air also serves to keep these rooms positively pressurized with respect to the Natatorium. If the airflow to these rooms from the main system has been disabled, it should be restored under the HVAC renovation project.
39. Cleaning and/or replacing some of the components in the first floor mechanical room is recommended once the room has been sealed and the exhaust rate set appropriately to dilute chlorine in the air.
40. Damaged insulation on the domestic water piping in the first floor mechanical room should be replaced.
41. The badly corroded carbon dioxide cylinder in the first floor mechanical room should be replaced.
42. Eliminate diffusers adjacent to exhaust grille in the both the Men's and Women's Locker / Shower room and the airflow shifted to the other diffusers in the rooms. This will also have the benefit of preventing air blowing directly on occupants in the shower.
43. City staff indicated the dryer vent line was recently blocked by lint. The city should verify the dryer vent fan is rated to push exhaust to the roof level which is approximately 33 feet above the first floor. If not, a booster fan may be added to the vent line or the dryer should be replaced with a commercial grade dryer rated to push exhaust to the require elevation.
44. Clean air devices to remove dust throughout the building.

Plumbing Recommendations

45. Verify the use of glycol in the solar arrays, along with making sure that there are no valves in between the expansion tanks and the pressure safety valves that could be closed. If there is no evident cause for the breakage, the vendor should be engaged. There are different types of solar arrays and the manufacturer will be best suited to provide input on what may be happening.
46. Replace the rusted 30-gallon electric water heater in the Second Floor Mechanical Room.
47. Verify the location of the cold shower complaints. If with all showers, the problem appears global and may require verifying functionality of the heat tracing on the hot water lines. If the problem is isolated to showers with push button metering valves, planned replacement of the valves may fix the problem. If not, verify the discharge setpoint on both shower thermostatic mixing valves are adjusted to 100°F and if so, increase the setpoint by a few degrees.

48. Secure lavatory or replace mounting in Family Room 104.

Fire Protection Recommendations

49. Clean and paint sprinkler pipe fittings above ceilings and in mechanical or storage areas without hard ceiling with rust inhibiting primer.
50. Replace corroded sprinkler head and escutcheon in ADA shower of Women's Toilet Room 108B.
51. Confirm status of corrosion on sprinkler heads in mechanical spaces; replace as needed.

Electrical Recommendations

52. Add proper fitting to protect cable insulation from sharp edges of the panel penetration on panel adjacent to PDU-1.
53. Most of the interior lighting except for the Natatorium are fluorescent lighting. Upgrading the fluorescent lighting to more energy efficient LED type light source would reduce energy consumption. The LED light technology is very energy efficient, approximately 40 - 50% less energy consumption than fluorescent lamps, with lamp life at approximately 50,000 hours vs 10 – 12,000 hours for fluorescent lamps.
54. The general lighting of the Natatorium is minimal at best, not to mention the extreme difficulty and expense of accessing the light fixtures in the Natatorium area for maintenance purposes. The existing light fixtures have been modified to include LED lamp sources, but do not provide the recommended lighting levels and light distribution. Replace fixtures with Natatorium rated enclosure with indirect distribution LED type light fixtures on the perimeter walls that are designed for adjusting the distribution of lighting across the ceiling to evenly light the pool surface, providing safety to the staff and the public. The installation of the wall mounted fixtures would require surface mounted conduits, painted to match adjacent surfaces and minimal junction boxes. Raceway installation on the mosaic tiled wall would be most challenging aesthetic. Accessing the wall mounted light fixtures would be much safer than the present pendant mounted light fixtures that are on the edge of the pool surface. Fixtures should be installed at a lower elevation than current, as determined by design calculations including lighting distribution and lumen output selection. Direct LED lighting would be recommended to replace the existing recessed compact fluorescent lighting illuminating the egress pathway under the spectator seating area.
55. Remove the existing damaged (not plumb) bollard light fixtures and associated concrete bases, compact the soils, pour new concrete bases on compacted soils and reinstall bollard light fixtures utilizing the existing branch circuit.
56. The emergency egress lighting is composed of mostly compact fluorescent light fixtures with integral backup batteries that in some cases have exceeded their useful life. A power outage during occupancy may prove enough battery backup emergency lighting is not present to allow comfortable egress from the building prompting the following recommendations:

a. Replacement of the existing emergency egress light fixtures with LED type fixtures on a central battery backup power system is recommended. With this type of battery backup system, the system is more easily tested by turning off lighting branch circuits and verifying the capacity of the backup batteries. There would be no need for test push buttons, climbing up ladders, etc.
b. The Natatorium emergency egress lighting should be designed as both normal and emergency lighting, with the battery backup system being fed from the central battery backup power system.
c. The main entrance requires emergency lighting to across the entry bridge to a safe dispersal area or the public way.
d. The side and rear entrances require emergency lighting to the public way. The existing branch circuits for all bollard light fixtures may be placed on a central battery backup power system; however, additional emergency lighting may be required further out from the building to access the public way.

57. Replace exit sign above the Natatorium egress door toward center of the south wall.
58. Replace exit sign near Door 115A (from Family Changing Room 102 into the Natatorium) and pointing toward the double egress doors on the east side of the Natatorium.
59. Consider adding lighting protection to the building; if not now, possible as part of a future roof replacement.

DISCLAIMER

This report was derived in accordance with current standard of care and professional practice to assist the City of Charlottesville in understanding both the nature and type of investigation associated with the building systems. The opinions and recommendations contained in this report are based on information provided by the Owner and on information gathered through a limited visual field investigation.

This report does not provide any warranty, either expressed or implied, for any portion of the existing structure. VAE assessed specific issues relevant to the concerns identified by City staff at the Smith Aquatic Center. We have made every effort to reasonably present the various areas of concern identified during site visits. Comments in this report are not intended to be comprehensive but are representative of observed conditions. This evaluation did not include review of concealed conditions, material testing, or detailed analysis to verify adequacy of the structure to carry the load, or check conformance with applicable codes. Repair recommendations discussed herein are conceptual and will require additional design effort for implementation.

This report has been prepared by Virginia A&E, PLLC for the exclusive use of the City of Charlottesville. Please do not hesitate to contact our office if you have any questions regarding this report.