Arrowhead Stadium Assessment

JCSCA + Burns & McDonnell

This document contains information pertaining to the condition of Arrowhead Stadium as documented by the Jackson County Sports Complex Authority (JCSCA), including descriptions, conditions, and exhibits which have been reviewed by Burns & McDonnell and documented in this report.

JACKSON COUNTY Sports Complex Authority

BURNS McDONNELL architecture + engineering

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Purpose

The Kansas City Chiefs organization has a lease with the Jackson County Sports Complex Authority (JCSCA) that requires the organization to maintain Arrowhead Stadium to a level consistent with a First-Class NFL Football Stadium. The purpose of this study is to report the overall condition of Arrowhead Stadium and the immediate environs to determine if the team is upholding their lease agreement.

Scope

Burns & McDonnell, in conjunction with the JCSCA, has developed a Facility Assessment Report that reviews and documents the stadium condition. During 2018, the JCSCA conducted an inspection of every space within Arrowhead Stadium. Each room was carefully examined and documented using iPad technology (Fuze Inspections mobile application by Evoco Inc.) during the walkthrough. This application allowed the JCSCA to build a database containing photos, condition ratings, and an inventory of building elements in each room. These elements included: a rating of overall room condition, electrical components, mechanical components, and various pieces of equipment, including, a listing of the type of floors, walls, and ceilings in each room. Checks of mechanical and plumbing equipment, life safety systems, including 24 hour monitored control rooms and fire suppression systems were also completed. Burns & McDonnell received the database from the JCSCA, spot-checked the database, interviewed Kansas City Chiefs staff and reviewed maintenance records. This report is based on the above review in conjunction with on-site evaluations by Burns & McDonnell engineers and architects.

Burns & McDonnell's scope is limited in nature and did not include an entire facility room-by-room inspection or evaluation. An on-site walk through of the stadium and the immediate environs was performed by Burns & McDonnell's engineers and architects to spot-check rooms and areas to compare that the overall conditions reported in the Jackson County Sports Complex Authority's condition reports align with the actual conditions as observed. Additionally, Burns & McDonnell has provided recommendations for observed maintenance issues that may need to be rectified in a timely manner.

General Description

Arrowhead Stadium, located at One Arrowhead Drive in Kansas City, Missouri. Arrowhead Stadium was completed in 1972 with a major renovation completed in 2010 that enhanced the fan game day experience, increased revenue generation, and improved the day to day operations of the Kansas City Chiefs and its other users. The stadium holds approximately 80,000 fans and offers amenities such as club level suites, luxury suites, bars, restaurants, and other venues geared towards large scale entertainment.

General Condition

In general, Arrowhead Stadium and the immediate environs were observed to be in satisfactory condition. It is apparent the Kansas City Chiefs have performed the ordinary cleaning and maintenance obligations consistent with a First-Class NFL Football Stadium.

Minor physical deficiencies were observed throughout various locations within Arrowhead Stadium and the immediate environs. Such deficiencies are expected in such a large facility and typical of a high-use facility. These can be addressed by the Kansas City Chiefs through standard maintenance procedures.

Recommendations

The final section of this document, labeled “Summary of Recommendations” includes recommendations for the deficiencies observed for each building or site category. Most observed deficiencies are generally minor and may require attention in a timely manner. Critical, more hazardous issues are less frequent, and the level of importance has been noted in the document to reflect the need for a resolution.

KC Chiefs Response Plan

The Kansas City Chiefs have developed a response plan to rectify the deficiencies observed by Burns & McDonnell this year. This plan includes the location of each deficiency, an action to correct or maintain the item of concern, and a date for which each item is to be addressed. This report can be found as **“Exhibit A”** attached to the end of this document.

Site Flatwork

Arrowhead Stadium houses a substantial amount of paved area throughout the arena grounds. These paved areas serve mostly as access walkways for pedestrians to traverse the stadium concourse, both inside and outside the security fencing. In addition to the walkways, stairs, curbing, and retaining walls make up the site flatwork. Overall, the site flatwork at Arrowhead Stadium was observed to be in satisfactory condition, apart from a few mild site defects.

The most common site defect observed on site was pavement cracking. Fatigue cracking, transverse cracking, spalling, and faulting of the pavement. Figure C-1 shows an example of transverse cracking found on site. Figure C-2 shows an example of corner cracking of the pavement that was observed in several areas throughout the stadium concourse. Figure C-3 shows cracking observed on several footings along the stadium fencing. Cracking that exceeds 1/4" should be further inspected and considered for replacement as it is primed to be subject to displacement due to freeze-thaw condition.

Other observed damages to the pavement included deteriorated joint sealant and damaged curb in several places within the concourse. Figures C-3, C-4 and C-5 show examples of joint sealant becoming completely detached from the pavement, leaving a considerable space for water entry. Figure C-6 shows an example of the damaged curbing.

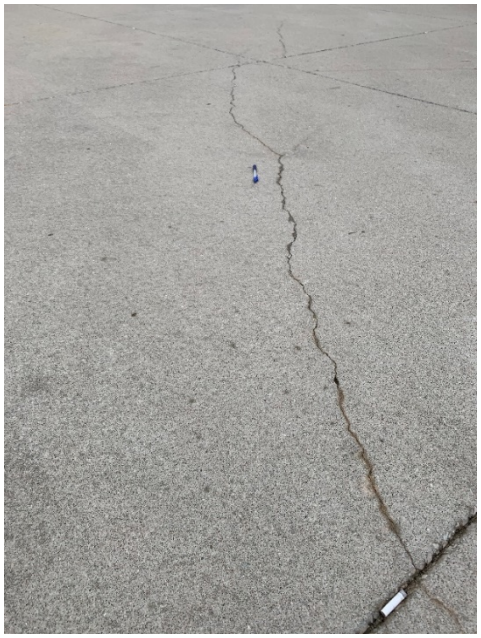

Figure C-1: Transverse Cracking
Location: Outside of Gate A (Founder's Plaza)

Figure C-2: Corner Cracking
Location: Adjacent to Gate H, Inside Security Fencing

Figure C-3: Cracking on Fencing Footing and Deteriorated Sealant
Location: Adjacent to Gate D, Inside Security Fencing

Figure C-4: Detached Sealant
Location: Adjacent to Gate H, Inside Security Fencing

Figure C-5: Detached Sealant and Displaced Sign Footing
Location: Southwest of Gate E (Tower Gate), Outside Security Fencing

Figure C-6: Curb Damage
Location: Southeast Corner of The Concourse, Outside Security Fencing

Other site appurtenances on site were evaluated, this included fencing, decorative walls, hand railings, light poles, and drainage structures. Minor site defects were observed and most of which was deemed to be in acceptable condition. Figure C-7 shows some damage to the perimeter security fencing. Figure C-8 displays a damaged doorway threshold protruding upwards approximately ½", which creates a tripping hazard for those entering and exiting the electrical room. Figure C-9 displays an area drain that is covered with decorative rocks, blockage of this structure will inhibit proper drainage. Figure C-10 depicts a detectable warning that has displaced and deteriorated. This can create a tripping hazard as the detectable warning should be flush and have minimal spacing between the blocks.

Figure C-7: Fence Damage
Location: Adjacent to Gate D, Inside Security Fencing

Figure C-8: Doorway Threshold Damage
Location: Outside Electrical Room P251

Figure C-9: Area Drain Covered
Location: Adjacent to The Southwest Helix Ramp

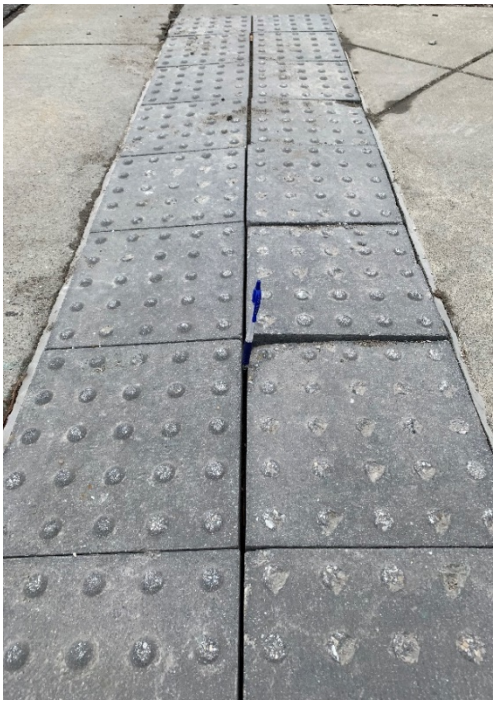

Figure C-10: Detectable Warning Displacement and Deterioration
Location: North of Gate A (Founder's Plaza)

Landscaping and Appurtenances

Various species of native planting and grass can be found between walkways and within planting beds surrounding the stadium. Landscaping around the stadium improves aesthetic appeal of the facility and provides visual breaks within the otherwise largely paved surface. Overall, the landscaping features were observed to be in acceptable condition, with only a few landscaping features containing defects. Figure L-1 shows deterioration of the mulch bed exposing the tarping underneath. Figure L-2 displays a barren area of the decorative rock bed.

Figure L-1: Deteriorated Landscape Bedding
Location: North of Gate A (Founder's Plaza)

Figure L-2: Deteriorated Rock Bed
Location: South of Gate E (Tower Gate)

Structure

The substructure is primarily concrete drilled piles with pile caps. Cast-in-place (CIP) grade beams are located around the perimeter and throughout the foundation system. CIP mat foundations support the stair and elevator core walls and CIP single spread footings also exist for lighter loaded structures. Floating slabs-on-grade exist throughout the facility.

During our assessment, the upper bowl seats where being removed. Figure S-1 shows a partially removed seat.

No significant settlement of the structure was observed. The slab-on-grade is primarily in satisfactory condition. No major cracks or spalling of the concrete were observed, however minor spalling was encounter in a few spots as shown in Figure S-2. Control joints and expansion joints are in satisfactory condition.

Figure S-1: Upper Bowl Seat Removal
Location: Entire Upper Bowl

Figure S-2: Concrete Spalling
Location: Upper Concourse Multiple Locations

The original superstructure is primarily cast-in-place (CIP) reinforced concrete columns and walls for the vertical support system with reinforced concrete pan joist slab system. During the renovations, additions were constructed which consisted primarily of CIP reinforced concrete columns. Other vertical support systems include Hollow Structural Section (HSS) columns, CIP reinforced concrete and concrete masonry (CMU) load bearing shear walls.

The Plaza, Club, Lower-Upper Concourse and Upper Concourse levels consist primarily of reinforced concrete pan and joist slab system. Concrete spalling was present at the rim of the upper bowl as shown by Figure S-3. The Horizon and Press level consists of light weight composite deck supported by steel wide flange beams. The roof levels primarily consist of steel roof deck supported by steel wide flange beams. Other roof systems consist of cold form metal joists with steel roof deck. The lateral resisting system consists of reinforced concrete load bearing shear walls. The scoreboard and advertising boards consists of built-up hollow steel shapes.

The original reinforced concrete columns and walls are in satisfactory condition. No major cracks or spalling was observed. The vertical column and wall surfaces are flat and smooth. Concrete patchwork of the original structure is in satisfactory condition.

The steel wide flange columns and beams are in satisfactory condition. Rust and corrosion was observed at the base of the scoreboard and speaker HSS columns as shown in Figure S-4. Scoreboard column base and mid-span connections are in satisfactory condition. Beam connections are in satisfactory condition. The steel decks are in satisfactory condition. No corrosion or significant deflection was observed.

Figure S-3: Corrosion from Concrete Spalling
Location: Rim of Upper Bowl

Figure S-4: Rust & Corrosion of Speaker Column
Location: Adjacent to Room 05.41.01

The original reinforced concrete pan joist slab systems are in satisfactory condition. No major cracks or spalling were observed. Minor cracking and spalling exist but are not detrimental to the structure and should be expected with a structure of this age. Minor cracking should be repaired to prevent further damage and degradation.

At various locations throughout the stadium, the glass drink-stop located in multiple suites, shown in Figure S-5, was loose. If not maintained, this could pose potential hazards to the occupants below.

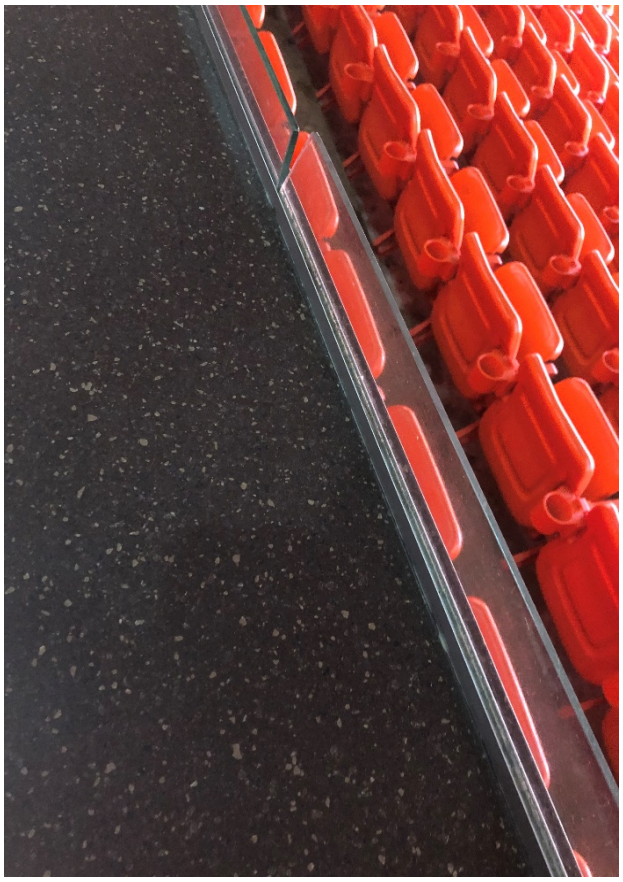

Figure S-5: Loose Glass Drink Stop
Location: Field Suite 119A

The handrails were observed at various locations throughout the stadium. Loose anchors are present in a few locations as shown as shown in Figure S-6. The grout at the base of the handrails was missing in multiple locations which leads to rusting of the base of the handrail. Refer to Figure S-7.

Figure S-6: Loose Handrail Support
Location: Player Tunnel 01.69.01

Figure S-7: Missing Grout and Rust at Base Handrail
Location: Multiple locations

Façades

Arrowhead Stadium incorporates a variety of finish materials that are used in the composition of the exterior façade, as shown in **Figure AF-1**. The primary surface materials include structural concrete, insulated metal panel, curtainwalls, and graphic mesh fabric on galvanized steel framing.

Stone veneer and glass storefront systems are utilized extensively along the base of the stadium, in addition to miscellaneous structures such as metal entry canopy, gates, and fencing.

Figure AF-1: Arrowhead Stadium Overall Exterior
Location: North East Parking

All facades, in general, appear to be in satisfactory condition. Glass storefronts and curtainwall systems appear to be in satisfactory condition, as shown in **Figure AF-2**. Aluminum frame and mullions were observed to be free of staining, fading, or degradation of any kind. Seals and flashing around storefronts appear to be in satisfactory condition. Glazing was observed to be free of defects, including cracking or chipping.

Insulated metal panel systems appear to be in satisfactory condition, as shown in **Figure AF-1** and **Figure AF-2**. No oil canning, staining, or degradation of any kind was observed.

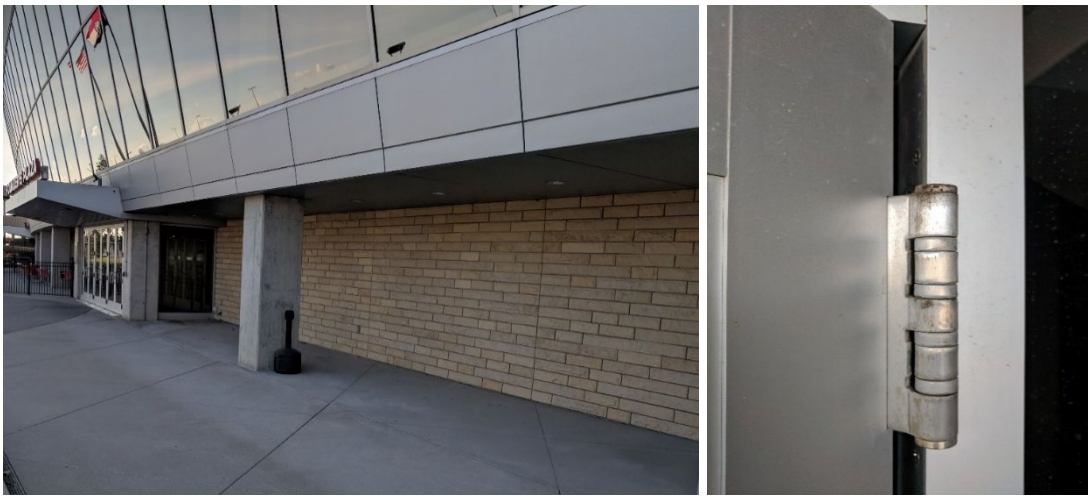

Figure AF-2: External Glass Curtainwall and Storefront Systems
Location: South East Exterior

Exterior doors at the exterior plaza level were observed to have minor deficiencies. As noted in the 2017 assessment, many of the door hinges in the various locations were showing signs of rust from the elements and again observed on the walk-through this year. Refer to **Figure AF-2** for the types of doors observed. To avoid rust stains or streaking on the aluminum frames, consider replacing hinges with an anti-corrosive material such as stainless steel.

Paint applied to steel angle lintels above Plaza Level hollow metal service doors appear to have been repainted. As noted in the 2017 report, the steel lintel above the windows at the Security & Fire Command room 03.54.02A appeared to be chipping and flaking once more, refer to **Figure AF-3**. To avoid exposing the steel lintels to moisture and eventual rust development, consider scraping and re-painting with an appropriate paint product which is specifically formulated for this material and exterior conditions.

Figure AF-3: Flaking Paint at Exterior Lintel
Location: Plaza Level 3 – 03.54.02A Security & Fire Command

Stone cladding systems appear to be in satisfactory condition, as shown in **Figure AF-4**. No chipping or staining of the stone or grout was observed.

Graphic mesh fabric systems anchored to galvanized steel framing was observed to be in satisfactory condition, typically. No signs of corrosion or rust on framing exist and fabric mesh panels appear to be free of rips, tears, or fading.

Figure AF-4: Stone Veneer Wall
Location: Plaza Level 3 – 03.54.02 Security & Fire Command

Internal storefront and glass wall systems appear to be in satisfactory condition, as shown in **Figure AF-5**. Aluminum frame and mullions were observed to be free of staining, fading, or degradation of any kind. Seals and flashing around storefronts appear to be in satisfactory condition. Glazing was observed to be free of defects, including cracking or chipping.

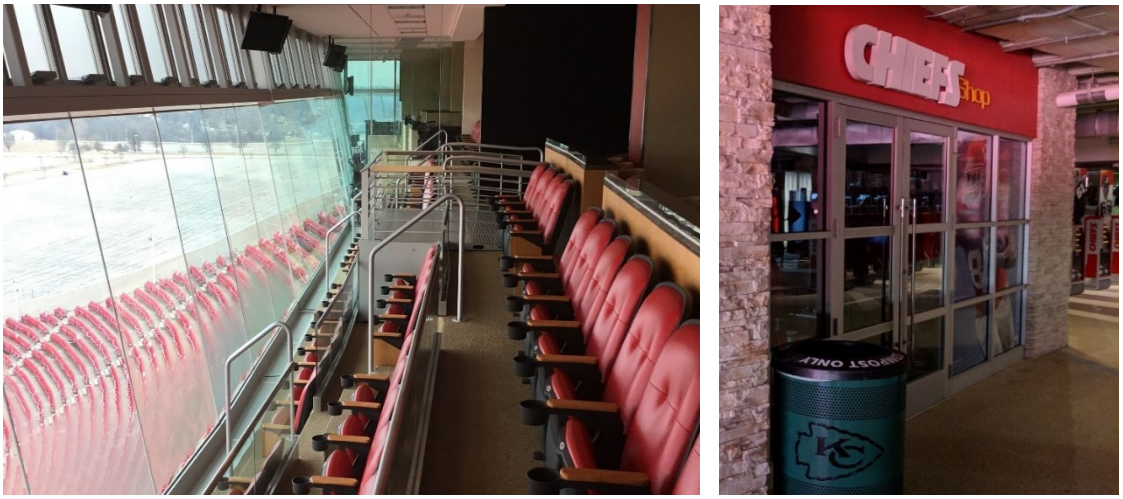

Figure AF-5: Windows, Storefront, and Sliding Glass Wall System
Location: Press Level 9 - 09.17.01 Cabaret Seating

Roofing

The roofing structures throughout Arrowhead Stadium vary greatly in composition. The primary roofing material utilized at the renovated office and event spaces is a Polyvinyl-Chloride (PVC) membrane on R-24 thermal insulation. Standing seam metal roof panels are also utilized at various locations around the facility.

Roofing membranes were observed to be in satisfactory condition. No rips, tears, or other failures were observed. All observed copings, flashings, and sealants appear to be in satisfactory condition, as shown in **Figure AR-1**. However, portions of the roofing membrane improperly placed were observed near the stair to the roof, as shown in **Figure AR-2**.

Figure AR-1: Membrane Roofing (right) & Typical Prefinished Metal Coping at Concourse (left).
Location: Upper Concourse Level 6 – 06.76.02 Cooking Concession & Restroom Building

Figure AR-2: Debris over Roof Membrane & Coping
Location: Upper Concourse Level 6 – 06.76.02 Cooking Concession & Restroom

Standing seam metal roof panels appear to be in satisfactory condition, as shown in **Figure AR-3**. No signs of rust, staining, or other failures were observed from what is visible from stair or ramp.

Figure AR-3: Standing Seam Metal Roof Panels
Location: Upper Concourse Level 6 - 06.77.05 Stair #3

Miscellaneous Exterior Observations

In previous year reports, several stairs within the facility were noted to have missing or partially damaged/torn slip resistant caution tape. Upon observation overall, the current slip resistant tape is in satisfactory condition, as shown in **Figure AME-1**.

Figure AME-1: Replaced Slip Resistant Caution Tape at Club Level Stairs
Location: Club Level 4 – 04.70.01 Super Suite Type B

Interior Elements

Interior finishes within Arrowhead Stadium encompass a broad range of materials for floors, walls, and ceilings. The primary flooring systems are composed of epoxy and sealed concrete, as shown in **Figure AI-1.**

These surfaces were observed to be in satisfactory condition, typically. Minor cracking was observed at various locations throughout the facility, which is considered normal given the expansion and contraction properties of the material and their exposure to outside air temperatures. No excessive cracking was observed during the walk-through.

Figure AI-1: Exposed Concrete (left) & Epoxy Flooring (right)
Location: Upper Concourse Level 6 - 06.80.02 Concourse (left) & Field Level 2 – 02.66.03 Hall of Honor (right)

Carpet flooring was typically observed to be in satisfactory condition. In general, no signs of rips, tears, stains, or discoloration were observed, as shown in **Figure AI-2**. Porcelain/Ceramic tile flooring areas appear to be in satisfactory condition, as shown in **Figure AI-2.** No signs of grout discoloration or cracking were observed, typically.

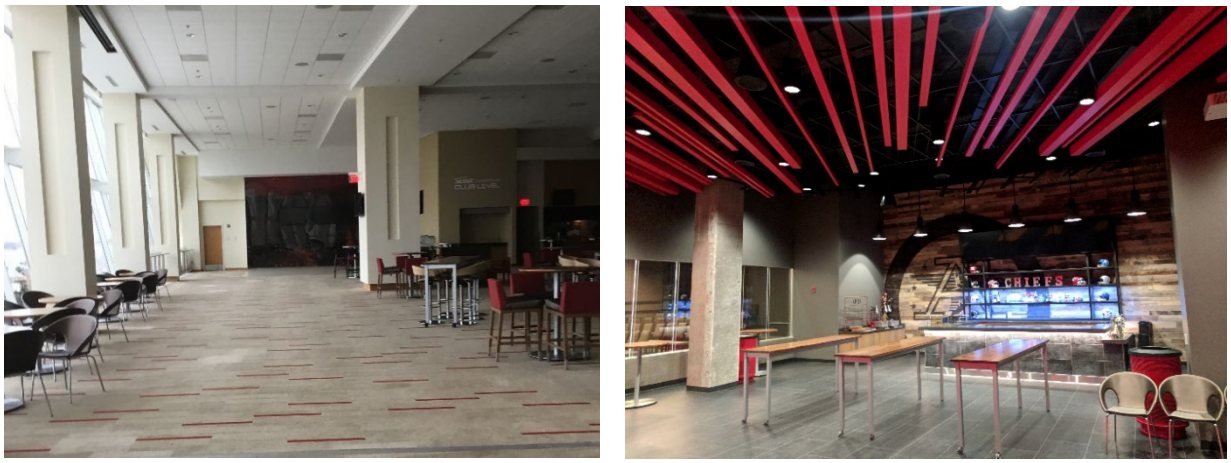

Figure AI-2: Carpet Flooring (left) & Porcelain Tile Flooring (right)
Location: Club Level 4 - 04.46.02 Bar (left) & Service Level 1 – 01.72.03 Club (right)

Less abundant areas of flooring materials include vinyl composition tile (VCT) and athletic rubber flooring. These materials are generally found in service areas, camera/press booths or back-of-house type areas which are less visible to the public. Some VCT floor tiles were observed to be missing in 03.70.02 Cameras and 03.68.03 National Broadcast, as shown in **Figure AI-3.** All other observed materials of this type were found to be in satisfactory condition, as shown in **Figure AI-4.**

Figure AI-3: VCT Floor Tiles Missing
Location: Plaza Level 3 - 03.70.02 Cameras and 03.68.03 National Broadcast

Figure AI-4 Rubber Flooring (left) & VCT Flooring (right)
Location: Service Level 1 – 01.57.02 Toilet (left) & 01.61.04 Corridor (right)

Wall materials at Arrowhead Stadium vary throughout the facility but are primarily painted or exposed Concrete Masonry Units (CMU) at outdoor areas and painted gypsum board on metal stud framing at interior areas. Alternative wall materials include ceramic tile and wood veneer, which are generally located in bathrooms and fan suite areas, respectively.

Generally, painted CMU walls were observed to be in satisfactory condition. No signs of chipping, flaking, or cracking of the applied paint system were observed.

Painted Gypsum board walls appear to be in satisfactory condition, typically, as shown in **Figure AI-5.** No signs of punctures or holes in the gypsum board materials were observed.

Figure AI-5: Painted Gypsum Board Walls
Location: Club Level 4 – 04.41.01 Suite (left) & 04.28.02 Bar (right)

Graphic applied presentation boards throughout the stadium appear to be in satisfactory condition, as shown in **Figure AI-6**. No signs of scratching or delamination were observed. Wood veneer panel at interior walls appear to be in satisfactory condition, as shown in **Figure AI-6**. No scratches, scuffs, or fading of any kind was observed.

Figure AI-6: Graphic Applied Presentation Board and Wood Veneer Paneling
Location: Plaza Level 3 – 03.20.05 Theatre and Club Level 4 – 04.70.01 Super Suite Type B

Ceilings in Arrowhead stadium are typically exposed concrete around the outdoor concourse areas. Refer to the “Structure” section for observations of concrete surfaces. Other ceiling types located within the interior spaces of the stadium include gypsum board, acoustic ceiling tile, and lay-in perforated metal ceiling tiles in some cases.

Acoustic ceiling tiles appear to be in satisfactory condition, generally. A typical condition at the Club Level lounge area is shown in **Figure AI-7**. Ceiling tile in these spaces do not show signs of stains or deterioration of any kind.

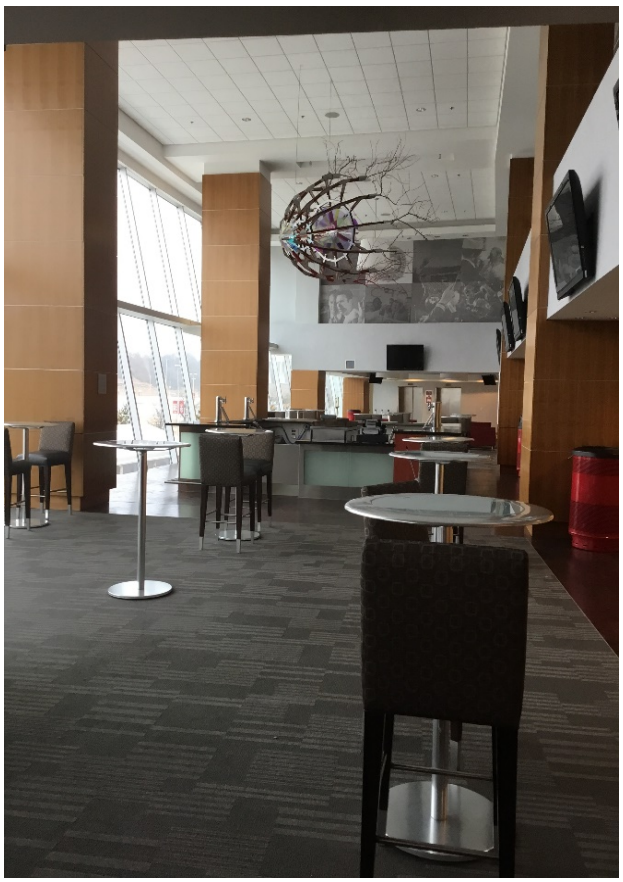

Figure AI-7: Acoustic Ceiling Tile at Event Space
Location: Club Level 4 - 04.92.03 Bar

Gypsum board ceilings appear to be in satisfactory condition, typically. No punctures, stains, scrapes, or tears were observed. Refer to **Figure AI-8** for typical condition.

Figure AI-8: Gypsum Board Ceiling, Painted
Location: Club Level 4 – 04.69.03 Club Concourse

Lay-in perforated metal ceiling tiles were observed to be in satisfactory condition. No signs of rust or finish deterioration was observed at Field Level 2 Concourse 02.23.05. Refer to **Figure AI-9** for typical condition at exterior concourse.

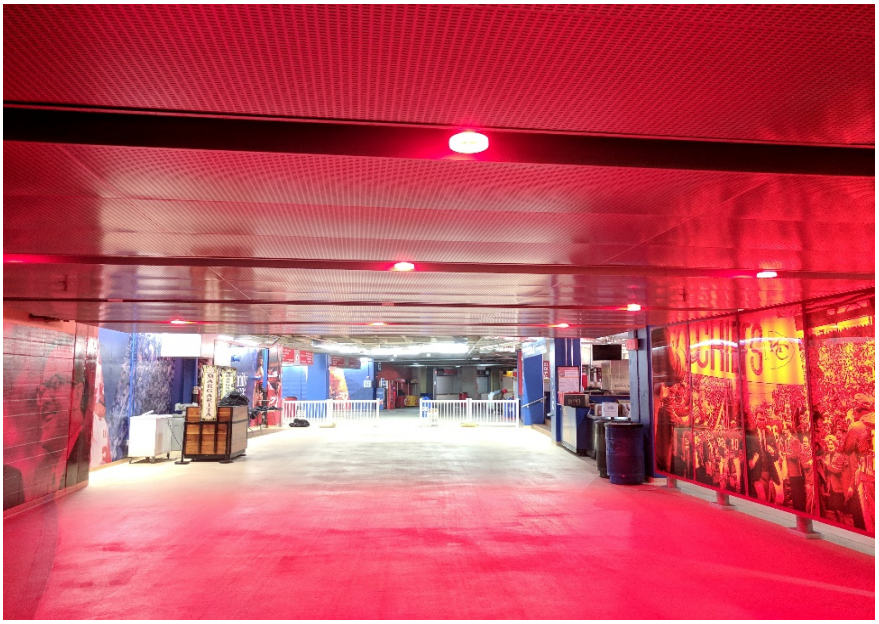

Figure AI-9: Lay-In Perforated Metal Ceiling Panels
Location: Field Level 2 – 02.23.05 Concourse

Door types and styles throughout Arrowhead Stadium include painted hollow metal doors and frames, flush wood doors, aluminum glazed doors, overhead coiling doors, and access doors.

Generally, all doors were observed to be in satisfactory condition. Refer to **Figure AI-10**.

Figure AI-10: Hollow Metal Doors at Training Room
Location: Service Level 1 – 01.63.01 Training Room

At the Service Level 1 01.61.04 Corridor, a balcony area was observed to have inadequate fall

protection in the 2017 assessment. Upon review, proper fall protection was observed on the balcony over the double door, as shown in **Figure AI-11** (right). However, the balcony shown in **Figure AI-11** (left) does not maintain proper guard rail around all three sides. It is assumed that this area is not accessible to the general public and that individuals accessing this space are aware of the hazard. It is also assumed that this area is intended for maintenance. However, failure to keep proper fall protection in place (guardrails) may present a major safety concern for individuals accessing this space. It is highly recommended that these balcony areas be adequately closed off with a guardrail when not required to be open.

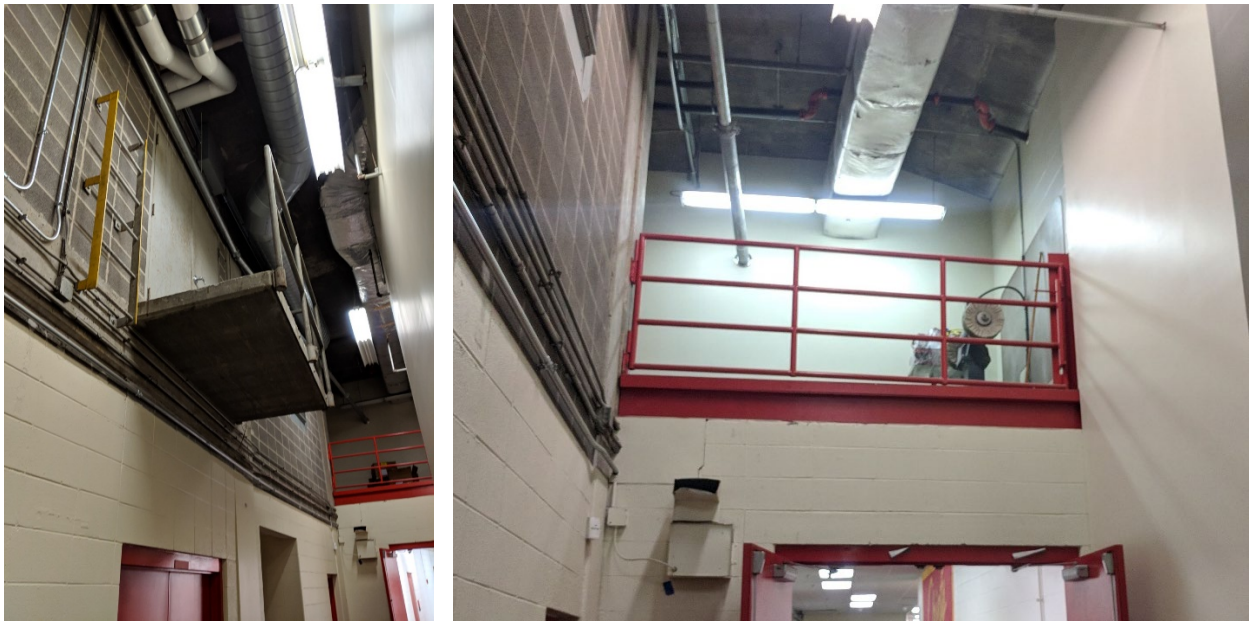

Figure AI-11: Balcony Area without Proper Fall Protection
Location: Service Level 1 – 01.61.04 Corridor

Miscellaneous Interior Observations

On the Press level, one of the cabinet doors at the Bar was observed to not close fully and no longer hung properly in the 2017 assessment. Upon observation, it appeared as though condition was addressed and properly repaired, as shown in **Figure AMI-1**.

Figure AMI-1: Cabinet Door Hung
Location: Press Level 08 – 08.72.01 Bar

Observed service areas appeared to be generally in satisfactory condition. However, it was observed at the Club Beer Pump room in the 2017 assessment that IMP floors and ramp have been warped, most likely due to the weight on top of them. The significant warping of the entry ramp had created a high lip and a potential tripping hazard. Upon observation, it appeared as though the hazard was identified, and the ramp was replaced, as shown in **Figure AMI-2**.

Figure AMI-2: Pump Room Ramp
Location: Plaza Level 3 – 03.29.03 Club Beer Pump Room

Upon observation of concourses, finishes generally appear to be in satisfactory condition. In the 2017 assessment, a large rust stain was observed from a seam between placements in the exposed concrete ceiling above at Field Level 2 outside Cooking Concession 02.61.02. Refer to **Figure AMI-3**. This most likely is a result of moisture penetrating from above and contacting the reinforcement inside the structure and streaking down the face of the column. This may result in future structural implications. The condition was existing upon further observation and remains an issue.

Figure AMI-3: Rust Stain on Column
Location: Field Level 2 – 02.70.05 Concourse Outside of Cooking Concession 02.61.02

Mechanical

Arrowhead stadium is heated and cooled by a variety of mechanical equipment. Due to the diverse occupancies and end-uses of each area, different styles of equipment serve each area. In general, most of the equipment in the stadium utilizes electric resistance heating and either direct expansion (DX) or chilled water cooling. Types of equipment used include packaged air handling units, packaged rooftop units, mini-split systems with remote mounted condensing units, fan coil units, electric unit heaters, electric baseboard heaters, exhaust fans, electric resistance water heaters, and pumps for fire water, domestic water, and chilled water. The only central equipment that serves the stadium is a chiller farm that is located in the parking lot between Kauffman and Arrowhead.

The 2017 assessment noted that some filters were observed to be in need of replacement due to visible dirt and indicated age. During this year's assessment, similar conditions were present. While some filters appeared clean, as shown in Figure M-1, others were dated up to 6 months old and clearly in need of replacement, as shown in Figure M-2.

Figure M-1: Typical Clean Filter
Location: Main Elec 03.42.02

Figure M-2: Dirty Filter
Location: Elec. 03.50.02

An exhaust fan on level 03 was noted in the 2017 report having large vibration during operation. This fan was observed to operate normally during this year's assessment.

While in Mech. 05.17.01, some noise was observed from the chilled water pipes serving the air handling unit. The noise sounded like there could be air in the chilled water lines. It is recommended that the system be purged of all air and all air vents, automatic and manual, be checked for proper operation. Air in the piping can cause damage to equipment, corrosion, and loss of performance, so addressing this issue is a priority. In the same room, a duct smoke detector was observed to be sealed poorly to the surrounding duct, as shown in Figure M-3, and a hole from a previous piece of equipment in the duct was not sealed at all, as shown in Figure M-4.

Figure M-3: Duct Smoke Detector
Location: Mech. 05.17.01

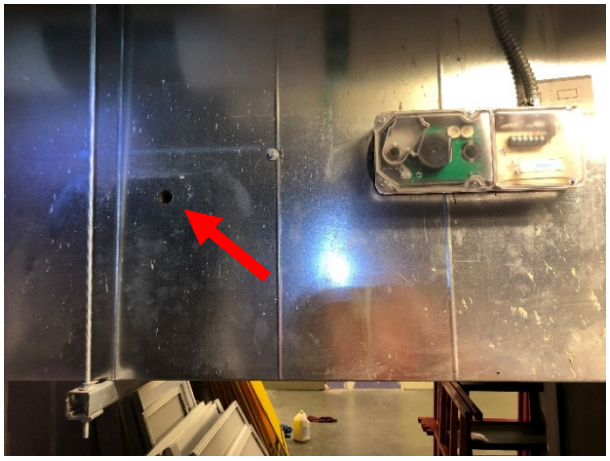

Figure M-4: Hole in Duct
Location: Mech. 05.17.01

Many water heaters were observed during the assessment, and all appeared in excellent condition. All pressure/temperature relief valves looked either like they had been recently replaced, or in excellent condition, as shown in Figure M-5.

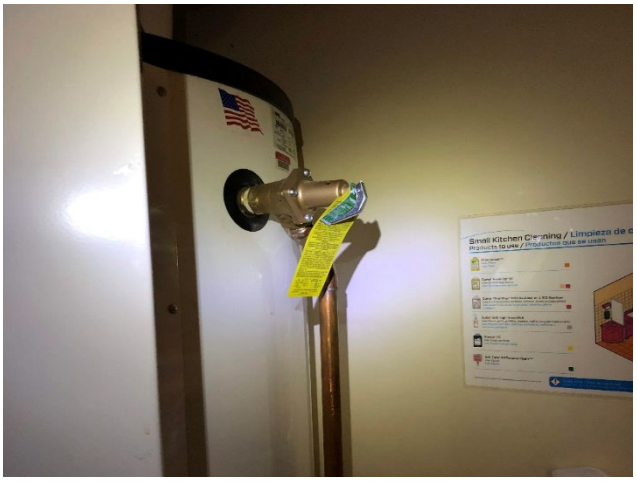

Figure M-5: Pressure/Temperature Valve
Location: Concession Prep. 04.17.06

Fire zone valves and dry-pipe valves that were observed all had recent inspection tags attached and appeared in good condition (Figure M-6). The clean agent system tanks serving the broadcast booth also had current inspection tags and appear in good condition, as shown in Figure M-7.

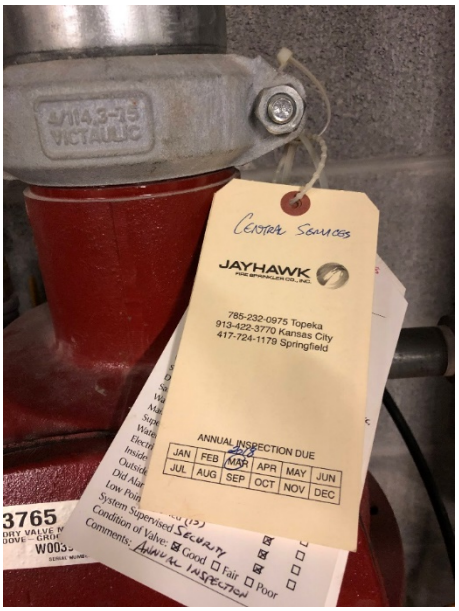

Figure M-6: Sprinkler Inspection Tag
Location: Elec. 04.15.06

Figure M-7: Clean Agent Tag
Location: Scoreboard Equip. 09.61.07

Electrical

The stadium main electrical service consists of 13.2kV switchgears with integral 13.2kV to 480V transformers in each quadrant main electrical room on the Plaza level. The electrical distribution also consists of (10) 4,000A 480Y/277V 3-phase, 4-wire main switchgears. The stadium electrical essential distribution service consists of (2) main 2,000A 480Y/277V, 3-phase, 4 wire switchgears power fed backed up by (2) 1250KW on-site generators. The lighting and appliance branch circuit panelboards are located throughout the stadium in each electrical closet on each stadium level.

The main telecommunications service is fed from a vault on the Field level and is run to the Main Telecommunications Equipment room on the Plaza level. Backbone cabling is run throughout the stadium to various telecommunications rooms on each stadium level. Horizontal cabling is routed from each telecommunication closet to workstations, media suites, and P.O.S. stations on respective floor levels.

The overall electrical system present installation was observed to be in satisfactory condition. However, the following conditions have been observed:

The electrical room 01.68.08, as shown in Figures E-1 and E-2, on the field level had two panels, 4A1L1 and E4A1H1, which had out of date schedules included on the panels.

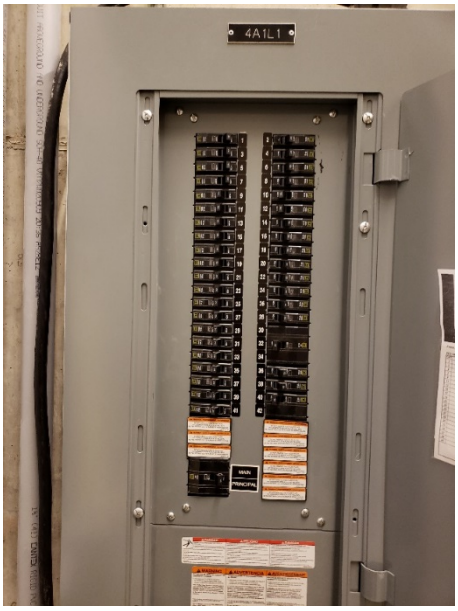

Figure E-1: Electrical Panel 4A1L1
Location: 01.68.08

Figure E-2: Electrical Panel E4A1H1
Location: 01.68.08

The electrical room 01.67.05 did not have any smoke detectors within 5 feet of the fire alarms Notification Appliance Circuit (NAC). The following rooms were also found to be missing an audio-visual fire alarm device: 04.43.03, 04.42.02, 01.67.05, and 09.78.02.

On level 9 in room 09.61.07(520A), as shown in Figure E-3, panel 4B8L8 section 1 did not have single pole branch circuit breaker 36 or the three-pole branch circuit breakers 38, 40 and 42 included on the schedule.

Figure E-3: Electrical Panel 4B8L8
Location: 09.61.07

Receptacles within 6'-0" of a sink in suite 04.67.01, as shown in Figure E-4, and the 30A twist lock receptacle above the sink in Concessions 06.15.01, as shown in Figure E-5, (U343Az) do not appear to be GFCI protected.

Figure E-4: Receptacle
Location: Suite 04.67.01

Figure E-5: Receptacle
Location: Concession 06.15.01

The GFCI receptacles in the ceiling of Concessions 06.28.02, as shown in Figure E-6, (U303B) are taped off.

Figure E-6: Ceiling Receptacles
Location: Concession 06.28.02

Electrical room 03.42.02, as shown in Figure E-7, (P 252) had extension cords on the floor. Floor located power cords pose as a trip hazard.

Figure E-7: Cords on the Floor
Location: 03.42.02

The exit signs on the club level outside electric room, as shown in Figure E-8, 04.43.03 going south are facing backwards going against the egress path.

Figure E-8: Exit Sign
Location: Club level Quadrant B&C, 04.43.03

Site Flatwork

The majority of flatwork at Arrowhead was observed to be in acceptable condition. Regular site maintenance to the should be continued throughout the year to sustain the quality of the concourse. Some of the following specific observations should be addressed:

- Pavement cracking throughout the stadium concourse should be monitored closely or repaired. Cracks exceeding ¼" in width should be replaced or sealed to avoid pavement damage during freeze-thaw conditions. Significant displaced of pavement can create a tripping hazard for pedestrians and are aesthetically unpleasant. Refer to Figure C-1 to area outside of Gate A (Founder's Club); Refer to Figure C-2 to see area adjacent to Gate H, Inside Security Fencing; and Refer to Figure C-3 to see area adjacent to Gate D, Inside Security Fencing.
- Joint sealant that is deteriorated or damaged will need to be repaired. Deficient joint sealant can allow water to flow into paved walkways or footings and displace the pavement during freeze-thaw conditions. For examples, refer to Figure C-3 to see area adjacent to Gate D, Inside Security Fencing; Refer to Figure C-4 to see area adjacent to Gate H, Inside Security Fencing; and Refer to Figure C-5 to see area southwest of Gate E (Tower Gate), Outside Security Fencing.
- Broken or damaged site appurtenances. To see damaged site amenities, refer to Figure C-6, southeast corner of the Concourse, Outside Security Fencing; refer to Figure C-7, area adjacent to Gate D, Inside Security Fencing; refer to Figure C-8, area outside Electrical Room P251; and refer to Figure C-10, north of Gate A (Founder's Plaza). Each area doesn't pose as a hazard for stadium visitors but will improve the stadium's overall aesthetic quality.
- Clear any area drains from obstructions. Blocked area drains will not allow rainwater to run off into its intended structure. See Figure C-9, area adjacent to the Southwest Helix Ramp for an example.

<u>The following comments pertain to elements that may pose potential safety concerns and should be addressed as soon as possible.</u>

- Any major pavement faulting (1" or greater) observed or warned of in this report will need to be addressed. Displaced pavement from freeze-thaw conditions can be a tripping hazard and is a threat to pedestrian safety.

Landscaping and Appurtenances

The landscaping and appurtenances within the stadium concourse were found to be mostly in acceptable condition. Routine maintenance should be performed to sustain the concourse landscaping, so it is to remain in acceptable condition. General landscape recommendations area as follows:

- Landscape beds with barren or unhealthy plantings should be replanted and replaced. Refurbishing these beds will improve the aesthetic quality of the concourse. Weed control should also be provided. Refer to Figure L-1, area north of Gate A (Founder's Plaza), and Figure L-2, area south of Gate E (Tower Gate).

Structure

All observed structural elements are in satisfactory condition. The following recommendations should be considered:

- Remove rust and corrosion with wire brush and fill in base of handrails with grout immediately to avoid further deterioration of handrails as shown in Figure S-7, multiple locations.
- Remove rust and corrosion with wire brush and apply touchup paint in accordance with manufacturer's instructions to steel scoreboard and speaker bases to prevention further corrosion and rust as shown in Figure S-4, adjacent to Room 05.41.01.
- Continue routine inspection, maintenance and patching of concrete structure as required.

The following comments pertain to elements that may pose potential safety concerns and should be addressed as soon as possible.

- Repair handrail anchor supports immediately to avoid life safety concerns as shown in Figure S-6, Player Tunnel 01.69.01.
- Repair loose glass drink stop immediately to avoid injuring occupants below from falling glass as shown in Figure S-5, Field Suite 119A.

Façades

Rust was observed on the hinges of various exterior doors around the facility, as shown for example in Figure AF-2, south east Exterior.

- To avoid rust stains or streaking on the aluminum frames, consider replacing hinges with an anti-corrosive material such as stainless steel.

Paint applied to steel angle lintels above Security & Fire Command room was observed to be peeling and flaking. Refer to Figure AF-3, Plaza Level 3 – 03.54.02A.

- To avoid exposing the steel lintels to moisture and eventual rust development, consider scraping and re-painting with an appropriate paint product specifically formulated for this material and exterior conditions.

Roofing

Roofing membrane debris observed improperly placed near stair to additional roof. Visible from Stair #3 on the Upper Concourse Level at 06.76.02 Cooking Concession & Restroom building, as shown in Figure AR-2.

- To avoid unsightly areas of the facility, consider an evaluation of the membrane debris use. And if not utilized as function of the roof, consider removing and / or repairing the area.

Miscellaneous Exterior Observations

In previous year reports, several stairs within the facility were noted to have missing or partially damaged/torn slip resistant caution tape. Upon observation—at Club Level 4 Suites in particular—the current slip resistant tape is in satisfactory condition, as shown in Figure AME-1, 04.70.01 Super Suite Type B.

- Continue the diligence of tracking down any missing or damaged slip resistant tape as the throughout each season and off-season to maintain proper safety within the facility.

Interior Elements

Less common to the general flooring found around the facility, vinyl composition tile (VCT) and athletic rubber flooring can be found in select areas, including 03.70.02 Cameras and 03.68.03 National broadcast. Observed in these areas were missing VCT tiles, as shown in Figure AI-3.

- To avoid slips and trips, consider replacing VCT tiles on a regular basis as identified upon routine inspections by stadium and county staff.

<u>The following comments pertain to elements that may pose potential safety concerns and should be addressed as soon as possible.</u>

At the Service Level 01.61.04 Corridor, a balcony area was observed to have inadequate fall protection as shown in Figure AI-11. The balcony does not maintain proper guard rail around all three sides. It is assumed that this area is not accessible to the general public and that individuals accessing this space are aware of the hazard. It is also assumed that this area is intended for maintenance. However, failure to keep proper fall protection in place (guardrails) may present a major safety concern for individuals accessing this space. It is highly recommended that these balcony areas be adequately closed off with a guardrail when not required to be open.

- It is highly recommended that these balcony areas be adequately closed off with a guardrail when not required to be open. In addition, doors accessible to balcony spaces should always be locked and only accessible to individuals who are completely familiar with the potential hazards of these spaces. Unintentional passage through adjacent doors and onto unprotected balcony areas may cause serious injury or death should someone fall due to inadequate fall protection.

Miscellaneous Interior Observations

At Field Level 2 outside of 02.61.02 Cooking Concession, a large rust stain was observed from a seam between placements in the exposed concrete ceiling above, as shown in Figure AM-3. This most likely is a result of moisture penetrating from above and encountering the reinforcement inside the structure and streaking down the face of the column. This may result in future structural implications.

- Consider cleaning the current rust stain from the concrete column and locating the potential source of moisture above and prevent additional moisture penetration through the concrete to avoid future issues in this area.

Mechanical

Generally, all mechanical items observed were in satisfactory condition. Continue routine maintenance as required.

- Filters that have not been changed in 12 months should be discarded and replaced with new filters. Refer to Figure M-1, Main Electrical 03.42.02.
- Ensure air is purged from chilled water lines and that all automatic air vents are functioning properly. Refer to Figure Figure M-2, Electrical 03.50.02.
- Seal holes at duct smoke detector serving unit on level 05. Refer to Figures M-3 and M-4, Mechanical 05.17.01, and Figure M-5, Concession Prep 04.17.06.

Electrical

The Electrical Room 01.68.08 on the Field Level had two Panels, 4A1L1 and E4A1H1, which had out of date schedules included on the panels. Refer to Figures E-1 and E-2.

- It is recommended to update panelboard directory indicate load descriptions and spare branch circuit breakers as indicated in the National Electrical Code 2017 (NEC) article 408.4.

On Level 9 in Room 09.61.07(520A) Panel 4B8L8, Section 1 did not have single pole branch circuit breaker 36 or the three-pole branch circuit breakers 38, 40 and 42 included on the schedule. Refer to Figure E-3.

- It is recommended to update panelboard directory indicate load descriptions and spare branch circuit breakers as indicated in the National Electrical Code 2017 (NEC) article 408.4.

Receptacles within 6'-0" of a sink in suite 04.67.01, and the 30A twist lock receptacle above the sink in Concessions 06.15.01 (U343Az) do not appear to be GFCI protected. Refer to Figures E-4 and E-5.

- It is recommended to remove obstruction from in front of panelboards to maintain a minimum clearance of 3'-0" as indicated in the National Electrical Code 2017 (NEC), article 110.26.

The GFCI receptacles in the ceiling of Concessions 06.28.02 (U303B) are taped off. Refer to Figure E-6.

- It is recommended to provide safety plug for unused portions of the receptacles.

Electrical Room 03.42.02 (P 252) had extension cords on the floor. Floor located power cords pose as a trip hazard. Refer to Figure E-7.

- It is recommended to clear floor area and store power cords appropriately to avoid tripping conditions in the electrical room.

The exit signs on the Club Level outside Electric Room 04.43.03 going south are facing backwards going against the egress path. Refer to Figure E-8.

- It is recommended to provide blank, mirror face on exit sign side that is going against the path of egress.

Arrowhead Stadium Assessment Review

JCSCA + Burns and McDonnell

STADIUM SERVICES

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Scheduled, Western Construction, 9.1.19

Figure C-3: Cracking on Fencing footing and Deteriorated Sealant • Adjacent to Gate D, Inside Security Fencing..... 8
Scheduled, Western Construction, 9.1.19

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Scheduled, Western Construction, 9.1.19

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Complete, Filter has been replaced
*It should be noted that comments "The only central equipment that serves the stadium is a chiller farm that is located in the parking lot between Kauffman and Arrowhead." Only relates to Kauffman Stadium not Arrowhead.

Figure M-3: Duct Smoke Detector • Mechanical 05.17.01 37
Complete, Smoke Detector Repaired

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Complete, Smoke Detector Repaired

Figure E-1: Electrical Panel 4A1L1 • 01.68.08 39
Scheduled, Panel Schedules will be updated to annotate additional installed circuits, 12.31.19

Figure E-2: Electrical Panel E4A1H1 • 01.68.08 39
Scheduled, Panel Schedules will be updated to annotate additional installed circuits, 12.31.19

Figure E-3: Electrical Panel 4B8L8 • 09.61.07 40
Scheduled, Panel Schedules will be updated to annotate additional installed circuits, 12.31.19

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Scheduled, Receptacles will be examined and replaced if necessary, 5.31.19

Figure E-5: Receptacle • Concession 06.15.01 41
Scheduled, Receptacles will be examined and replaced if necessary, 5.31.19

Figure E-6: Ceiling Receptacles • Concession 06.28.02 41
Scheduled, Receptacles will be examined and replaced if necessary, 5.31.19

Figure E-7: Cords on the Floor • 03.42.02 42
Complete, Cords have been picked up and stowed properly

Figure E-8: Exit Sign • Club level Quadrant B&C 04.43.03 42

Complete, exit signs are transparent and represent closest means of egress for individuals located in the End Zone Bar location, no correction needed. Inspectors can review Life Safety drawings upon request.