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

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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 its 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 2017 , 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 its 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 the near future.

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

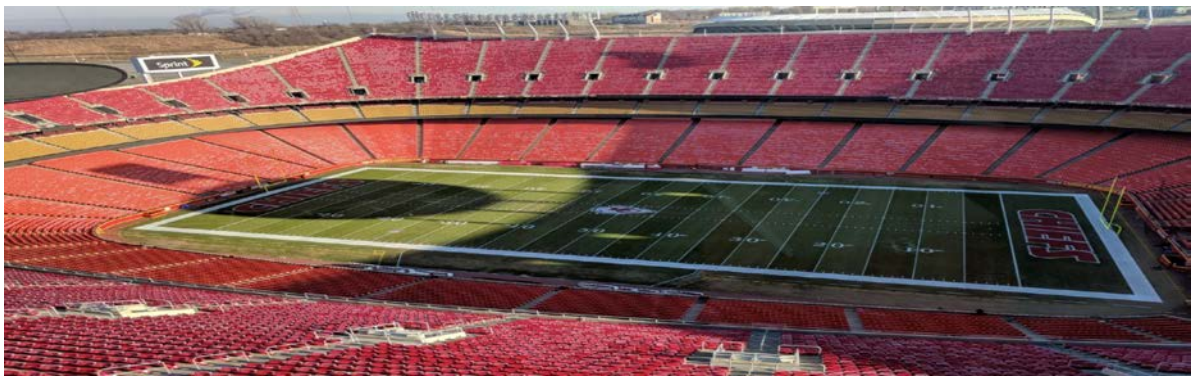
Minor physical deficiencies were observed throughout various locations within Arrowhead Stadium and its immediate environs. Such deficiencies are expected in such a large facility and typical of a high-use facility. These can be addressed by the Kansas City Chiefs through standard maintenance procedures.

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 the near future.

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 an extensive number of paved walkways surrounding and leading into the complex. These walkways serve as access pathways to different areas of the stadium concourse that are both interior and exterior to the stadium fencing. Other site flatwork that was observed on site includes stairways, curbing, and retaining walls. Overall, the flatwork was observed to be in acceptable condition, with the exceptions of a few mild to moderate site defects.

The most common defect observed on site is the transverse cracking, spalling, & faulting of the concourse pavement. Transverse cracking was observed on the exterior curb around the stadium concourse in several locations, Figure C-1 shows an example of curb cracking observed on site. Cracking along the pavement corners was also commonly seen around the stadium, Figure C-2 shows an example of pavement corner cracking. Repairs were seen to be made to longitudinal (transverse) cracking on site, which is an acceptable solution to any of the site issues previously mentioned. Figure C-3 shows an example of proper cracking repair utilizing joint sealant.

Figure C-1: Cracking Along Exterior Curb
Location: East of the Founder's Plaza Gate, North of the Helix Walkway

Figure C-2: Corner Cracking
Location: Near Column Adjacent to the Founder's Plaza Gate

Figure C-3: Repaired Transverse Cracking
Location: Northeast of Gate G, Exterior to the Stadium Fencing

Damaged footings were observed around the stadium concourse in various locations. Footings with damaged sealant or cracking should be addressed to avoid further damage to the footing and fence due to freeze/thaw conditions. Figure C-4 shows an example of a damaged fence footing observed on site. Damaged sealant was also observed around the stadium in the paved walkways, which was often accompanied by joint spalling. Figure C-5 shows an example of joint sealant deterioration that has occurred within the concourse.

Figure C-4: Cracking at Fence Footing
Location: Directly West of the Sprint Gate Entrance

Figure C-5: Joint Sealant Deterioration
Location: Directly West of Hy-Vee Gate

The trench drains were utilized on site, primarily outside of the Founder's Plaza. The grate on the trench drains were found to be damaged/broken into several pieces and could be removed from the trench or displaced when stepped on. Figure C-6 shows a displaced piece of trench drain found directly outside of the Founder's Plaza Gate.

Figure C-6: Broken Trench Drain
Location: Directly Outside of the Founder's Plaza Gate

Damaged concrete curbing utilized for landscape beds was observed around the concourse, Figure C-7 shows damaged curb found inside the stadium grounds.

Figure C-7: Damaged Curb
Location: South of Gate D

Other site amenities that were evaluated in the stadium concourse included fencing, decorative walling, hand railings, and light poles. Most of which was observed to be in acceptable condition. Damaged or deteriorating decorative walling was identified on site, Figure C-8 shows damaged decorative stone. Damaged fencing was found within the stadium concourse, Figure C-9 shows the displaced fence. Light poles around the stadium concourse were mostly intact and functional, but there were a few damaged pole bases amongst them. Figure C-10 shows one of the damaged pole bases.

Figure C-8: Damaged Decorative Wall
Location: West of the Tower Gate, Adjacent to the Stairs

Figure C-9: Damaged Fencing
Location: Adjacent to Gate D, Along the Helix Walkway

Figure C-10: Damaged Light Pole Base
Location: North of Gate G, Along Exterior Paved Walkway

Landscaping and Appurtenances

Arrowhead Stadium is a host to a variety of plantings and grass among the concourse walkway. Most of the landscaping beds that are located within the concourse hold a combination of rock, grass, mulch, and plantings. Overall, the landscaping features are in an acceptable state, however, there are a few landscape amenities that contain minor defects.

Some barren landscape areas have been observed on site, these areas contain little to no plantings, grasses, rock or mulch. Figure L-1 depicts an example of a barren landscape bed found within the concourse.

Figure L-1: Barren Landscape Bed
Location: Adjacent to North Helix Walkway

Healthy plantings and grasses were commonly seen among landscape beds around the stadium, close regulation and regular maintenance should be performed to ensure an acceptable condition is maintained, Figure L-2 shows an example of a healthy planting. Landscape beds should also be kept clear of unsightly debris that may accumulate through the year to maintain a pleasant aesthetic and allow access to irrigation valves, Figure L-3 shows an irrigation water valve that is free of debris.

Figure L-2: Healthy Planting
Location: Directly East of Gate D

Figure L-3: Irrigation Valve Free of Debris
Location: Landscape Directly South of the 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.

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-1 & Figure S-2. Control joints and expansion joints are in satisfactory condition.

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.

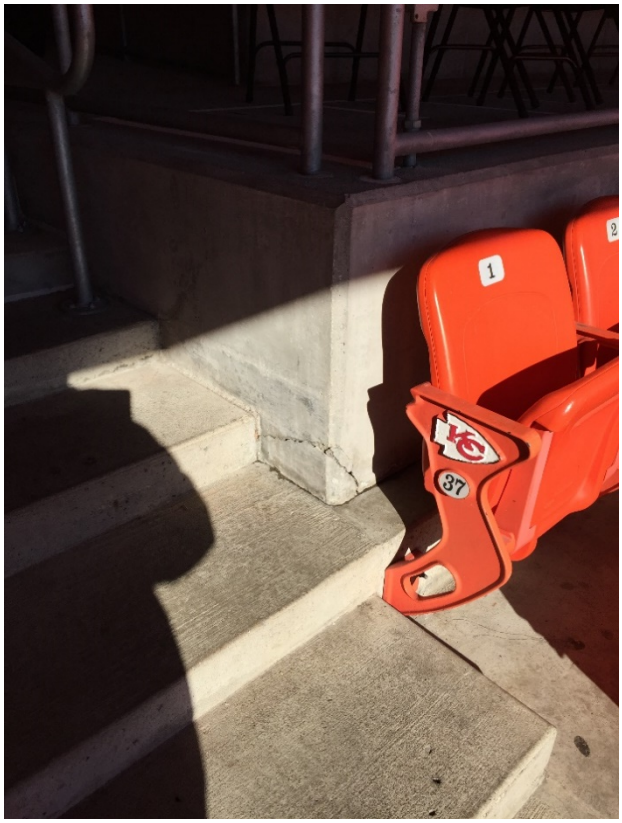


Figure S-1: Concrete Spalling In Lower Bowl
Location: Between Sections 128 & 129

Figure S-2: Concrete Spalling
Location: Between Sections 218 & 219

The Plaza, Club, Lower-Upper Concourse and Upper Concourse levels consist primarily of reinforced concrete pan and joist slab system. 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, as shown in Figure S-3.

Figure S-3: Concrete Patchwork
Location: Concourse 05.83.03

Figure S-4: Rust & Corrosion of Speaker HSS Column
Location: HSS Column in Concourse 05.83.03

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.

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.

The graphic fiber mesh system was observed throughout the stadium. In multiple locations, it was observed that (2) anchor bolts were missing between the connection of the steel structure and the concrete structure. In one location, it was observed that (3) anchor bolts were missing as shown in Figure S-5.

Figure S-5: Graphic Fiber Mesh Structural Steel Missing (3) Anchor Bolts
Location: Concourse 02.01.03

The handrails were observed at various locations throughout the stadium. Loose anchors are present in multiple locations as shown as shown in Figure S-6 and Figure S-7. The grout at the base of the handrails were missing in multiple locations which leads to rusting of the base of the handrail. Refer to Figure S-8.

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

Figure S-7: Loose Handrail Support
Location: Press Level Room 09.75.01

Figure S-8: Missing Grout & Rust at Base Handrail
Location: Between Sections 218 & 219

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-2. No oil canning, staining, or degradation of any kind was observed.

Figure AF-2: External Glass Curtainwalls and Storefronts
Location: South East Exterior

Exterior doors at the exterior plaza level were observed to have minor deficiencies. As noted in the 2016 assessment, the hinges on the aluminum framed storefront doors near the team store were observed to have minor rust and corrosion accumulation. Refer to Figure AF-3 (right image). 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. However, the steel lintel above the windows at the Security & Fire Command room appears to be chipping and flaking, refer to Figure AF-3 (left image). 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 (left) and Rusted Hinges at Aluminum Door (right)**
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 - Southern Ticketing Kiosk

Internal storefront and glass wall systems appear to be in satisfactory condition, as shown in Figures 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.

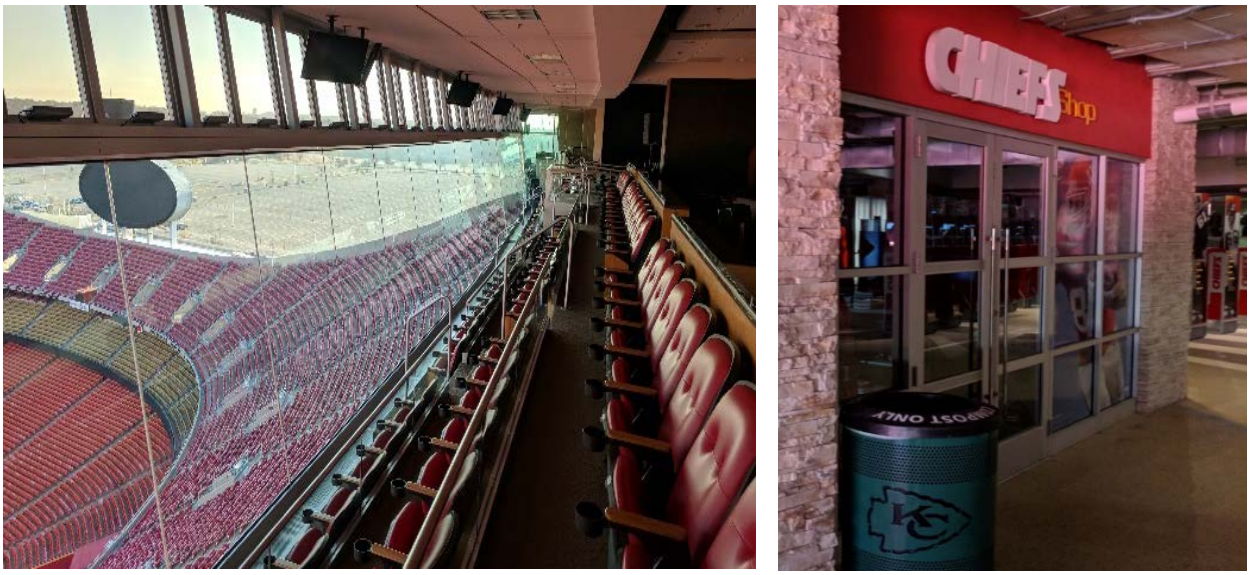


Figure AF-5: Windows, Storefront, and Sliding Glass Wall System
Location: Press Level 9 - 09.17.01 Cabaret Seating

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, debris was observed near the stair to the roof, as shown in Figure AR-2.

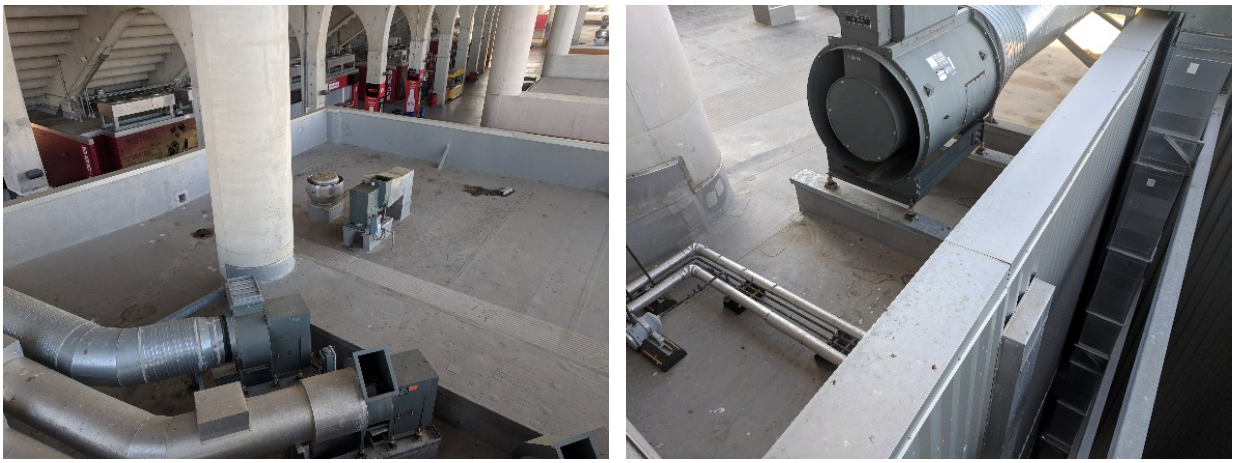


Figure AR-1: Membrane Roofing (right) and Typical Prefinished Metal Coping at Concourse (left)
Location: Upper Concourse Level 6 – 06.76.02 Cooking Concession & Restroom Building

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

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.

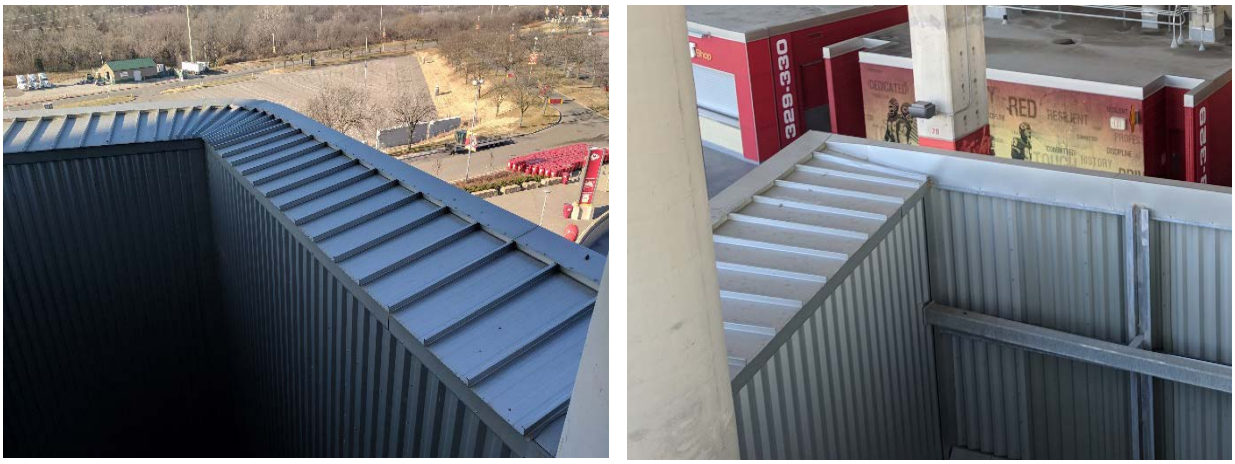


Figure AR-3: Standing Seam Metal Roof Panels
Location: Upper Concourse Level 6 - 06.77.05 Stair #3

Miscellaneous Exterior Observations

At the field level, in 2016's assessment, insulation applied to the underside of the concrete deck was observed to be deteriorating. Upon inspection it appears from the underside, that the insulation has been replaced. Refer to Figure AME-1.

Figure AME-1: Replaced Insulation to underside of Concrete Deck
Location: Field Level 02 - 02.23.05 Concourse

At several stairs within the club level seating bowl, nosing applied slip resistant caution tape was observed to be replaced after deteriorated or missing strips were observed in 2017's assessment, refer to Figure AME-2.

Figure AME-2: Replaced Slip Resistant Caution Tape at Club Level Stairs
Location: Club Level 4 - 04.60.03 Seating Bowl

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) and 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 (left image). However, minimal stains were observed in the team store. Additionally, on the Club Level carpet tile at transitions to tile at food service locations were observed to begin showing signs of discoloration from typical use, as shown in Figure AI-3 (right). Porcelain/Ceramic tile flooring areas appear to be in satisfactory condition, as shown in Figure AI-2 (right image). No signs of grout discoloration or cracking were observed, typically.

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

Figure AI-3: Carpet Flooring Stains & Discoloration
Location: Plaza Level 3 - 03.20.01 Team Store (left) & Club Level 4 – 04.64.02 Club Lounge (right)

Less abundant areas of flooring materials include vinyl composition tile (VCT) and athletic rubber flooring. These materials are generally found in service areas or back-of-house type areas which are less visible to the public. All observed materials of this type were observed to be in satisfactory condition, as shown in Figure AI-4.

Figure AI-4 Rubber Flooring (left) and 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 (left image). 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 (right image). No scratches, scuffs, or fading of any kind was observed.

Figure AI-6: Graphic Applied Presentation Board (left) and Wood Veneer Paneling Wall (right)
Location: Plaza Level 3 – 03.20.05 Theatre (left) and Press Level 9 – 09.63.02 Suite (right)

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 (left image). 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. 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 speaking, all doors were observed to be in satisfactory condition. However, at the Plaza level suites, near the broadcast booth, the glazing at each suite entry door was observed to be scuffed. Refer to Figure AI-10. Continue routine painting and cleaning as required to maintain the appearance of a world class NFL stadium.

Figure AI-10: Scuffed Hollow Metal Full Lite Doors at Plaza Level Suites
Location: Plaza Level 3 – 03.66.03 Suite Lounge

At the Service Level, two balcony areas were observed to have inadequate fall protection in the 2016 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.

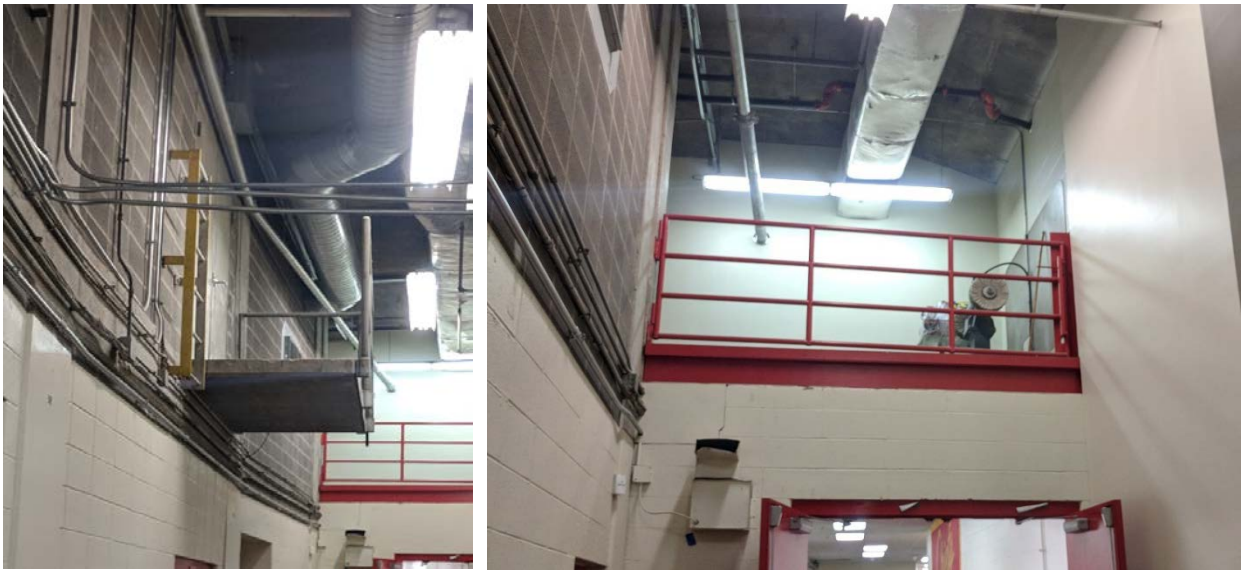


Figure AI-11: Balcony Areas Without Proper Fall Protection
Location: Service Level 1 – 01.61.04 Corridor

Miscellaneous Interior Observations

Several fire extinguishers were checked for verification of updated inspection tags. All fire extinguishers observed were inspected and punched within the last year, as shown in Figure AMI-1.

Figure AMI-1: Fire Extinguishers
Location: Various Locations

On the Press level, one of the cabinet doors at the Bar was observed to not close fully and no longer hung properly, as shown in Figure AMI-2.

Figure AMI-2: 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 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 has created a high lip and a potential tripping hazard to workers, as shown in Figure AMI-3.

Figure AMI-3: 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. However, a large rust stain was observed from a seam between placements in the exposed concrete ceiling above. This most likely is a result of moisture penetrating from above and coming into contact with the reinforcement inside the structure and streaking down the face of the column, as shown in Figure AMI-4. This may result in future structural implications.

Figure AMI-4: Rust Stain on Column
Location: 02 Field Level – 02.70.05 Concourse Outside of Cooking Concession 02.61.02

Mechanical

The mechanical equipment at Arrowhead Stadium is a variety of different styles due to the spread-out nature of the facility and the different occupancies of spaces. Most of the air-conditioning units utilize electric heat and either chilled water or direct expansion (DX) for cooling. Equipment styles installed in the buildings include packaged air handling units, packaged rooftop units, electric unit heaters, split-systems with roof-mounted condensing units, ceiling-mounted fan coil units, electric baseboard heaters, electric infrared heaters, pumps (fire, domestic water, and chilled water), exhaust fans, and electric resistance water heaters.

The 2016 assessment identified dirty or old filters as an action item. Upon review, most of the filters observed had been changed recently and appeared to be in good condition, as shown in Figure M-1. One observed unit had filters dated from February 2017, as shown in Figure M-2, these should be replaced along with any others of similar age.

Figure M-1: Typical Clean Filter
Location: Tele. 02.61.04

Figure M-2: Dirty filter
Location: Main Elec. 03.42.02

Also observed in the previous report was a hole in the ductwork serving the Founders Club. The hole could not be located so it appears that it has been fixed.

The final note from the 2016 assessment was for valves with rust and corrosion to be tested to ensure that the valve functions, holds, and seals properly. Some valves were still observed to have surface rust and corrosion, see Figure M-3, but most valves appeared to be cleaned of much of the corrosion.

Figure M-3: Corroded Valve
Location: Mech. 01M.64.01

Mechanical Room 01M.64.01 contains two electric water heaters that serve the locker rooms. One of the water heaters was out of operation for repair at the time of observation. The flange where one of the electric elements connects to the storage tank had failed and was being repaired, as shown in Figure M-4. The person performing the repair indicated that a single heater could handle the entire load, so there would be no impact to facility operation. Due to the age of the water heaters, repairs such as this may become more commonplace. The water heaters should be evaluated to determine if replacement is more economical than continued repair, especially considering parts availability now and in the future.

Figure M-4: Water Heater Flange Under Repair
Location: Mech. 01M.64.01

A sample of public restrooms and associated janitor closets were observed to be in overall good condition. Janitor Closet 02.53.04 was missing pipe shields at the supports on the domestic water piping as shown in Figure M-5. These should be replaced to prevent the insulation from being crushed and its performance degraded.

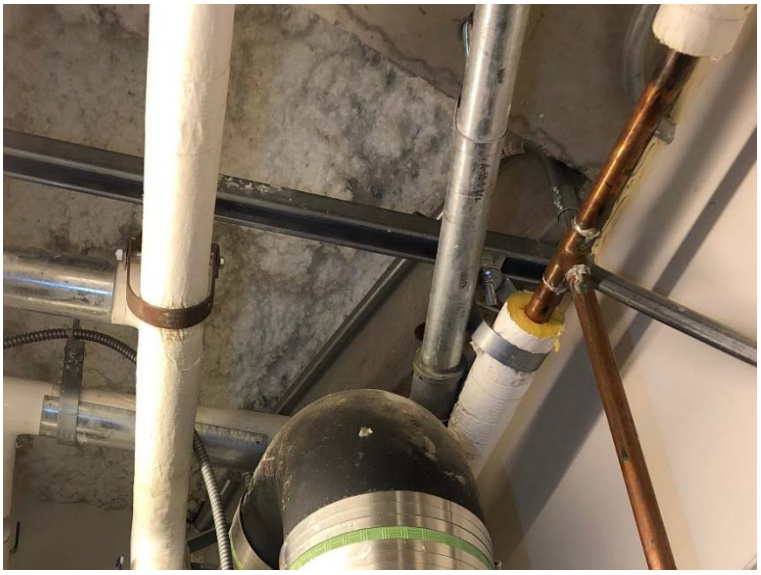


Figure M-5: Pipe Shields Missing
Location: Jan. 02.53.04

An exhaust fan, shown in Figure M-6, in Mechanical Room 03.31.01 was vibrating loudly while operating. The fan should be inspected and repaired to prevent damage to the fan.

Figure M-6: Exhaust Fan
Location: Mech. 03.31.01

Throughout the facility, there was evidence of regular maintenance. There are stockpiles of replacement parts, belts, and filters in many mechanical rooms ready to be installed, as shown in Figures M-7 and M-8. The main chilled water pumps in Pump Room 05.40.03 appeared to be recently lubricated, as shown in Figure M-9.

Figure M-7: Spare Parts
Location: Mech. 03.31.01

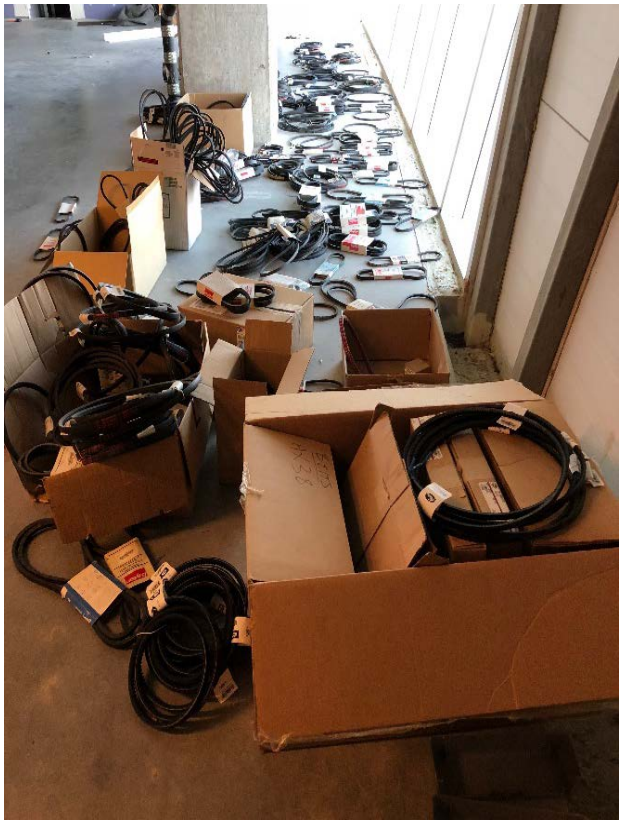


Figure M-8: Spare Belts
Location: Mech. 05.29.01

Figure M-9: Chilled Water Pump
Location: Pump Room 05.40.03

All fire protection systems and assemblies observed were in good condition and had recent inspection tags, as shown in Figure M-10. The clean agent systems in Scoreboard Equipment 09.61.07 and PA 09.60.01 also have current inspection tags and are appropriately charged, as shown in Figure M-11.

Figure M-10: Fire Protection Valves
Location: Mech. 01M.64.01

Figure M-11: Clean Agent Tanks
Location: Scoreboard Equipment 09.61.07

Electrical Service Description

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's present installation was observed to be in satisfactory condition, however, the following conditions have been observed:

On the service level, panelboard F5L2 was found to not have all breakers labeled indicating load descriptions and spare breakers. Refer to Figures E-1 and E-2.

Figure E-1: Panelboard F5L2
Location: Room 01.70.06

Figure E-2: Panelboard F5L2 Directory
Location: Room 01.70.06

In a service level electrical room, panelboard clearances were observed to be obstructed with ladders. Refer to Figure E-3.

Figure E-3: Obstructed Panelboard
Location: Room Elec. 01.68.08

On level field level in concession 02.51.02, a single receptacle, circuit #4, located above a sink was observed to be non-GFCI receptacle. Refer to Figure E-4.

Figure E-4: Non-GFCI Single Receptacle
Location: Room Concession 02.51.02

On Lower UPCON level, concourse 05.55.03 at grid columns 54 and 52, duplex receptacles on concourse were evaluated and were found not to be GFCI receptacles and to not have weatherproof covers. It was also observed on this level in the port location at column grid 51, GFCI duplex receptacles to not have weatherproof covers. Refer to Figure E-5.

Figure E-5: GFCI Receptacle Without Cover-plate
Location: Concourse 05.55.03, Between Grid Columns 50 & 51

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:

- Cracking and spalling throughout the paved areas should be monitored closely or repaired to prevent further damage to the pavement and avoid pavement displacement during freeze-thaw conditions. Displaced pavement can create a tripping hazard for pedestrians and can be aesthetically unpleasant. Refer to Figure C-1 and C-2 for examples.
- 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. Specifically, on Figure C-4, the damaged sealant shown is at the foot of a structural column and a fence post footing. Both footings could be subject to water damage.
- Broken or damaged site appurtenances. Damaged site amenities shown in Figures C-6, C-7, C-8 and C-9 don't pose as a hazard for stadium visitors but will improve the stadium's overall aesthetic quality.

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

- Repair, replace or fasten down trench drains found in Figure C-5. Heavy pedestrian traffic may cause these trench pieces to be displaced and cause a tripping hazard for visitors.
- 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.
- Figure L-2 and L-3 show examples of healthy landscape plantings and beds. Landscape beds and area drains should be rid of debris to maintain functionality and aesthetic quality. Irrigation valve covers should remain free of debris to maintain accessibility.

- On site were observed to be in acceptable condition. Regular maintenance and observation should be continued year-round to sustain a satisfactory site. Any recent improvements or repaired items should be regularly observed to prevent any deterioration on site.

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.
- 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.
- 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.

Façades

Rust was observed on the hinges of the aluminum framed storefront doors near the team store, as shown in Figure AF-3 (right image).

- 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 (left image).

- 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.

Roofing

Roofing debris was observed near the stair to the roof off of Stair #3 on the Upper Concourse Level, as shown in Figure AR-2.

Interior Elements

Carpet flooring was typically observed to be in satisfactory condition. In general, no signs of rips, tears, stains, or discoloration were observed. However, minimal stains were observed in the team store. Additionally, on the Club Level carpet tile at transitions to tile at food service locations were observed to begin showing signs of discoloration from typical use, as shown in Figure AI-3 (right).

- Consider cleaning or replacing carpet tiles in these locations in order to maintain the appearance of a world class NFL stadium.

Doors throughout Arrowhead were observed to be in satisfactory condition, typically. However, However, at the Plaza level suites, near the broadcast booth, the glazing at each suite entry door was observed to be scuffed. Refer to Figure AI-10.

- Continue routine painting and maintenance as required to maintain the appearance of a world class NFL stadium.

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

At the Service Level, a balcony area was observed to have inadequate fall protection as shown in Figure AI-11 (left image). 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. It is also recommended that doors accessing the balcony spaces be locked at all times 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

On the Press level, one of the cabinet doors at the Bar was observed to not close fully and no longer hung properly, as shown in Figures AMI-2.

- Consider replacing the hinges on the door to restore proper closure and function to the cabinet door.

Club Beer Pump room 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 has created a high lip and a potential tripping hazard to workers, as shown in Figures AMI-3.

- Consider replacing or correcting the IMP ramp to remove the potential tripping hazard.

A large rust stain was observed from a seam between placements in the exposed concrete ceiling above, as shown in Figure AMI-4. This most likely is a result of moisture penetrating from above and coming into contact with 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 off of 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

In general, all observed mechanical elements are 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.
- Water heater in 01M.64.01 is being repaired. Evaluate water heaters to determine if replacement is more economical than continued repair, especially considering parts availability due to the age of the water heaters.
- Pipe shields in Janitor Closet 02.53.04 should be replaced.
- The exhaust fan in Mechanical Room 03.31.01 should be repaired to eliminate the excessive vibration.

Electrical

On the service level, panelboard F5L2 was found to not have all breakers labeled indicating load descriptions and spare breakers. 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.

In a service level electrical room, panelboard clearances were observed to be obstructed with ladders. Refer to Figure E-3.

- 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.

On level field level in concession 02.51.02, a single receptacle, circuit #4, located above a sink was observed to be non-GFCI receptacle. Refer to Figure E-4.

- It is recommended to provide GFCI protection at branch circuit breaker as indicated National Electrical Code 2017 (NEC), article 210.8(B)(2) and 210.8(B)(5).

On Lower UPCON level, concourse 05.55.03 at grid columns 54 and 52, duplex receptacles on concourse were evaluated and were found not to be GFCI receptacles and to not have weatherproof covers. It was also observed on this level in the port location at column grid 51, GFCI duplex receptacles to not have weatherproof covers. Refer to Figure E-5.

- It is recommended to provide GFCI protection at branch circuit breaker for outdoor receptacles, or replace duplex receptacles with GFCI receptacles as indicated in the National Electrical Code 2017 (NEC), article 210.8(B)(4).

2017 ARROWHEAD STADIUM ASSESSMENT - REPONSE PLAN

ITEM DESCRIPTION	PAGE OF REPORT	DESCRIPTION OF REPAIR	DATE TO CORRECT
Flatwork	8,9,11,12	Repair Cracks & Broken Concrete (Western)	8/30/2018
Grates on Plaza	13	Replace with grates in storgage Possible Weld and relocate to edges	3/31/2018
Curb	14	Repair Cracks & Broken Concrete (Western)	8/30/2018
Decorative Wall	15	Repair Spalling (Western)	8/30/2018
Damangen Fencing	20	Replace panel	8/30/2018
Concrete Spalling	21	Repair Spalling (Western)	8/30/2018
Rust Corosion	22	Requested in Cap Ex Re paint Enzone signs	8/30/2018
Structure	23	No Repair Needed	NA
Hand Rail	24	Inhouse work to be completed	3/31/2018
Hand Rail	25	Western Recoat all bases and caulk	8/30/2018
Repaint Header	28	Inhouse work to be completed	8/30/2018
Hinges	28	No Replacment planned	3/16/2018
Roof Repairs	31	Cap Ex Roof Maintence	8/30/2018
Carpet	35	Cap Ex Requested for complete replacment	8/30/2018
Frames and Art	41	Polish scratches and repalce coating Cap Ex Request	8/30/2018
Cabinet Work on Press	44	Inhouse work to be copleted	3/31/2018
Rust Corrosion	46	Routine Cleaning	8/30/2018
Damaged Light Pole Base	17	Replace or tap out base - Finkemeier	2/9/2018
Dirty Filter	47	Replace filter dated 2/20/17 - Boyce	Completed
Corroded Valve	48	Repair was completed shortly after inspection - Ongoing - Boyce	Completed
Water Heater Flange Under Repair	49	Will wire brush and coat to prevent further corrosion - Franiuk	2/9/2018
Pipe Shields Missing	50	Will reinstall sheilds - Franiuk	Completed
Exhaust Fan	50	Exhaust fan fixed - Defrees	Completed
Chilled Water Pump	52	Undergoing maintenance (greasing) - Heard	Completed
Panelboard (Figure E-1)	54	We are currently undergoing an effort to update all panel schedules	4/30/2018
Panelboard (Figure E-2)	54	We are currently undergoing an effort to update all panel schedules	4/30/2018
Obstructed Panelboard	55	Ladders to be moved to give clear access to panels	2/9/2018
Non-GFCI Single Receptacle	56	Will switch receptacle to GCFI - Sparks	Completed
GFCI Receptacle Without Cover-plate	56	Will put new weatherproof cover plate on receptacle - Sparks	Completed