April 3, 2017

Facility Condition Assessment

Nissan Stadium

VENUE Solutions group

COMMONWEALTH DEVELOPMENT GROUP, INC.

METRO SPORTS AUTHORITY NASHVILLE

TABLE OF CONTENTS

Overview & Executive Summary	4
Architecture & Interiors	11
Mechanical, Electrical, Plumbing & Fire Protection	27
Structure	59
Technology	74
Roofs	94
Vertical Transportation	111
Food Service & Retail	125
Playing Surface	141
Preventive Maintenance Program	146
Capital Expense Matrix	149

OVERVIEW & EXECUTIVE SUMMARY

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NISSAN STADIUM

Nissan Stadium Condition Assessment

Overview & Executive Summary

Venue Solutions Group was engaged by Commonwealth Development Group on behalf of the Metropolitan Government of Nashville & Davidson County and the Metro Sports Authority to provide a comprehensive facility condition assessment of Nissan Stadium that benchmarks the current condition of the facility. As part of the assessment, VSG, in partnership with their consultant team, has developed a 20-year capital expense matrix to assist the owner in establishing priorities for major repairs, potential upgrades and maintaining the facility in such a way to keep it "competitive" for touring and family events. The ability to plan and maintain the stadium as it transitions from years 18 to 30 is crucial in extending the life of the facility as well as its relevance in the competitive and ever evolving regional and national marketplace.

As the stadium approaches the start of its second decade of operation, its ability to deliver a positive guest experience is crucial for it to remain relevant both locally and nationally. As in-home technology has improved, it has become more of a challenge for professional sports franchises to keep their customers engaged. Thus, more attention and planning are required in keeping the stadium contemporary and vibrant, especially in a market with other professional sports franchises.

The consultant team put together by VSG includes national firms with specific expertise in the design and operations of large arenas with major professional sport franchises as major tenants or operators.

Convergence Design, which is owned by a nationally recognized arena and stadium designer, assessed the condition of public and team spaces.

Smith Seckman Reid, Inc. (SSR), a locally based MEP & technology design firm, performed the review of the mechanical, electrical, plumbing and fire protection systems and at the same time provided strategies for more efficient operations of major systems.

Walter P Moore, a Houston based structural engineering firm, performed a structural review of the stadiums that focused on load bearing walls, fireproofing, steel structures and exterior sidewalks and slabs.

Wrightson, Johnson, Haddon and Williams (WJHW) reviewed the entertainment systems. The firm extensively reviewed video displays, sound, cabling infrastructure and CCTV.

The food and retail operational review was performed by The Bigelow Companies, a nationally recognized food and beverage firm. They reviewed the condition of food service equipment, kitchens and concession stands.

Van Deusen & Associates (VDA) reviewed the condition and performance of the elevators and escalators.

Mike Devera & Associates (MTD), a Baltimore based roof consultant, reviewed the condition of roof membranes, ballasted roof systems and water diversion.

A landscape design principal from Populous, an internationally recognized sports architectural firm, performed the review of the natural grass playing surface.

VSG and the consultant team performed the on-site review on November 14 and 15, 2016. The review consisted of a visual inspection of equipment and spaces along with interviews with staff and a document review. It should be noted that the staff of Nissan Stadium, Metro Finance and the Metro Sports Authority provided the review team with significant amounts of documentation. Facility staff were available at all times during the on-site review to answer questions from the team. The assistance and organization of facility staff, Metro Finance, Metropolitan Nashville Sports Authority as well as Commonwealth Development Group contributed significantly to the depth of the report.

Each of the report sections has a list of recommendations which VSG has developed into an "action items" spreadsheet that prioritizes each item as "high, medium, or low" based on the following criteria:

High Priority - items that should be addressed immediately to maintain serviceability of the associated item and/or maintain the safety of the facility.

Medium Priority - items that should be addressed in the near term to mitigate further deterioration of the item and ensure the overall serviceability of the structure is maintained.

Low Priority - items that should be addressed once the high and medium priority items have been repaired to sustain the overall serviceability of the facility for the long-term.

This document will be separate from this assessment report.

Facility Description

The stadium, opened in 1999 with a 68,000-seat capacity, has six primary levels: the event level, on which the loading dock, home and visiting team locker rooms, groundskeeping and food production spaces are located; the main concourse, which serve as the primary points of entry and egress as well as spaces for food and beverage offerings; the loge level with club seating and dining; two levels of private suites; and the upper concourse, which serves as the secondary circulation and concessions space.

The facility has approximately 7,500 parking spaces on site which are used as public parking for the downtown business district on non-game days. The site is linked to the downtown business and entertainment district by a 3,150-foot pedestrian bridge, which is one of the longest pedestrian bridges in the world.

The stadium has had several improvement projects since 1999, including the restoration of the event level after the 2010 flood and upgrades to the loge level. Recent improvements have included new seating, waterproofing of the ramps and concourses, and expansion joint repairs. In 2012, renovations included the addition of twelve high speed elevators from the main to the upper concourse, a new sound system, the installation of two large video and ribbon board displays, and renovation of the video production control room.

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The stadium has hosted, in addition to the Titans and Tennessee State football, many iconic events in the last 18 years, starting with the annual CMA Music Fest which began in 2001. The stadium has been a regular host of the US Men's and Women's National Soccer teams as well as international professional soccer teams from Mexico and South America.

Architecture & Interiors

Nissan Stadium is an open-air stadium that uses bright color accents as its distinguishing feature. Most notable are the bright red trusses supporting the field lights which have become a thematic element for the stadium.

The stadium itself is clean and contemporary, with little in the way of applied ornamentation or exterior skin beyond the enclosure of enclosed lounges at the suite and club levels. On first glance, one appreciates the clarity and clean appearance of the stadium. On closer inspection, however, it becomes clear that much of the lack of ostentation appears to be due to cost cutting in design and construction.

Parking around the building is generally in very good condition, with only a few areas of paving in need of repair. Lots E and F should have improved landscaping and pedestrian features. Landscaping is in generally good condition; some trees need to be replaced.

The seating bowl has been refreshed and creates a positive game day environment. However, the spaces behind the bowl lag significantly behind other NFL stadiums, even peer facilities like NRG Stadium, which opened nearly the same year.

Finishes at the field level including the home and visiting locker rooms are very utilitarian and mostly painted concrete block, with finished ceilings in most occupied spaces. Lighting is generally the cheapest type of fixture available at the time of construction, mostly 2 by 4 foot fluorescent troffer fixtures with prismatic plastic lenses, a truly bottom-of-the-line lighting device. Better and more efficient lighting has become available in the years since the stadium opened.

The overall impression of the main and upper concourse is that it has unfinished or under finished space. This is primarily due to the extensive use of exposed unpainted concrete masonry units (of no special color) to construct many of the walls at this level. While colored CMU is often used to create durable and economical concourse walls, plain CMU is seldom used because of this unfinished effect. Floor finish in the concourse is generally plain concrete. Visible cracking in the concourse floor was limited. Some doors and frames in high traffic areas are showing signs of wear and should be refurbished as part of routine maintenance.

In the premium spaces, the renovation of the suites is on-going and will be over the next few years. Much of the common areas on the suite and club levels have no activation and offer opportunities for additional destinations to enhance the fan experience.

The exposed structural steel has been recently recoated, and appears to be in excellent condition with respect to color and finish.

Mechanical, Electrical, Plumbing & Fire Protection

For the most part, the mechanical, electrical, plumbing, and fire protection systems are original to the stadium and 17 years old. The stadium MEP and fire protection systems have been maintained over the years; however, a few of the systems are reaching the end of their overall life expectancy and in the process of being replaced or upgraded.

Mechanical

The mechanical systems are in fair condition and have been well maintained over their 17-year life span. Focus should be on continuance of the current preventive maintenance and service plan.

The existing building automation system (BAS) is in good condition, but will require system upgrades in 5 to 10 years to keep the system modern and properly commissioned.

The club level air handlers and their associated components appear to be in generally good condition considering their age and runtime. However, one of the air handlers apparently has a leak in the condensate drain pan that is getting onto the floor.

There are ten other air handling systems throughout the stadium which appear to be in a reasonable condition, considering all air handling systems are original to the building. The air handling units' cooling coils and condensate drain pans are rusted and starting to show signs of leakage. In some units, there appears to be a biological growth on the cooling coil which is an area of concern.

There are 238 fan coil units which were observed to be in fair condition, but the units are not provided with an isolation valve on their return line. This prevents staff from shutting down the entire system when unit replacement is needed. Considering the location of most FCUs and the age of the equipment, this is a major problem.

The chilled water insulation is showing signs of water damage in certain areas of the facility. Most of the chilled water piping serving the facility is insulated with a closed cell, fiber-free elastomeric thermal insulation.

Cooking exhaust and makeup air systems, serving the main kitchen and commissary, should be changed to variable speed systems and coupled with a hood system that measures heat above the cooking surfaces to see if fan turndown is appropriate.

Electrical

Electrical equipment is generally in very good condition, with many original panels appearing nearly new.

We observed several instances of equipment being stored in the electrical rooms, but proper clearances have been maintained in the front and back of the equipment. Transformers in concession areas were observed to not have adequate clearance due to rooms being used for equipment storage.

In several of the electrical riser rooms, the emergency and normal power branch circuits were in one common busway which does not meet code. At the time of construction, the NEC did not permit emergency and normal power circuits to share a common busway per section 700.9 of the NEC and is currently not permitted per the NEC.

Several junction boxes and wireways were observed to be open and missing covers completely, and the riser electrical rooms on the upper concourse were extremely dusty at the time of the review.

The generators appear to be in good condition, and the facility appears to have a preventative maintenance plan in place.

Interior and exterior lighting is a combination of original metal halide, fluorescent and LED. Staff have been replacing legacy fixtures on a continuous schedule. Not all the fixtures are controlled by the lighting control system and remain on 24/7.

The lighting in the suites does not include egress lighting illuminating the stairs for the suites box seating. This does not allow the suites to have sweep off safety during an event.

The field lighting system is original and was last re-lamped in 2008. We observed that several lighting ballasts have started to fail. As the system is reaching 20 years old, consideration should be given to total replacement with LED.

The main fire control panel is original, has been experiencing nuisance alarms and will likely require replacement soon.

Plumbing

The galvanized coating inside all of the cold water piping has deteriorated over the years, and now the piping is oxidizing at an accelerated rate. Currently the maintenance staff is flushing the entire cold water piping system four (4) days before an event. The flushing procedure requires two (2) technicians dedicated to this effort for 8 hours each time. As the corrosion continues, more time may be necessary to flush the system until clear water is present in all fixtures at all levels of the stadium. It is estimated that approximately 681,600 gallons of water each year is used for the flushing procedure.
Flush valve water closets and urinals are predominately used throughout the stadium. Manual single lever faucets are at most locations, and sensor operated faucets were found at a few locations. Bathroom fixtures were generally observed to be in good condition. Most of the water closets are 3.5 gallon per flush and urinals at 1.0 gallon except for the club level where waterless urinals have been installed.

The three bolt water closet carriers are going to present a problem as manufacturers phase out this product. Replacement of these units will involve demolition and rebuild of the chase walls where the fixtures are installed. When the fixtures are replaced, we would recommend replacing with a 1.28 GPF fixture as this uses 64% less water than the current water closet.

The existing sewage pumps are original, and a phased replacement of the pumps, valves, controls and control panels is recommended.

Structural

The visual observations of the stadium structure indicated that the overall condition of the structure was fair. The primary structural elements observed (floor slabs, beams, girders, columns, precast seating units, and raker beams) exhibited only isolated minor cracking or spalling, with steel corrosion found at the scoreboard back up steel framing and the elevated steel exterior ramp slabs.

There are a few structural concerns that should be addressed to maintain the facility in its current condition, including cleaning and protecting the corroded steel on the scoreboard framing and the exterior ramp framing. There are also some non-structural concerns which include a failed ribbon board connection on the club level and several missing nuts and bolts on the handrail and guardrail connections.

In addition, there are ongoing maintenance concerns with expansion joints; which are currently being addressed in a phased renovation schedule. In 2016, 33% of the expansion joints on the east and west side of the upper concourse were replaced and 85% on the east side club level. A new waterproofing membrane has been added on the upper concourses.

There are several concrete spalls in the precast concrete double tees and elevated concrete framing that should be addressed, with priority given to those with exposed reinforcing.

Technology

Overall, the IT system meets current Internet protocol (“IP”) trends in a reasonable fashion, having recently upgraded the local area network (“LAN”) with redundant cores and a 10 GB (Gigabit fiber) backbone.

The phone system is a legacy phone PBX, NEC NEAX 2400 IMS. The manufacturer announced End of Support of the PBX as of March 31, 2014. Support and refurbished parts availability is becoming more difficult to obtain.

Stadium WLAN (Wireless LAN) is Wi-Fi compatible, deployed as an Enterasys IEEE 802.11a/g/b/n 2.4/5 GHz AP WLAN with 500 Access Points. The BOH (back-of-house) WLAN is reported to meet stadium operations current coverage requirements.

Physical security systems require additional and updated field devices in order to obtain an on par electronic tool for a modern day NFL stadium. The surveillance system is a legacy analog CCTV system with 145 cameras and is sub-par when compared to other NFL stadiums which have as many as 500 cameras.

The video displays and video production equipment were updated in 2012 and remain functional at this time. We did, however, observe several issues with the main video boards such as poor uniformity between modules, presence of vertical seams between modules, cobwebs present in modules and broken and damaged pixels that compromise video image.

The main loudspeaker system serving the seating bowl was replaced and updated in 2012. The current system performance is at or above other NFL stadia with distributed sound systems. Much of the sound system to the clubs, ticket booths and press areas still relies on original analog connections and was not part of the 2012 upgrade.

The sound system control equipment was upgraded in 2012 and a new mixing console added in 2015. Most of the audio cabling servicing the field level is original except for the portion that was damaged in the 2010 flood. The flood remediation work included the installation of splice points, which is not considered a best practice and will eventually lead to service issues due to corrosion at splice points.

The broadcast cabling system is in poor condition due to the presence of rust and debris in connectors, lack of single mode fiber optic cable and clogged drains in camera wells, and most coaxial connections are not usable.

Nissan Stadium is also not on par with NFL stadia in that it has an insufficient camera location for national broadcasts, no broadcast program distribution to broadcast booths, improper TV locations in broadcast booths and insufficient video and audio lines to the TV trucks to support a second broadcast position.

Roofs

The existing EPDM and PVC single-ply roof covering systems on the stadium generally range from fair-to-very poor/failing condition. The existing roof covering systems have been in place for nearly 20 years, and there do not appear to be any existing in-force manufacturers' warranties on either the EPDM or the PVC/TPO roof covering systems.

The existing EPDM roof covering systems are much more severely deteriorated than the PVC/TPO systems, and there are many failing/non-watertight seams and other conditions in the EPDM systems, particularly on those roof areas that are more (or fully) exposed to the elements; therefore, it is our opinion that the existing EPDM roof covering systems on areas with exposure to the elements have reached the end of (or have exceeded) their useful service life, and these areas of roofing/flashing will continue to deteriorate/fail/leak until they are properly removed/replaced.

During our inspection of the roofs, we noted very little evidence of the roof covering systems having been cleaned, maintained, or repaired within recent years. We understand that the stadium maintenance staff contracted with a local roofing company to make repairs when leaks/interior damage occurred; however, it does not appear that much, if any, preventive maintenance has been performed over the life of the roofs. Our inspection of the roofs revealed numerous open lap seams in the membrane roofing and other non-watertight conditions; it is our opinion that there are many areas with moisture-saturated roof insulation, areas with concealed moisture damage to roof insulation and roof decks/substrates, and potential structural damage that may not yet be visible as interior drips or ceiling damage. Damage of this nature can become very costly to repair once it is detected.

Major efforts could be undertaken to repair the existing EPDM-covered roofs; however, it is our opinion that the roof covering systems will continue to deteriorate/fail at a more accelerated rate, particularly on those areas that are more exposed to the elements/UV, and it would neither be practical nor cost-effective to repair the existing EPDM roof covering systems.

As previously mentioned, the existing PVC/TPO membrane roof covering systems visually appear to be in better condition than the EPDM roofing. and in our opinion, with some cleaning, repair, and preventive maintenance work, the service life of the PVC/TPO roof covering system may be maintained in a serviceable condition for several more years.

Vertical Transportation

VDA® surveyed the eight (8) geared traction elevators, twelve (12) MRL gearless traction elevators and four (4) escalators installed by various companies, including Montgomery Elevator Company and Nashville Machine/ThyssenKrupp Elevator, at the referenced property the week of November 14, 2016. The purpose of the audit and systems analysis was to identify the primary equipment, determine the maintained condition of major components and evaluate the vertical transportation based on applicable industry and code standard. The areas observed for all elevators were machine rooms, hoistways and pits, and for the escalators, we evaluated the external areas and removed the top and bottom landing plates with the assistance of Nashville Machine, the current maintenance provider.

Overall, the equipment is being maintained, but more emphasis needs to be provided on the freight elevators and escalators. These are high maintenance devices that require considerable uninterrupted scheduled maintenance. The freight elevators are obviously critical to the day to day operations, year around, so it would be in the facility's best interest to schedule a dedicated time slot each month, of three to four (3-4) hours per unit, so that detailed maintenance can be performed on each freight elevator. We have been advised that these freight elevators will be modernized in the near future. It is our recommendation that the hall bi-parting freight door equipment be included in this modernization. While most of the actual door panels can be reused to reduce cost, all tracks, guides, chains, motors and locks should be replaced at the time of modernization to provide the most reliable performing product. The freight door equipment is the most worn equipment at the facility.

Estimated life expectancy for the original passenger elevators is twenty to twenty-five (20-25) years under normal conditions. With proper maintenance, your current elevators should operate reliably for another five to seven (5-7) years, but parts availability may become an issue before the units wear out completely. Parts availability or obsolescence for the Magnetec DSB-312 drives will typically be what becomes the biggest issue. While the current drives are operational, replacement parts or repairs will become an issue down the road, leading to extended shutdown times required for lengthy repairs and resulting in mandatory upgrades or replacement. It is our recommendation that you plan for modernization within the next 3-4 years.

Estimated life expectancy for escalators is also twenty to twenty-five (20-25) years. The current systems appear to be operating reliably and as designed. If proactive annual clean downs are performed on each of these units regularly, then they should operate reliably for another six to eight (6-8) years. At the time of modernization, it would be more cost effective to do a complete unit replacement, truss included, rather than a modernization reusing the existing truss in place. Due to easy access and the extensive area around the units, this should be accomplished relatively quickly within 2-3 weeks per unit, compared to the several months per unit required to perform a rebuild in place within the existing truss.

There are elevator fixture manufacturers that can provide custom designed pushbutton assemblies that will incorporate the home team's logo into the fixture design and provide a higher level of durability than you are currently experiencing with your existing fixtures. They can also incorporate video screens within the fixture panel. Another car interior push button alternative is a touch screen car station that is manufactured to replace the current button panel assembly including the stainless-steel plate and can be also utilized for advertisement and video feed within the elevators.

The relatively new express elevators are MRL units and tend to be of a lighter duty construction. Their actual life expectancy is not clearly defined yet in the industry. We do see that this product seems to be prematurely ageing since it has entered the market. These "Express" units seem to support this conclusion based on their current condition. The condition of the cabs, fixtures, entrances and hoistway equipment indicates that the actual life expectancy of this equipment will be closer to ten to fifteen (10-15) years rather than the typical twenty to twenty-five (20-25) years experienced in the past. Maintenance and protection of the existing stainless steel entrances should be considered immediately to help prolong life expectancy. Because of the environment these units are installed in and their application, diligent maintenance, frequent cleaning and painting will be necessary to maximize the life cycle.

Food Service

The Titans and Aramark, their concessionaire, have made improvements in the food and beverage areas, including new graphics at the permanent concession stands, but they do need to continue to upgrade to stay competitive with industry standards. The Titans and their merchandiser, MainGate, also need to update the retail store and satellite locations to provide a more modern look.

For the first 15 years, Centerplate managed the food, beverage and merchandise services for the Titans. Aramark took over food and beverage management prior to the 2014 NFL season. The Titans food and beverage operating agreement with Aramark covers all premium clubs, suites and general concession foodservice, and they have a second agreement for merchandise with MainGate covering the team store and all merchandise and program sales throughout the stadium.

While the original food and beverage (foodservice) equipment may have been purchased by the Sports Authority, as equipment has been replaced and/or added, it has been either purchased directly by one of the two concessionaires or funded by a 1% account. Each concessionaire contributes ½% of their gross revenues to the 1% account, and the funds are spent as approved by the operator and the respective concessionaires.

While the original food and beverage (foodservice) equipment may have been purchased by the Titans and Metropolitan Government of Nashville and Davidson County and used by the original concessionaire, Centerplate, Aramark's understanding is that the Titans own all of the equipment and/or are responsible for all of the equipment, with the exception of the Test Kitchen Portable that is owned by Aramark. MainGate has made capital improvements into their merchandise spaces as needed.

Aramark is responsible for repair, maintenance and replacement of the equipment they use in their operation, drawing from a 1% accrual fund based on 1% of Aramark's Gross Sales. In addition, Aramark funded a capital Fund for new equipment of $750,000. $300,000 of that fund has already been spent for new equipment replacements, leaving $450,000 in the fund for future improvements.

In 2017, Aramark is contractually obligated to invest another $3 million into the stadium for foodservice improvements. The Titans are responsible for repair and maintenance of leasehold improvements such as floors, walls, ceilings, lighting and utility systems.
Our 20-year capital planning will be for routine replacements once useful life of the equipment has been attained and selected new pieces of equipment to keep current with the industry standards, such as the introduction of a finishing kitchen on each of the five suite levels and upgraded merchandise sales locations.

Playing Surface

The natural grass playing field at Nissan Stadium was originally constructed in the Spring/Summer of 1999, immediately prior to the Tennessee Titans inaugural game in August of that year. The playing field design and construction were typical to the USGA sand-based playing field standards established at that time, and included a vertically drained, sand-based rootzone profile with a sodded natural turf playing surface. A subsurface drainage system was installed under the rootzone/sod profile and an overhead broadcast irrigation system was also installed. There is no warning track currently, as the grass playing surface spans from field wall to field wall.

The general condition of the various natural grass playing field sub-systems (sod, rootzone, drainage, and irrigation) can be classified as good. Although currently adequate, there are a handful of potential playing field modifications that could potentially enhance the overall condition, performance, and maintenance requirements of the field. The improvements and modifications include the addition of a sub-surface field heating system to extend the turf growing season; a perimeter warning track to minimize the impact of foot and vehicle damage to the turf; a new irrigation system due to obsolescence; and the addition of water bibs along the perimeter wall.

Preventive Maintenance Program

Stadium operations staff have utilized a work order system that was developed by the Titans IT department in 2003 and is administered by an operations manager. The manager opens and closes work orders manually, which can be a challenge to complete due to his responsibilities in maintaining the stadium.

Currently, there is no centralized computerized maintenance management system (CMMS). Most of the stadium systems that require preventive maintenance have it performed by 3rd party providers. These systems include vertical transportation, mechanical, electrical, plumbing and technology. Each of the contractors are responsible for documenting their work. A singular CMMS and work order system for the stadium staff and contractors should be strongly considered in the near term.

Capital Expense Matrix

The 20-year capital expense matrix is a tool to be utilized by facility owners and management for planning and prioritizing and reflects information provided by manufacturers and current facility users based on “best practices” for similar sized arenas. The matrix is intended to be a “living” document, whereby it is continually updated as changes occur with costs and in the CPI.

Since VSG has no control over construction costs or contractor prices, any equipment or infrastructure cost estimates are made based on the consultants’ experience and judgment. VSG cannot and does not warrant or guarantee that future contractors’ proposals, bids or costs will not vary from their estimates. The costs in the Capital Expense Matrix represent the replacement costs of the associated equipment only. They do not include any costs for demolition or installation (some installs could be handled in-house, others by contractor), architectural fees, contractor or other professional fees, taxes, insurance, any product mark-ups, permits or licenses. Before undertaking a project involving items in the Capital Expense Matrix, we recommend a full vetting and identification of all costs prior to allocating or requesting funds.

ARCHITECTURE & INTERIORS

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ARCHITECTURE & INTERIORS

Overview

Nissan Stadium is an open-air stadium that uses bright color accents as its distinguishing feature. Most notable are the bright red trusses supporting the field lights. These become a thematic element for the building.

The stadium itself is clean and contemporary, with little in the way of applied ornamentation or exterior skin beyond the enclosure of enclosed lounges at suite and club levels. One appreciates the clarity and clean appearance of the stadium. On closer inspection, however, it becomes clear that much of the lack of ostentation appears to be due to cost cutting in design and construction.

In comparison to other NFL stadiums, Nissan Stadium is Spartan almost to the point of inadequacy. It certainly pales in comparison to billion dollar NFL stadiums opened in the past few years. Its biggest flaw may be the lack of connectivity at upper levels—apart from the main concourse, none of the other spectator levels of the buildings have a connection between east and west sides. This prevents a type of movement and socialization that is common in NFL stadiums and other arenas, where a 360-degree concourse is a common expectation, one whose absence is notable at Nissan Stadium.

Site/Parking Lots

Stadium Site

The stadium site is generally very flat, and is well landscaped. Most of the landscaping is in good condition (exceptions will be noted below). Spectators approach the stadium from several directions, as there are parking resources located on all four sides of the stadium. Pedestrian routes are logical and sidewalk widths reasonable for the expected crowds. One exception is at the north and south ends of the stadium, where pedestrian traffic during ingress and egress periods (immediately before and after an event) conflict with vehicular traffic on Russell Street and Victory Avenue.

In the same vein, temporary barricades (including bike racks, fencing, and Jersey barriers) are used at several locations along Victory Avenue to restrict pedestrians from crossing the street at random locations. If this strategy is intended as a long-term solution, the barricades should be replaced with appropriate permanent decorative fencing of a height sufficient to discourage jumping (5 feet minimum, 6 feet recommended).

Sidewalks and landscaping immediately around the stadium appear to be in generally good condition, with some small exceptions that can be addressed through routine maintenance. In keeping with the generally Spartan appearance of the stadium, sidewalks are typically unadorned concrete. Consideration should be given to upgrading some of the pedestrian paving adjacent to the stadium with better materials, such as brick, unit pavers, stamped concrete, colored concrete, or the like.

Stadium security screening (bag check and metal detection) is located outside each gate using folding tables and portable magnetometers. This setup is not weather-protected and impermanent.

Parking Lot A

Lot A is located northwest of the stadium and divided by Russell Avenue. Paving, striping and pedestrian features are in good condition. Landscaping is in good condition excepting a few trees in need of replacement. Lot A includes some turf parking with paved drives that appears to be functional and well maintained.

Parking Lot B

Lot B is located southeast of the stadium at Interstate Drive. Paving, striping and pedestrian features are in good condition. Landscaping is in good condition excepting a few trees in need of replacement. Lot B includes some turf parking with paved drives that appears to be well maintained and functional.

Parking Lot C

Lot C is located immediately east of the stadium. Paving, striping and pedestrian features appear to be in good condition. This situation could be remedied only by eliminating several of the crosswalks and adding fencing to control pedestrian movement.

Parking Lot D

Lot D is located immediately southeast of the stadium. Paving, striping and pedestrian features appear to be in good condition.

Parking Lot E

Lot E is located north of the stadium, across Woodland Street, which is a very busy street on event days. Lot E is characterized by a complete lack of landscaping, and inadequate sidewalks for pedestrian traffic loads.

Parking Lot F

Lot F is located north of the stadium, across Woodland Street, which is a very busy street on event days. Lot F is characterized by insufficient landscaping and a poor pedestrian route to the stadium. The entry to lot F is not aligned with Lot E across 1st Street, which can lead to traffic congestion.

Parking Lot G

Lot G is located immediately north of the stadium. Paving, striping and pedestrian features appear to be in good condition.

Parking Lot H

Lot H is located immediately southwest of the stadium. Lot H includes two types of paving: conventional asphalt and permeable paving. The permeable paving is in good condition, but because it is concrete with voids (part of the design for permeability), it appears in worse condition than adjacent asphalt paving. Care should be taken to properly maintain the permeable portion of Lot H which would include keeping the surfaces clean of debris & sediment, maintain adjacent grassy areas and continue to inspect surfaces for deterioration or spalling.

Parking Lot J

Lot J is a very small parking lot located immediately southeast of the stadium. Paving, striping and pedestrian features appear to be in good condition. Landscaping adjacent to Lot J has excessive wear from pedestrian traffic.

Parking Lot K

Lot K is a very small parking lot located immediately south of the stadium. Paving, striping and pedestrian features appear to be in good condition. Landscaping adjacent to Lot J has excessive wear from pedestrian traffic.

Parking Lot M

Lot M Is located northwest of the stadium. Paving, striping and pedestrian features appear to be in good condition. Landscaping appears to be in good condition.

Parking Lot N

Lot N is somewhat remote from the stadium, located southeast of the complex across Shelby Avenue/Korean Veterans Boulevard. Paving, striping and pedestrian features appear to be in good condition. Landscaping is very sparse in Lot N. A junkyard immediately to the south could benefit from extensive landscape screening.

Parking Lot P

Lot P is a small lot located southeast of the stadium across Shelby Avenue/Korean Veterans Boulevard, and is used for oversized vehicles (mostly RVs). Paving, striping and pedestrian features appear to be in good condition. Landscaping is very

sparse in Lot P. Jersey barriers to control pedestrian flow should be replaced with decorative fencing.

Parking Lot R

Lot R is two parking lots separated by the ramp to the old Shelby Street Bridge. Paving, striping and pedestrian features appear to be in fair condition—several drive lanes have deteriorated and are in need of repaving. Landscaping is very sparse in the portion of Lot R south of Korean Veterans Boulevard.

Parking Lot S

Parking Lot S is located immediately west of the stadium. Privacy screening suggests this lot is used for player parking. Paving, striping and pedestrian features appear to be in good condition. Landscaping is very sparse in Lot S. Landscaping appears to be in good condition overall, apart from a few missing or dead trees which should be routinely replaced.

Parking Lot T

Lot T is located southeast of the stadium across Victory Avenue from Lot J. Paving in Lot T is permeable concrete paving, which appears to the untrained eye to be in worse condition than asphalt parking in adjoining lots. In fact, the permeable concrete paving is in good condition and should remain so if properly maintained. Landscaping in Lot T is less mature, but should catch up to other areas of the site over time.

Stadium Exterior

Nissan Stadium is characterized by large amounts of exposed precast and cast-in-place concrete, concrete masonry units, red painted exposed steel structural elements, and curtain wall glazing at the east and west sides. While the overall appearance of the stadium is clean and contemporary, when compared to more recent NFL stadiums, it could be described as stark, less finished, or less impressive. Short of a major addition that created new exteriors (as in Miami or Kansas City), an interim solution to this issue would be to consider recladding precast concrete portions of the exterior with newer materials, such as concrete or terra cotta exterior panels (for example).

A current strategy in use at Nissan Stadium is to wrap large exterior elements completely with printed graphics. This approach is not recommended. Printed graphics have a relatively short life span and will require frequent replacement, and the use of printed graphics over an entire exterior building element detracts from the architectural integrity of the building. Large sponsorship panels can be integrated in a way that preserves the integrity of the building while making a major statement for the sponsor.

The exposed structural steel has been recently recoated, and appears to be in excellent condition with respect to color and finish.

Field Level

The constructed interior space at field level at Nissan Stadium only covers about a third of the building footprint, generally at the north end of the stadium. Many NFL facilities have a complete (360 degree) service level, suggesting that Nissan Stadium may be tight on back-of-house service space.

However, the field level did not appear to be overcrowded or stressed in terms of space utilization, so it seems that building management is doing a good job of making use of the available space.

Finishes at the field level are very utilitarian, mostly painted concrete block, with finished ceilings in most occupied spaces. Lighting is generally of the cheapest type fixture available at the time of construction, mostly 2 by 4-foot fluorescent troffer fixtures with prismatic plastic lenses, a truly bottom-of-the-line lighting device. Better and more efficient lighting has become available in the years since the stadium opened.

Production Studio

A well-equipped and finished production studio has been created at the field level. This space appears to be nicely fitted out for a variety of indoor production activities related to the football team.

Catering

A wide hallway is used for catering for crew. This space should be upgraded with improved finishes and amenities if it continues to be used for catering.

TSU Locker Room

Tennessee State University football team lockers are located at the field level. The locker room is in good condition and appropriate for the level of competition. Toilet and shower areas appear to be very well maintained.

Family Lounge

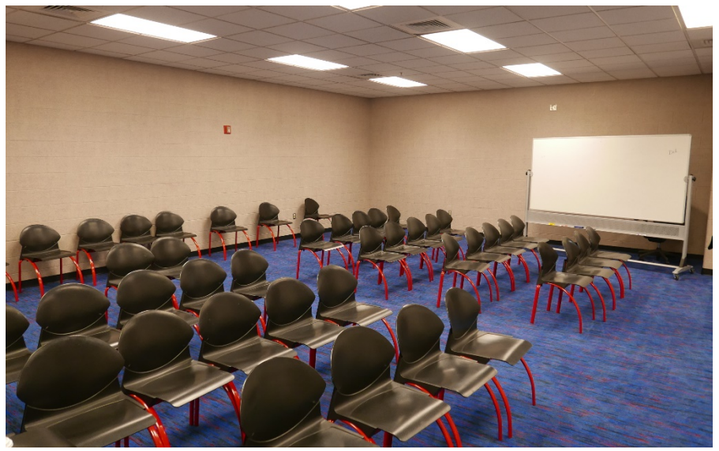
A large space in the TSU locker room area functions as a family lounge/nursery for the building. This is an example of space doing double duty due to an overall lack of space.

Training

Home team training facilities seemed small for an NFL facility. Reasonably well fitted out given space constraints, consultants noted that the space lacks a Swim-Ex machine and other amenities often found at NFL stadiums. Hydrotherapy area appeared cramped as well. Physician exam room and x-ray room are located adjacent to training.

Meeting rooms

Team meeting facilities are utilitarian. They have flat floors, (relatively) low ceilings, and little in the way of upgraded finishes or furnishings.



Home Lockers

The Titans home lockers are a day-of-game accommodation only, as the team trains offsite. While functional and well maintained, the appearance of the locker room is not up to standard for NFL home lockers. Toilet and shower areas appeared to be in excellent condition given the age of the facility. These same comments apply to the coaches' locker areas as well.

Visitors' Locker Rooms

The visitors' locker room is minimally finished and outfitted, but this is not unusual in NFL and other stadiums. Finishes are not fancy, but adequate to the function. Toilets and showers are in excellent condition. There appears not to be a space for hydrotherapy for visiting teams other than in the drying area adjacent to the showers.

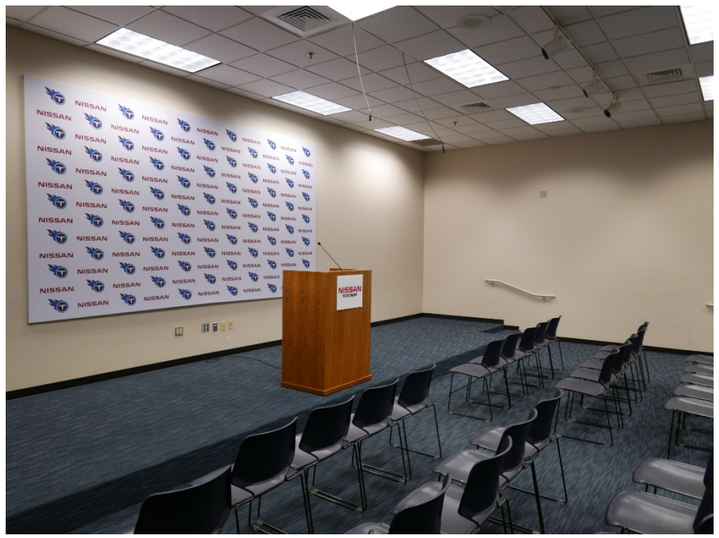
Officials' dressing areas are simple and utilitarian but appear in generally very good condition.

Media Rooms

The media workroom is likewise very simple, but well fitted out with a perimeter work counter and outlet strip. An adjoining area has multiple darkrooms that are obsolete with respect to film and paper development and could be repurposed for other uses.

There are three general purpose lounge/meeting room areas at the field level that provide a great deal of flexible use for temporary use as lounges, catering areas, star dressing rooms, and the like. These spaces, finished with either vinyl floor tile or carpet, are very valuable and should be maintained in their current multifunction state.

The interview room is functional and well-maintained, with a sloped floor, dais and camera platform. Lighting (the building standard fluorescent troffer with prismatic plastic lens) is poor for television and video. A more flexible lighting setup with consideration of the needs of broadcast video would enhance the utilization of this space without the need to bring in additional lighting and stands. The visitor's interview room is smaller but similarly outfitted.



Marshalling/Loading

An indoor marshalling/loading area allows for broadcast trucks to be located indoors (a plus), along with space for unloading of team buses and other large scale activities. While more space for broadcast trailers is desirable, expanding this space would be expensive. Consideration should be given to enclosing additional space at grade for parking broadcast trailers, whose size and expansion capability seems never to stop growing.

A security control room is located off the marshalling area. An adjoining space is used for the coordination of police and fire personnel serving the building for events.

Holding areas for persons detained by police are very open and informal. Curtains and loose furniture are used to separate individuals or groups of persons for detention or interviewing.

Crew lockers and toilet/showers are clean and in excellent condition. Finishes are utilitarian but appropriate. There is a disparity in the size of event staff locker and toilet/shower areas for men and women. This may or may not reflect the reality of the current roster of personnel, but consideration should be given to equalizing these spaces in the future. It appears that the men's dressing area could be reduced to achieve parity with the women's and the extra space repurposed for another use.

Mascot Storage

A large amount of space (relative to other functions) is devoted to the storage of vehicles and costumes related to T-Rac, the Titans' mascot. This space could be consolidated and compacted if needed for other functions.

Cheer/Dance Team Dressing

A reasonably large and well-outfitted space is provided for the Titans' cheer/dance team, including both lockers and a makeup area. The shower room in this area was observed to be in good condition.

Shop

A large unfinished space serves the building as a general maintenance shop, on a par with other similar sized facilities. A building staff break room is located nearby.

Building Storage

Storage is combined with some of the shop space, suggesting that overall building storage is inadequate. This space is expensive to create in existing buildings, suggesting that alternate strategies (such as off-site storage of seldom-used items) be considered before adding new storage space at field level.

Main Concourse Level

The main concourse is primarily at grade level, which facilitates the arrival of a large fraction of spectators who arrive at this concourse without a level change. The main concourse is largely unconditioned space that alternates between roofed (under upper levels) and unroofed (in the end zones) conditions. As one traverses the concourse, the sensation is of going from indoors to outdoors, although the entire concourse (except VIP lobbies) is unconditioned space.

The overall impression of the main concourse is of unfinished or under finished space. This is primarily due to the extensive use of exposed unpainted concrete masonry units (of no special color) to construct many of the walls at this level. While colored CMU is often used to create durable and economical concourse walls, plain CMU is seldom used because of this unfinished effect. The floor finish in the concourse is generally plain concrete. Visible cracking in the concourse floor was limited. Some doors and frames in high traffic areas are showing signs of wear and should be refurbished as part of routine maintenance.

Similarly, the ceiling (where one exists) is crisscrossed by white PVC drain lines that underscore the unfinished nature of the space. While raw space is popular in many urban settings, in this setting it simply looks unfinished. However, adding acoustical tile ceilings (especially in unconditioned space) is probably not the solution. The blue paint used to accent edges of the seating bowl could be extended to areas within the main concourse to good effect.

Large scale graphics are used liberally and help to alleviate the unfinished character of the spaces. Wayfinding graphics are appropriately scaled to the size of the space and generally very good. Some critical signage, such as first aid and fan assistance, is undersized and easily lost among the many large graphic elements. The large backlit ad panels (with red trusses) above some restrooms actually enhance the concourse. The smaller backlit ad panels just below these larger ones only add clutter.

VIP Lobbies

VIP lobbies have upgraded finishes with tile floor and chamfered acoustical tile ceilings and are conditioned spaces. Low ceilings exist where there is a floor directly above. A preponderance of beige wall paint should be reconsidered with some bold accent colors to support either the team colors, sponsor color scheme, or the architectural character of the space. 2 by 2 foot fluorescent fixtures with prismatic plastic lenses should be replaced with something more appropriate to an upscale lobby space.

Titans Offices

Offices on this and the press level are finished to a basic level with carpet tile, painted walls and acoustical ceiling tile. Lighting is generally low-quality 2 by 4 foot or 2 by 2 foot fluorescent troffers with prismatic plastic lenses. Open office systems furniture is used for workstations in larger areas. Overall, the impression of the space is comfortable but uninspiring. The box office and ticket office areas are similarly finished.

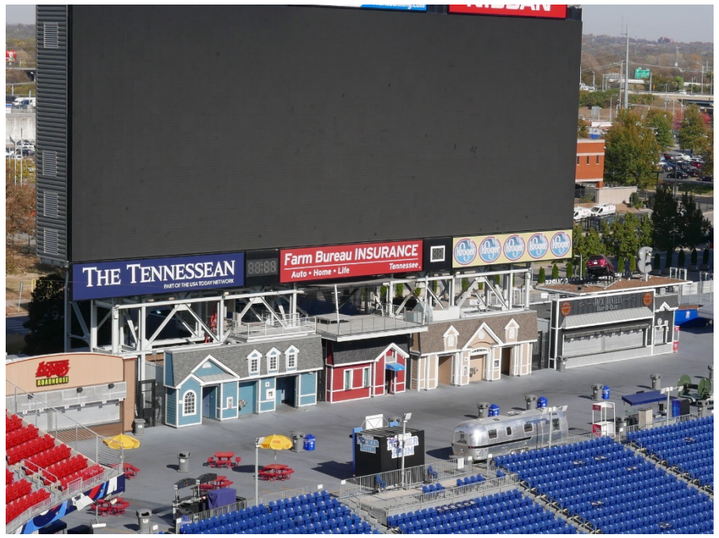
Public Restrooms

The restrooms have recently been refurbished with new finishes, including an epoxy “flake” flooring that helps with cleanability as well as to improve the appearance of the space. Despite the new finishes, the restrooms themselves are still fairly stark, though they appear to be very well maintained. Multiple toilet tissue holders are symptomatic of supplier-provided restroom equipment that is added to restrooms without consideration of equipment already in place. Family toilets are provided in two locations at this level.

Concession and Retail Areas

These areas are colorful and (in some cases) effectively branded. In other cases, retail signage are flat inexpensively printed signs. There is a large, high-ceilinged Titans team store on the east side of the main concourse that appears to be well stocked and with appropriate finishes. The store can open to the street on non-game days as well as to the concourse during events. Equipment within the concession stands will be addressed elsewhere.

A collection of themed storefronts line the concession areas in each end zone under the scoreboard. While vaguely reminiscent of the scenic design of the Grand Ole Opry, these themed areas seem out of place at the otherwise starkly contemporary Nissan Stadium, and have proven difficult to repurpose without significant investment. The entrance to the Mother's Lounge is especially forbidding and should be reworked.



First aid rooms are finished appropriately, with the necessary casework and privacy curtains.

The vast open areas of the end zone concourses at the north and south ends of the stadium lend themselves to experimental uses, such as a food truck court that could bring unique or unusual menu selections to spectators with little or no investment.

The main level seating bowl appears to be in excellent condition, with seats having been recently replaced. Aisle steps and handrails appear state-of-the-art, and there was little evidence of damage or deterioration.

One way the lack of building storage at the field level manifests itself is with the existence of a "boneyard" in the shadow of the northwest pedestrian exit ramp. This is general building storage that would better be placed out of sight of guests. While screened at eye level, the boneyard is fully visible to guests using the ramp.

The west fan zone is a great example of making usable space out of leftover space between the pedestrian exit ramps. Bright lighting, bold graphics, and simple furnishings are used to add value at minimal cost. The painted floor finish is failing and should be replaced, ideally with a more permanent material (i.e., stained concrete or traffic topping).

Press/Suite Level

The press/suite Level is just above the main concourse. Press facilities are located on the west side of the stadium; a row of suites are located on the east side. Patrons access this level from VIP lobbies on each side of the stadium, using escalators or elevators. There is currently no connection between the east and west sides of the stadium at this level without returning to the main concourse.

Sagging acoustical ceiling tile was observed in enclosed spaces at this level. This condition likely occurs due to the poor insulation allowing in outside air resulting in humidity to rise to ambient (outdoor) levels.

Suite Lobby

A large mural livens up the otherwise dull finishes of this space, which is in very good overall condition. More or brighter colors would help enliven this dramatic vertical space.

Suite Corridor

Minor damage to gypsum board walls was noted in the suite corridor and should be repaired as part of routine maintenance. The suite corridor on the east side of the stadium needs artwork similar to the press corridor.

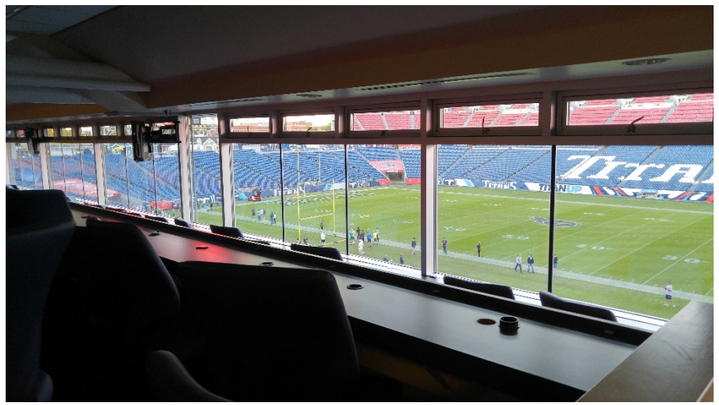
Suites

Suites are in the process of being renovated. New finishes are reviewed below. The consultant endorses the renovation of all suites in the stadium. The owner's suite at this level includes newer finishes and is appropriate for an NFL stadium.

Media Facilities

The various rooms for media have been adapted over time to meet the needs of the various media groups using them.

Although some of these adaptations are a little rough, we presume they suit the purpose. Common areas such as media dining and writing press have been well maintained and present the building well to visiting journalists. Wall-hung photos in media dining should be much larger than what exists.



The writing press window to the field uses a curtainwall glazing system with vertical mullions that create partial obstruction of views of the playing field. Replacement of this glazing with fully butt-glazed insulated glass should be considered in the future. Chairs for the writing press are too large for the space available and should be replaced with smaller (though not necessarily narrower) chairs.

Fan Zones

Two fan zones have been created in found spaces near the southeast and southwest exit ramps. Though lacking views to the playing field, these spaces have a special floor finish, have large-scale graphics, and can be closed off from other spaces on the floor. They provide versatile if somewhat long and narrow social spaces for group functions during or between events. A higher quality stacking chair should be used for functions in these spaces. The lightweight folding chairs seen by the consultant will not stand up to abuse.

Suite level public restrooms are finished extensively with a red-orange tile that is seen in upscale restrooms throughout the building. Though an upgrade from paint, the tile finish is monotonous and oppressive.

Club Level

Located between the press/suite and mezzanine suite levels, the club level provides access to the club seating section of the seating bowl. There is currently no connection between the east and west sides of the stadium at this level without returning to the main concourse.

There are two major and four smaller club lounges on this level, the major ones at midfield and the small ones near the end zones.

Club Level Seating Bowl

The seating bowl appears to be in excellent condition, with seats having been recently replaced. Aisle steps and handrails appear state-of-the-art, and there was little evidence of damage or deterioration.

The design of some handrail/guardrail conditions at the club seating bowl is problematic, as such conditions often are next to vomitory stairs and similarly complex geometry. While there is no inexpensive fix, greater use of tempered glass in lieu of fabricated metal railings in these areas can improve compromised sightlines for seats affected by these conditions.

Some corrosion is evident at galvanized guardrails and handrails. Galvanized rail should not corrode (in theory). One solution to this is painting the rails, but painting galvanized metal is very difficult and should only be undertaken with very strict specifications regarding products used, surface preparation, and application methods.

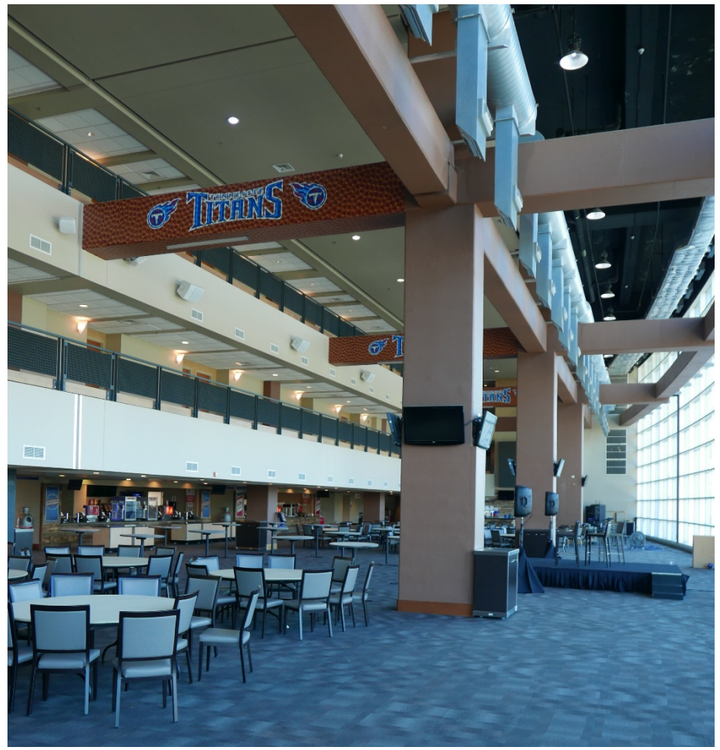
Sagging acoustical ceiling tile was observed in enclosed spaces at the club level. This condition likely occurs due to the poor insulation allowing in outside air resulting in humidity to rise to ambient (outdoor) levels.

Club Level Public Restrooms

The restrooms are finished extensively with a red-orange tile that is seen in upscale restrooms throughout the building. Though an upgrade from paint, the orange tile finish is monotonous and oppressive.

Club Lounges

The large midfield lounges are tall spaces with large windows having exterior views. The west club lounge offers spectacular views of the downtown skyline. The décor in these spaces is very bland, with office-style carpet tiles, beige paint and some large-scale graphics.



Building management reported an issue getting guests from this level to the two suite levels above, which are not accessible via escalator.

Printed sign at team store is not appropriate for upscale club lounge area. Likewise, some of the wayfinding signage (e.g., for restrooms) appears amateurish and not appropriate for the upscale environment. Concession areas lack overhead signage.

End Zone Club Lounges

The arrangement of space at the club level creates four smaller lounges, two at each end zone. We recommend development of these lounges as sponsor-themed clubs with distinctive personalities. This idea has been partly carried out, but too many finishes from the common lounges at midfield are still in evidence for the theming to be convincing.

Daylight was observed at edges of some exit doors. These doors should be repaired as part of routine building maintenance. Wood doors giving access to the freight elevator were observed to be heavily worn. These doors should be refinished as part of routine building maintenance.

Mezzanine Suite Level

The mezzanine suite level is the lower of two all-suite levels below the upper concourse. Each level contains 30-35 suites on each side of the field, 60 total per level. There is currently no connection between the east and west sides of the stadium at this level without returning to the main concourse.

There is a block of unfinished space with field views at each of the four corners of the mezzanine suite level. This space has the potential to be used for additional suites, field-view lounges, party suites, or other revenue-producing space. The LP Building Products party suite is a good example of how these four areas could and should be redeveloped.

Sagging acoustical ceiling tile was observed in enclosed spaces at this level. This condition likely occurs due to the poor insulation allowing in outside air resulting in humidity to rise to ambient (outdoor) levels.

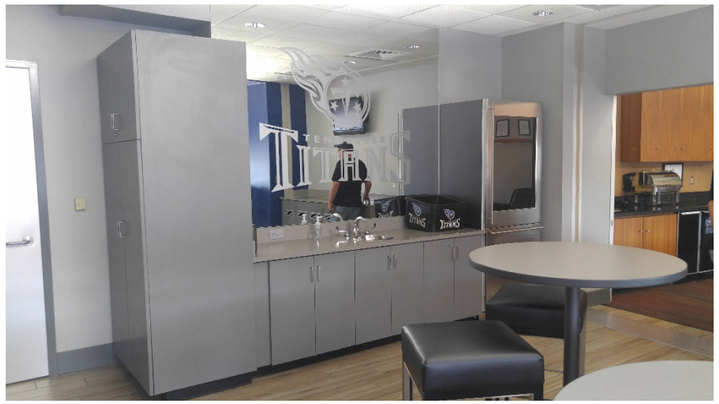
Suite Level Public Restrooms

The restrooms are finished extensively with a red-orange tile that is seen in upscale restrooms throughout the building. Though an upgrade from paint, the tile finish is monotonous and oppressive.

Suites

The new suite finishes are modeled at this level. In general, we endorse the new finish program as an appropriate update to the suite décor after more than 15 years of operations.

A few observations about the new suite décor are as follows:



- Consider using a larger television monitor above the buffet—expectations are moving rapidly towards larger screens.
- Corduroy look ceiling tile appears to be a holdover from the previous implementation and should be replaced. This ceiling tile has been around since the early 1980s and appears quite dated. Make sure ceiling tile has high resistance to humidity and sagging.
- Consider adding protection to outside corners of plastic laminate casework where exposed to cart traffic and other abuse.
- Carpet tile in updated suites should be something other than building standard.

No comments will be made regarding existing suite décor on the assumption that all suites will eventually be changed over to the new décor scheme.

<u>Suite Corridor</u>

The corridor is somewhat bland, with office-style carpet tile, beige walls, and 2 by 2-foot acoustical tile ceilings. Large-scale football graphics added in some areas are very helpful; however, in narrower parts of the corridor, framed artwork should be used as full-height graphics need distance to be appreciated. Wall covering used as an accent (e.g. at suite door recess) is too subtle to be noticed.

There are areas at each end of the mezzanine suite level where substantial floor space is treated the same as a corridor, with a small smattering of lounge furniture. These areas should be repurposed as suite lounges. Suite lounges are an important part of the suite holder experience, allowing suite guests to mingle in a private and exclusive setting. This has been done to a limited degree in some corners (e.g. LP Building Products), but needs a more thorough and intentional implementation.

Promenade Suite Level

The promenade suite level is located directly above the mezzanine suite level and below the upper concourse. There is currently no connection between the east and west sides of the stadium at this level without returning to the main concourse.

Sagging acoustical ceiling tile was observed in enclosed spaces at this level. This condition likely occurs due to the poor insulation allowing in outside air resulting in humidity to rise to ambient (outdoor) levels.

<u>Suite Level Public Restrooms</u>

The restrooms are finished extensively with a red-orange tile that is seen in upscale restrooms throughout the building. Though an upgrade from paint, the tile finish is monotonous and oppressive.

No comments will be made regarding existing suite décor on the assumption that all suites will eventually be changed over to the new décor scheme.

Suite Corridor

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There is a block of unfinished space at each of the four corners of the promenade suite level. This space has the potential to be used for additional suites, field-view lounges, party suites, or other revenue-producing space. The LP Building Products party suite on the mezzanine level is a good example of how these four areas could and should be redeveloped.

There are areas at each end of the promenade suite level where substantial floor space is treated the same as a corridor, with a small smattering of lounge furniture. These areas should be repurposed as suite lounges. Suite lounges are an important part of the suite holder experience, allowing suite guests to mingle in a private and exclusive setting. This has been done to a limited degree in some corners (e.g. LP Building Products on the mezzanine suite level), but needs a more thorough and intentional implementation.

Upper Concourse Level

The upper concourse is a mostly outdoor space without a roof or ceiling giving access to seating in the upper bowl and is accessed via elevators or ramps. There is currently no connection between the east and west sides of the stadium at this level without returning to the main concourse. There is no escalator access to this level. Escalator access would be desirable, but would require at least two extraordinarily long escalators to span the 77-foot vertical distance required to reach the upper concourse without using interior escalators that access premium levels. While desirable, this may prove economically infeasible.

The upper concourse floor was in the process of being resurfaced when the review team was present. We presume this will provide better protection for levels below from water penetration, as well as an improved walking surface for patrons.

The use of unpainted concrete masonry units (CMU) at this level lends it an unfinished appearance.

There is a relative lack of wayfinding graphics in the upper concourse. This could not only help with patron orientation, but also provide sponsor and team activation opportunities.

Upper Level Seating Bowl

The seating bowl appears to be in excellent condition, with seats having been recently replaced. Aisle steps and handrails appear state-of-the-art, and there was little evidence of damage or deterioration.

The design of some handrail/guardrail conditions at the upper seating bowl is problematic, as such conditions often are next to vomitory stairs and similarly complex geometry. While there is no inexpensive fix, greater use of tempered glass in lieu of fabricated metal railings in these areas can improve compromised sightlines for seats affected by these conditions.

Some corrosion is evident at galvanized guardrails and handrails. Galvanized rail should not corrode (in theory). One solution to this is painting the rails, but painting galvanized metal is very difficult and should only be undertaken with very strict specifications regarding products used, surface preparation, and application methods.

Some parts of the guardrail at the upper concourse are flat on top, allowing guests to rest food and drinks on it. Some portions of the guardrail effectively form a wall preventing views to spectators on the concourse. In some locations, concrete guardrail has accumulated an undesirable accretion of electrical conduit in a disorganized pattern.

Lighting

Lighting at the upper concourse is via HID floodlights. While efficient from a lumen per watt viewpoint, this lighting contributes to a lowest-cost ambience.

Retail signage is flat, inexpensively printed signs.

Public Restrooms

The restrooms have been updated as on the upper concourse; however, exposed fireproofing on the sloped ceilings detracts considerably from their appeal. The roof deck and structure within restrooms were never painted.

Recommendations

1. Investigate adding pedestrian ramps to cross over Russell Street and Victory Avenue at locations that would maximize their utilization by arriving and departing guests. Replace temporary pedestrian barriers with permanent decorative fencing 5 to 6 feet high to control pedestrian movement and limit jaywalking.

2. Replace 35% of pedestrian paving between the stadium exterior and the curb with upgraded paving material.

3. Create permanent security screening stations at each gate with (at a minimum) a roofed area to provide rain cover for screening activities. Design should be flexible to allow for constantly changing security screening technology.

4. Upgrade landscaping, sidewalks and pedestrian crossing at Russell Avenue and 1st Street to bring Lots E and F up to par with other parking and pedestrian resources at the Stadium complex. Align drives at Lots E and F.

5. Replace planting areas adjoining Lots J and K with ground cover to discourage pedestrian traffic, or a walkable landscape material such as decorative rock or granite chat.

6. Upgrade landscaping in and around Lots N, P and R by adding shade trees. Do not add shrubbery, which is conducive to crime.

7. Re-clad existing exterior opaque building walls with a contemporary building cladding system with long life, low maintenance, and good energy performance.

8. On a schedule, replace Event Level lighting with up-to-date, efficient LED or high-efficiency fluorescent lighting in occupied spaces.

9. Upgrade finishes and lighting in crew catering area.

10. Create a permanent Family Lounge at the event level near the Titans Locker Room.

11. Upgrade team meeting facilities with permanent (oversized) seating with folding tablet arms, tiered if possible, dimmable lighting and current AV technology.

12. Renovate Titans home team and coaches' locker rooms to a level of finish comparable to other NFL stadiums, at least the median level. All finishes and lighting should be upgraded, in addition to AV technology.

13. Upgrade lighting in home team interview room to a system more suited to broadcast quality video.

14. Add permanent holding rooms for persons detained by police; rooms should be designed to protect both detainees as well as building and security personnel.

15. Add carefully selected finishes, such as weather-resistant acoustical clouds, in main concourse areas to improve overall appearance of the facility. The ceramic tile facing added to the lower wall at midfield concessions is a good example for a high quality, weather-resistant finish.

16. Replace printed signage at any concession area with dimensional signage similar to the permanent concession stands.

17. Decommission the themed storefronts in the end zone and replace with concessions, toilets and other guest amenities consistent with the overall architecture of the stadium.

18. Consider elimination of the boneyard at the main concourse level by moving storage offsite or consolidating with field level storage.

19. Replace acoustical ceiling tile at the press/suite level with tile having extreme humidity resistance.

20. Repaint suite lobby (all levels) with colors pertaining to sponsor, team, or architectural theme.

21. Corner guards should be added to all outside corners in the suite corridor.

22. Replace ceiling tile in the fan zones with a more decorative acoustical ceiling (maintaining some sound-absorbing ability in the ceiling will be crucial) and more flexible lighting capable of a variety of light levels from very dim to bright.

23. Replace orange wall tile in public restrooms (all levels) with newer tile finish with orange accents to tie with floor tile, or replace all tile with new. Replacement of plastic laminate counters with a solid surface should accompany tile replacement.

24. Replace acoustical ceiling tile at club level with tile having extreme humidity resistance.

25. Implement a refurbishment of both midfield club lounges with updated and more lively colors and finishes including paint, wall coverings, carpet, and acoustical ceiling tile. Sponsor-themed bars should either conform to the new décor, or the entire club lounge should reflect the theming of the sponsored bars. Enclose large foil-wrapped ducts in gypsum board.

26. Add two escalators at each midfield club lounge to access mezzanine suite and promenade suite levels. This can be done with minimal demolition in the existing high-volume space above existing escalators from below.

27. Replace printed retail signage on club level with dimensional signs. Replace wayfinding signage with appropriately designed dimensional signage system. Add overhead dimensional signage at headers above concession stands.

28. Redevelop up to four smaller end zone club lounges as sponsored lounges with distinct, sponsor-driven personalities. This will require replacement of all finishes in the lounge area.

29. Redevelop up to four smaller end zone suite-level lounges on the mezzanine suite level as sponsored lounges with distinct, sponsor-driven personalities. This will require replacement of all finishes in the lounge area. Stadium seating should be replaced with suite-level type of chair. One or more of these lounge areas could be redeveloped as a triple party suite with operable partitions.

30. Replace acoustical ceiling tile on mezzanine suite level with tile having extreme humidity resistance.

31. Install permanent reception counter at elevator lobby on mezzanine suite level.

32. Add framed artwork at suite corridor on mezzanine suite level.

33. Replace mezzanine suite corridor carpet with hospitality-grade carpet tiles having a more distinctive pattern and color theme that supports the architectural theme of this level.

34. On the mezzanine suite level, replace wall covering accent at suite door recess with wood, tile, or other durable material.

35. Redevelop large open floor areas as suite lounges with bar service, upgraded finishes, intentional groupings of lounge furniture, and thematic (possibly sponsored) elements.

36. Install permanent reception counter at elevator lobby on promenade suite level.

37. On promenade suite level, replace acoustical ceiling tile on a schedule with tile having extreme humidity resistance.

38. Add framed artwork in suite corridor on promenade suite level.

39. Replace promenade suite corridor carpet with hospitality-grade carpet tiles having a more distinctive pattern and color theme that supports the architectural theme of this level.

40. On promenade suite level, replace wall covering accent at suite door recess with wood, tile, or other durable material.

41. Redevelop up to four smaller end zone suite-level lounges on the promenade suite level as sponsored lounges with distinct, sponsor-driven personalities. This will require replacement of all finishes in the lounge area. Stadium seating should be replaced with suite-level type of chair. One or more of these lounge areas could be redeveloped as a triple party suite with operable partitions.

42. On the promenade suite level, redevelop large open floor areas as suite lounges with bar service, upgraded finishes, intentional groupings of lounge furniture, and thematic (possibly sponsored) elements.

43. Consider adding escalator access to upper level (minimum of two escalators for each side of stadium).

44. Re-clad existing restrooms and concession stands on the upper concourse with durable, weather resistant materials to create a more appealing environment in the concourse.

45. Add large scale wayfinding graphics to upper concourse.

46. Add angled trim to flat guardrail tops to discourage resting food or drinks on guardrail. Lower height of precast cladding from approximately 10 feet to 4 feet (with sloped top) where spectator views are possible. Replace electrical conduit on precast guardrail to minimize visual impact.

47. Replace HID floodlights at upper concourse with a decorative light fixture with similar output characteristics.

48. Replace printed signage at any retail area on the upper concourse with dimensional signage similar to permanent concession stands.

49. Add permanent, moisture-resistant surface at sloped ceiling area of upper concourse restrooms. Paint inside roof deck and all visible roof structure of restrooms.

VENUE Solutions group

MECHANICAL, ELECTRICAL, PLUMBING & FIRE PROTECTION

MECHANICAL, ELECTRICAL, PLUMBING & FIRE PROTECTION

There were two primary goals for this section: first, to identify equipment that needs replacement or that will be within the next 20 years and second, to identify potential system upgrades and emerging technologies that would provide a benefit in utility savings, maintenance, guest comfort and indoor air quality. Ultimately, this document will provide an engineering "high level" evaluation of existing systems and guidelines aiding in annual (and more immediate) capital expenditures for MEP systems.

Estimates of equipment life are based on both the ASHRAE 2015 Handbook – HVAC Applications and the ASHRAE Owning and Operating Cost Database. Specifically, data from the ASHRAE Handbook is from the Akalin 1978 Study and where available, from the 2005 Abramson data. The Database is an ongoing project and represents more up-to-date information, although the dataset in some cases is too small to be considered useful. Information is presented in the report as a range between the three, while in the capital expenditure table, either the mean of the range or the best value from experience has been used. Access to the database is available at: http://xp20.ashrae.org/publicdatabase/

Recommendations regarding repair and replacement for existing systems are made inline along with their descriptions. Recommendations regarding emerging technologies and other updates are described separately below. References made below include ASHRAE Standard 62.1 – Ventilation for Acceptable Air Quality and ASHRAE Standard 90.1 – Energy Standard for Buildings except Low Rise Residential Buildings.

For the most part, the mechanical, electrical, plumbing, and fire protection systems are original to the stadium and 17 years old. The stadium MEP and fire protection systems have been maintained over the years; however, a few of the systems are reaching the end of their overall life expectancy and in the process of being replaced or upgraded.

The HVAC systems are chilled water for comfort cooling and primarily electric resistance heating throughout. It is understood that the decision to use electric resistance for heat is in large part due to the mild climate of Nashville and the issues with getting district steam from the downtown loop.

Mechanical

The HVAC systems utilize district chilled water, purchased from Nashville District Energy System (NDES), for comfort cooling and electric heating throughout the stadium. It is important to note that the stadium has no central heating systems installed, only localized electric heating systems are provided. In general, heating systems are limited in the stadium.

1. The mechanical systems are in fair condition and have been well maintained over their 17-year life span. Focus should be on continuance of the current preventive maintenance and service plan.

2. Due to the facility not utilizing a decoupled chilled water system and instead pumping district provided chilled water through the building piping, the mechanical systems are beginning to show signs of issues. There are major signs within the piping system and cooling coils of corrosion, rust, pitting, and scaling. This is causing reduced capacity throughout the facility. Because of this, planning and budgeting should be considered for replacement of the entire piping system and cooling coils or possibly just sections or quads at a time, beginning in about 5 years and continuing over a span of 5 to 7 years.

3. A major emphasis should be upgrades to the building automation system (BAS) for increased energy efficiency and control. The existing BAS is in good condition, but will require system upgrades in 5 to 10 years to keep the system modern and properly commissioned. We would encourage immediate upgrades to some of the sequences of operation to improve energy efficiency including:

   a. Chilled water pumping optimization and wire-to-water efficiency.

   b. Demand control ventilation (DCV) control for all air handling systems.

   c. Single zone VAV control for all constant volume single zone systems, including the club level air handling units.

   d. For all VAV air handling systems, provide for discharge temperature reset and static pressure reset based on the critical zone (CZ).

   e. Add outside air flow, supply air flow, and return airflow monitoring stations.

Chilled Water Cooling system

Observations

The chilled water system is original to the building and appears to be in moderate working condition considering its age. Purchased, district chilled water is supplied to the stadium by NDES for all cooling requirements. The chilled water system is not decoupled from the district loop system, meaning there are no heat exchangers that separate the building from the city loop. Because there are no heat exchangers, there is no equipment that requires maintenance or replacement other than pumps. The chilled water pumping system is served by three (3) variable-speed primary pumps sized for what appears to be 50% of the total flow for full redundancy. The pumps are each 50 HP end suction type. While the system may be sized for full redundancy at 3,600 gpm, the pumps are only able to produce on a peak day around 2,300 gpm. This in large part due to the additional scale build-up within the pipes from corrosion.

Primary Chilled Water Pump Skid

The chilled water system was designed to maintain a temperature difference between the supply and return lines of 14 degrees; however due to the restrictions, the system is only able to maintain around a 20 to 25-degree temperature rise. All the pumps appear to be in fair condition, given their age. The pumps are showing signs of wear. Pump condition is as follows:

- Chilled Water Pump, P-1: Motor replaced 1 year ago
- Chilled Water Pump, P-2: Bearings and seals replaced four years ago
- Chilled Water Pump, P-3: Bearings and seals replaced three years ago

Five (5) years ago, the chilled water pumps were provided with VFDs to vary chilled water flow to the stadium based on load and demand. Pump speed is controlled by the BAS per differential pressure sensors located at the farthest air handling unit cooling coil.

Primary Chilled Water Pumps

The median useful life of the chilled water pumps is between 20 and 21 years. All of this equipment may outlive, or already has outlived its useful life due to maintenance, but should be considered for replacement soon.

Electric Resistance Heating System

Observations

The electric resistance heating systems are original to the building and appear to be in fair working condition considering the age. The facility staff stated there are very few replacements of air handler heating coils at this time. The majority of replacements are part of the fan coil units, and are on an as needed basis for replacement.

The median useful life span of a heating coil is between 25 and 30 years and should be considered for replacement in 15 years.

Air Handlers - Clubs

Observations

The club area is conditioned by four (4) variable volume chilled water air handlers located on the third level within the mechanical room of each quad of the stadium. Each air handler ranges in airflow between 46,150 cfm to 68,000 cfm for a total of around 164,150 cfm of conditioned air in each club. The Trane air handlers have the following components: mixing box with DDC controlled dampers on return and OA side; filter racks for pre-filter and secondary filter; cooling coil; electric resistance heating coil; supply fan array and discharge plenum. All control components are DDC with the local control panel in each room and are centrally shown on the building automation system.

Each air handler has a supply fan array system consisting of nine (9) supply fans stacked in parallel and is provided with a single variable frequency drive located in the mechanical room. Each air handler also has a return fan that doubles for smoke exhaust in the event of emergencies and allows for airside economization when outside dry bulb conditions permit. Supply to each club area is through externally insulated ductwork and is distributed through the various levels within the club space which allows for uniform distribution. The return is also directly from the club space at each quad near the mechanical room. Due to the volume of air movement within the club and the exhaust point being centrally located, there are times where the air creates a cold draft at the level of return. This is not always present, especially during times of a reduced load or airflow quantity.

Club AHU Cooling Coil

Club AHU Buckled Return Plenum

Club AHU Supply Fan Array VFD

The club level air handlers and their associated components appear to be in generally good condition considering their age and runtime. However, one of the air handlers apparently has a leak in the condensate drain pan that is getting onto the floor. The air handler on Level 3 Sector B has a buckled, return air mixing box plenum due to a restriction within the ductwork at one point in time. While this is not a replacement issue, it should be reviewed and confirmed there is no leakage of airflow through the buckled seam. The coils are original to the unit and need to be cleaned. The unit with the leak may require replacement of the coil in the immediate future due to rust spreading up the coil.

Typical life span for a custom air handler is around 15-20 years. Hydronic coils are expected to last about 15 years, and fans reach their end of life around year 25. All this equipment may outlive, or already has outlived its useful life due to its good maintenance, but should be considered for replacement soon.

Air Handlers - Support

Observations

There are approximately ten (10) other air handling systems located around the stadium. Each is equipped with a mixing box with modulating return and outside air damper, pre-filter, cartridge filter, chilled water cooling coil, electric resistance re-heat coil, supply fan, and discharge air plenum.

Most air handlers throughout the building have return fans which allow for airside economization. Of the ten (10) air handling units, all but one unit is equipped with variable speed drives to vary the fan speeds, thus saving energy. Of the ten (10) air

handling units, it is estimated that one-third (1/3) of the units' variable speed drives are original to the building. Most VFDs are being replaced with new VFDs as required.

All equipment appears to be in a reasonable condition, considering all air handling systems are original to the building. The air handling units' cooling coils and condensate drain pans are rusted and starting to show signs of leakage. In some units, there appears to be a biological growth on the cooling coil which is an area of concern. The supply fans and motors are in good condition. There are a few locations where duct insulation located within the mechanical room is showing damage and extensive cracking and should be replaced as soon as possible.

The air handlers serving the locker rooms are units that have a high percentage of outside air, ranging from 50-70% outside air. These units do not appear to have a UV antimicrobial coil protection or an energy recovery device. A large percentage of utility costs are associated with conditioning outside air. Because the facility utilizes electric resistance reheat, this energy consumption is only exacerbated.

Air Handling Cooling Coil with Biological Growth

Air Handling Supply Ductwork Insulation

Building Automation System

Observations

The building automation system (BAS) is a Siemens web-based system. Most actuators in the building are electronic, DDC type controlled by the BAS.

This system is the original BAS system with minor upgrades to the system, other than software updates. Most control issues are being addressed by maintenance staff. The software updates have ended, therefore causing the control system to be out of date. All building automation system components appear to be in good working order given the age of the system.

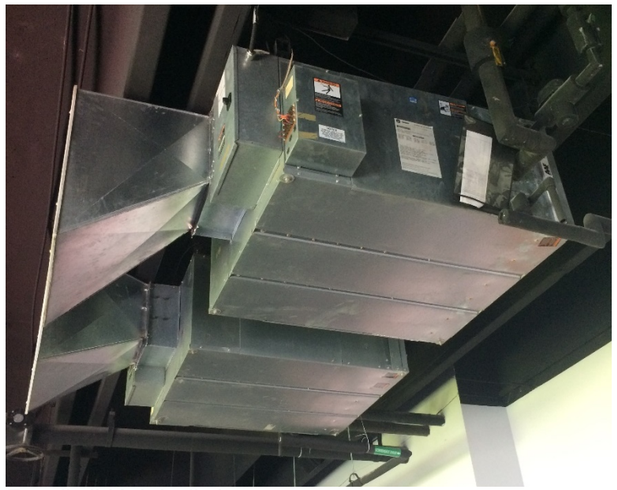
Siemens Control Panel

The staff currently is using the system for a troubleshooting tool and a means to control equipment on and off. While this is a vital piece of the building automation system, there are no schedules or trending in place to optimize the system, or provide any means of energy savings.

Fan Coils and Terminal Units

Observations

There are approximately 238 Trane blow through fan coil units located around the building. Each is equipped with a pre-filter, chilled water cooling coil, electric reheat coil, supply fan, and discharge air plenum. All equipment appeared to be in a reasonable condition, considering almost all fan coil units are original to the building.



Fan Coil Unit in Suite

One of the major concerns is that all FCUs are provided with an isolation valve on the chilled water supply line but no isolation valve on the return line. This prevents the staff from replacing units without shutting down the entire chilled water system. Considering the location of most FCUs and the age of the equipment, this is a major problem.

Many of the terminal box units are having issues with the valves sticking and failing to perform. Most of these are being replaced at the time of failure, but due to the limited information on the BAS, it is hard to determine if a box valve has failed.

Exhaust and Grease Fans

Observations

General exhaust and grease exhaust fans make up a large portion of the facility's mechanical systems due to the quantity and locations of cooking concessions, general concessions, and large restrooms throughout the concourses. Due to this, there are many small exhaust fans. Most of the general exhaust and grease exhaust fans are manufactured by Loren Cook, range from up-blast to belted vent sets, and are located on the roofs of restrooms. The exhaust fans are on a preventative maintenance schedule such that the belts are replaced once per year. At the time of belt replacement, the bearings are greased, and motors that need replacement are completed at the same time.

All equipment appears to be in a reasonable working condition, considering almost all exhaust fans are original to the building. The life span of a general exhaust system should be between 15 and 30 years. depending on the frequency of use and preventative maintenance.

The grease fans during a full cooking mode are not able to eliminate all the smoke produced under the kitchen hood; this can be caused by the kitchen hood not being properly cleaned or a grease build up the ductwork which creates a low flow situation.

Grease Fan on Low Roof

General Exhaust Fan on Low Roof

Miscellaneous

Observations

Chilled water piping throughout the building appears to be mostly black steel with grooved mechanical couplings similar to Victaulic fittings. Due to the facility not utilizing a decoupled chilled water system and instead pumping city provided chilled water through the building piping, the mechanical systems are beginning to show signs of premature corrosion. There are major signs within the piping system and cooling coils of corrosion, rust, pitting, and scaling. This is causing reduced capacity throughout the facility.

The chilled water insulation is showing signs of water damage in certain areas of the facility. Most of the chilled water piping serving the facility is insulated with a closed cell, fiber-free elastomeric thermal insulation.

The life span of the piping system should be between 30 and 50 years, depending on city water quality and on treatment. Undamaged, dry insulation has a median useful life of around 25 years but does not need to be replaced until it is damaged.

Cooking exhaust and makeup air systems, serving the main kitchen and commissary, should be changed to variable speed systems and coupled with a hood system that measures heat above the cooking surfaces to see if fan turndown is appropriate. Care must be taken to determine if such a system is acceptable to the Authority Having Jurisdiction as reduced airflow would also mean reduced velocity inside exhaust ducts.

Inside Chilled Water Pipe with Corrosion

Chilled Water Insulation

Main Kitchen Exhaust Hood

Operations and Maintenance

Observations

The air handling units are operational when there is not a major event underway. The air handlers modulate to meet set point and may shutoff based on building load. During the off season, the fan coil units are shut down completely. Building chilled water pumps are staged on and off only as required to match the building load. Airside economization is included on most air handlers, so there is no water-side economization.

The maintenance program uses in-house personnel for light, day-to-day work such as replacing fixtures and filters, with outside contractors doing most of the more skilled or heavy upkeep. Pre-filters in the air handlers are replaced quarterly depending on events, secondary filters are replaced every year. Filters throughout the building are kept on a similar schedule, and by accounts and observations, the program is tightly adhered to.

The facility has a service contract with Lee Company's facility management group who maintains the facility. This includes the chilled water system to the fan coil units in the suites. The chilled water pumps are reviewed every month and as needed.

Major repairs and replacements must go out for competitive bid, but smaller replacements, equipment repairs, and emergency work are performed by local mechanical contractors.

It seems that the operations and maintenance staff does not have the required number of staff to upkeep the stadium as needed. The staff appears to be in a reaction mode due to reduced staff. This means the building systems are just being maintained and not optimized. Energy consumption could drastically decrease with a renovated BAS by staff with expertise in optimizing building controls.

Recommendations

1. Chilled water pumps should be completely replaced in 3-4 years. Motor change-outs may be required in the interim.

2. Investigate the means and methods of properly treating inside walls of chilled water piping to prevent further corrosion.

3. Consider replacement of the entire piping system and cooling coils or possibly just sections/quads at a time, beginning in about five (5) years and continuing over a span of 5 to 7 years.

4. Installing a chilled water filtration system would help control and minimize any further damage to the chilled water system.

5. Preventative maintenance should be a focus to extend the equipment and coil life and allow for efficient operation. We recommend adding the electric resistance coils on the PM plan for routine inspection.

6. Based on the condition of the custom built-up air handlers in the club areas, it is recommended to stage replacement beginning within five (5) years. Each year replacing one (1) air handler with a standard custom air handling unit. It would be recommended to utilize a panelized knock down type construction for ease of placement and constructability.

7. We recommend the use of bi-polar type ionization filtration for the large air handler units. ASHRAE Standard 62.1 allows for two means of compliance. The most widely used method is the ventilation procedure, which requires a prescribed amount of outside air based on space use, floor area and occupant density. However, the indoor air quality procedure provided in the standard allows for alternate methods of cleaning the air, provided contaminants in breathable air are maintained below certain levels. Bi-polar ionization is proven technology which allows for significantly reduced outdoor air rates, often by up to 50%. This technology is expensive, but the cost savings is quite significant in spaces with large occupant densities such as club areas and usually has a very short payback. Carbon filters were installed in the club air handlers, but are now removed. These are typically effective in reducing odors from the supply airstream but are not as effective at reducing carbon dioxide, carbon monoxide, formaldehydes and ureas that are generated by occupants, equipment, and off-gassing from furniture and finishes.

8. We recommend that the current preventative maintenance program for the air handling units continue with a focus on extending the useful life of each system. However, due to the corrosion, planning and budgeting should be considered in replacement of entire air handling units or possibly just their cooling coils, beginning in about five (5) years and continuing over a span of 5 to 7 years.

9. A good way to lower energy cost is by reduction of outside air required. One way of doing this is through demand-controlled ventilation. That is, measuring indoor carbon dioxide rates as an indicator of a wide array of contaminants and lowering the outside air into the building accordingly. This is acceptable by code in most jurisdictions and is further allowed by ASHRAE Standard 62.1 and Standard 90.1. We estimate the cost to add modulating outside air dampers, carbon dioxide sensors and associated controls at $65,000 for about ten (10) air handlers.

10. One of the greatest energy loads in the building is in fan power. By adding variable speed drives to air handling systems, energy spent may be greatly reduced in part load conditions. These should be added along with the addition of modulating outside air dampers and an airflow measurement system to assure proper ventilation. This improvement, along with an updated control sequence and sensors, can also help humidity control by reducing overcooling without adding electric resistance reheat.

11. Air handlers that serve locker rooms are high percentage outside air units so the spaces can be fully exhausted for odor control. This is good practice for maintaining good indoor air quality for spaces that typically have a high degree of humidity and odor. Dehumidifying and heating this air represents a significant energy cost which may be abated by around 50% using an energy recovery wheel. There is expected to be a very fast payback in the installation of such a system because it saves energy in both heating and cooling. A more detailed engineering design would be required to assess the practicality

of such a system as the mechanical room space is very tight. Assume approximately $140,000 for the addition of energy recovery wheels and associated controls, sheet metal and power.

12. A complete replacement of the BAS system should be planned within the next two (2) years to allow the staff to properly operate and monitor equipment throughout the building.

13. Upgrades that come along with DDC control include nighttime and unoccupied setback control, including pre-cool/pre-heat optimization to minimize energy use during the change from unoccupied to occupied modes; static pressure; and supply temperature reset schemes in VAV systems.

14. Along with these upgrades to the building automation system, we recommend the addition of modulating outdoor air dampers and outdoor air measurement stations to major systems such as the club air handlers and variable volume air systems. This serves several purposes: it assures proper ventilation rates as required by code, even when supply airflow has been turned down; it helps in control of building pressurization; it can save energy by preventing over-ventilation; and it may be combined with a demand ventilation scheme (described above) for increased energy savings.

15. We recommend adding all the building exhaust fans, including those for restrooms and cooking, to the BAS for enable/disable and status monitoring.

16. We recommend adding all the air curtains, including those for concessions, to the BAS for enable/disable and status monitoring. This way, the BAS may track the air curtains left on around the facility and allow the facility's team to turn off any air curtains during un-occupied times.

17. With the BAS upgrade, it would be recommended to add an energy measurement component to the system. By installing current sensing relays and tracking run times on critical and larger pieces of equipment, energy usage may be monitored and trended through the BAS. By making this information readily available and trended historically, baselines and goals may be set for operations and maintenance personnel. The very fact that energy use is being monitored raises the awareness of the staff to energy savings and almost naturally creates energy savings. This effect may be even further magnified when coupled with an incentive-based program to further reduce energy use. In the BAS, energy use may be organized by system and by each piece of equipment individually. This will further offer a maintenance tool which will help indicate diminished performance due to bearing failures, loss of refrigerant, clogged strainers, etc. before a catastrophic failure.

18. We recommend that all FCUs be replaced over a four (4) year period, beginning in 2 to 3 years. FCU replacement should be scheduled during the NFL off-season. As FCUs are replaced, the chilled water system can be shutdown, and isolation valves can be added to the chilled water return piping.

19. We recommend that the exhaust fans be replaced on an as needed basis with the motor being the main area of concentration. The replacement motor should be a premium efficient motor. At the time of replacement, consideration should be given to direct drive fans instead of the belted fans for reduced maintenance.

20. The grease exhaust systems should have a thorough cleaning planned within the next 1-2 years. This cleaning should include the main kitchen, concessions on the main concourse and all concessions on the upper concourse.

21. Consider replacement of the entire piping system and cooling coils or possibly just sections/quads at a time, beginning in about five (5) years and continuing over a span of 5 to 7 years.

22. It is recommended as the current insulation on the chilled water piping needs to be replaced, it be replaced with a foamglass style insulation system. Foamglass has long been shown to offer great insulation properties, but more importantly, it offers resistance to condensation and water-logging.

23. Special attention should be focused on having exhaust hoods and exhaust fans operational only when needed by the food service staff. The hood was fully operational during the walk-through, though only one area had cooking activity. We recommend adding all kitchen hoods and exhaust fans to the BAS so that the operations staff can monitor and turn off equipment when not required to be operational.

24. We recommend upgrading the Carmon exhaust systems which include the inline fan, rail system above the trucks, the hard piping, and the flex connectors to the trucks. The full replacement is recommended due to the rapidly evolving truck design and the improvements that Carmon has made to control and efficiency in the system.

Other General Recommendations

1. All improvements listed above requiring motor replacements should specify premium efficiency motors. With highest efficiency fan and pump motors, the benefits are not only in reduced electric cost in operating equipment, but also in reduced waste heat to space that must be conditioned. Additionally, we recommend specifying a fan power limitation requirement of FEG (Fan Efficiency Grade) 67 or better, particularly on larger air handling systems.

2. We highly recommend that any work performed be fully commissioned, and that ongoing commissioning (Cx) services be contracted for at least two years thereafter. Building commissioning typically provides significant savings in operating costs with a short payback period. According to a 2009 study from Lawrence Berkeley National Lab, design and installation (new construction) commissioning provides median whole-building energy savings of 13%, a benefit ratio of 1.1, and a cash-on-cash return of 23%. Ongoing commissioning (existing building commissioning) has shown median whole-building energy savings of 16%, a benefit ratio of 4.5, and a cash-on-cash return of 91%. We recommend the renovations be commissioned during design and installation phases based on new construction commissioning practices, and ongoing commissioning be based on existing building commissioning practices. We also recommend that ongoing commissioning (OCx) be implemented post-installation of the renovations so there would be three phases to the commissioning process: first, design phase commissioning wherein the Cx provider would

review the design documents for completeness, design intent and adherence to owner requirements; the implementation phase in which the Cx provider would observe the construction process and review the final product for adherence to construction documents; and the ongoing commissioning process in which the Cx provider would be present to give ongoing training to the Stadium operations staff, track the operation of the building systems in all operating modes for consistency with design intent, and identify additional opportunities to improve the facility's operations.

The cost for commissioning depends a great deal on the scope of work, and a more detailed cost estimate can be prepared by SSR or by a third-party Cx provider upon request. For budgeting purposes, assume $200,000 for initial design commissioning and another $50,000 per year for two (2) years of continuous commissioning. Continuous Commissioning is On-going Monitoring of the Building Automation System via Software provided as a Professional Service. This serves as an enhancement to commissioning by allowing the commissioning agent or engineer to remotely monitor the building systems. Software as a Professional Service, is the true key of the effectiveness and exclusiveness of the platform to provide readily available data and analysis to allow a Professional to deliver actionable advice to diagnose, improve, and maintain performance of building systems during construction and most importantly after building turnover. This Cloud-based energy analysis and performance monitoring and optimization platform is designed to be delivered and utilized by Professional consultants to leverage their expertise and experience with advanced data processing and visualization capabilities.

The benefits to facility owners and operators are many:

- Efficiently research historical and recent operating data to identify performance and efficiency issues
- Find out about equipment and system performance issues earlier before it causes unhappy users and tenants
- Allows quick and cost-effective diagnosis of problem to avoid costly and time-consuming 'trouble-shooting' and investigative maintenance activities
- Provides ability to perform cost-effective automated diagnostic analysis – monitoring based On-Going Commissioning.
- Help to not only maintain performance but potentially continue to improve performance over time

Electrical

Site Electrical Distribution

Electrical service for the facility is provided by one (1) primary service feed and one (1) additional alternate feed at 15kV from Nashville Electric Service (NES). These serve the NES primary metering and distribution switchboard in an underground vault located near the property line in the southwest corner of the site. The NES switchboard serves four (4) separate NES switch cabinets located in each quadrant of the stadium in the NES vaults. Each switch cabinet serves two (2) 15kV / 480Y/277V utility step down transformers that feed a common collector bus. From the common collector bus, two (2) 480Y/277V bus ducts feed two (2) main switchgear units located in each quadrant of the facility. The main electrical rooms are adjacent to the NES vaults. It was noted that the facility experienced a failure of one of the bus duct feeds to the switchgear lineups serving Quadrant 'D'. The bus duct was replaced and no other issues have been documented.

Feeds from NES Vault to Main Switchgear Lineup

Observations

Primary electrical distribution equipment is assumed to be of original construction. Regular preventive maintenance of equipment is the responsibility of the local utility, Nashville Electric Service.

The site electrical distribution has redundancy in both the primary and secondary utility feeds. This is accomplished on the primary with the additional alternate 15kV feed to the NES distribution switchgear. The redundancy on the secondary side is provided through the use of the switch cabinets serving the dual transformers which are connected to the common collector bus. Each of the dual transformers serving the given quadrants is sized to have the capability of feeding that quadrant's main switchgear lineups via the collector bus in the event one of the utility transformers fails.

Normal Electrical Distribution System

There are eight (8) 480Y/277V main switchgear lineups consisting of a pair of main switchgears arranged in a 'main-tie-main' lineup that serves as the normal distribution for each of the respective quadrants of the stadium. The 'main-tie-main' switchgear configuration provides redundancy on the customer's side. The main switchgear units are listed below:

Quad 'A' Main Electrical Room:
- MSA1 – 4,000A
- MSA2 – 4,000A

Quad 'B' Main Electrical Room:
- MSD1 – 4,000A
- MSD2 – 4,000A

Quad 'C' Main Electrical Room:
- MSC1 – 5,000A
- MSC2 – 5,000A

Quad 'D' Main Electrical Room:
- MSD1 – 5,000A
- MSD2–5,000A

Main Switchgear Lineup

All main electrical distribution equipment is manufactured by Square-D and appears to be original. The main and tie breakers for the main switchgear lineups are Masterpact. manufactured by Square-D. Each switchboard has an analog Square-D PowerLogic meter.

Infrared windows were installed on all the main switchgear units three (3) years ago and facility performs yearly infrared scans including tightening of all main lugs. The facility contracts Schneider Electric to perform scans yearly, which occur during game days.

Each pair of switchboards serves an associated quadrant of the building and feeds loads vertically through the building at 480Y/277V via three (3) 2000A bus ducts.

Observations

The main switchgear analog meter was observed to be turned 'OFF' on some of the main switchgear and is not connected to the stadium's central building monitoring system.

Main Breaker and Analog Meter

Infrared Windows

Equipment Rooms

Branch electrical rooms are generally located throughout the facility on each level and in each quadrant.

The bus duct risers pass through the branch electrical rooms, serving each quadrant on all levels of the building. Each branch electrical room consists of 480Y/277V power panels, dry-type transformers, 208Y/120V branch circuit panels, emergency power panels, lighting control panels and fire alarm panels.

Observations

Electrical equipment in the rooms is generally in very good condition, with many original panels appearing nearly new.

The equipment has been maintained properly. There have been some issues regarding storing items in the electrical rooms, but proper clearances have been maintained in front and back of the equipment. Storage in these spaces potentially creates a problem for maintenance and safe accessibility into the space. These rooms need to remain clear of such items and maintain a clear workspace environment, especially regarding the egress paths to and from the large pieces of medium voltage switchgear that are greater than 6 feet wide.

In several of the electrical riser rooms, the emergency and normal power branch circuits were in one common busway which does not meet code. At the time of construction, the NEC did not permit emergency and normal power circuits to share a common busway per section 700.9 of the NEC and is currently not permitted per the NEC.

The branch circuits from the riser room electrical panels were observed to be PVC jacketed metal-clad cables. The PVC jacketed MC cable is run through the slab, and the maintenance staff expressed concern about several locations where the cabling is breaking down and shorting.

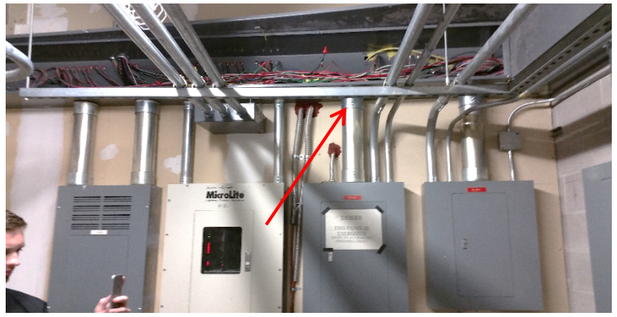
Several junction boxes and wireways were observed to be open and missing covers completely.

The riser electrical rooms on the upper concourse were extremely dusty at the time of the walk-through.

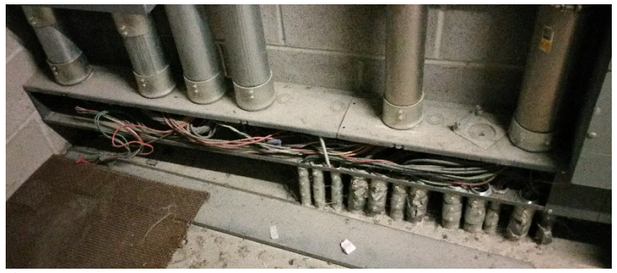
Bus Duct Risers

PVC Jacketed MC Cable

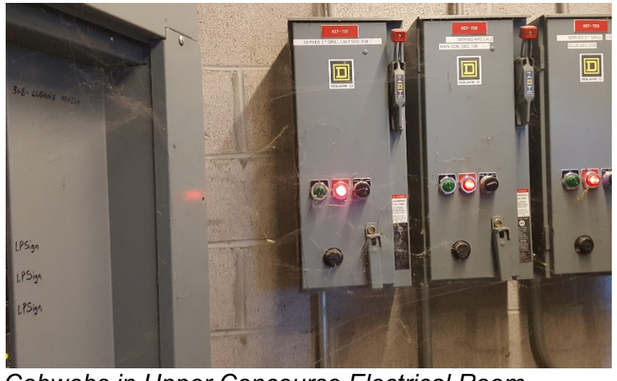
Main Electrical Room Utilized for Storage



Normal and Emergency Circuits run in the same wireway which is missing the cover



Open Wireway



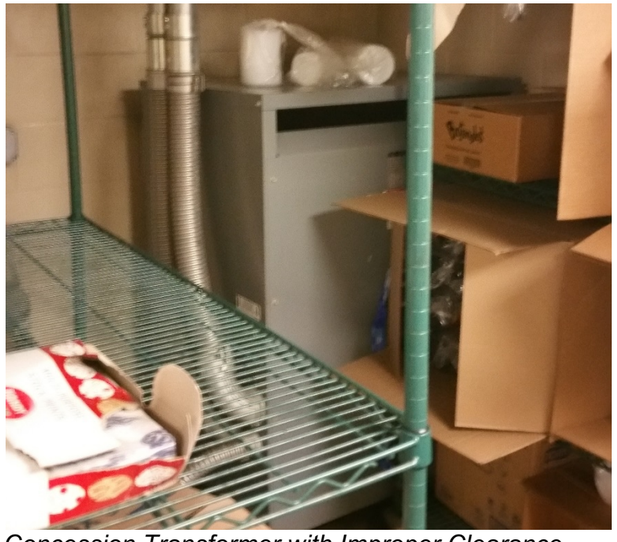
Cobwebs in Upper Concourse Electrical Room

Concessions

Dedicated concession distribution boards are located in each quadrant on the main concourse, club and upper concourse levels. These distribution boards, located in the riser electrical rooms, feed 480V-208Y/120V step-down dry-type transformers located in several concession stands. These transformers feed the individual 208Y/120V panels located in each concession. The facility remodeled several of the concessions which required no additional electrical distribution.

Observations

The concession transformers were observed to not have adequately maintained clearances or were being utilized for shelving.



Concession Transformer with Improper Clearance

Concession Transformers

Portable Concessions

Portable concession connections are located throughout the facility with a higher concentration on the concourse levels, as would be expected. Connections consist of a mix of 120V and 120/208/3. These connections consist of both original connections and some that have been added over the years to meet growing needs.

Observations

Several of the main concourse 120V GFCI receptacle covers were damaged or missing on the main concourse level. Also, a few of the 120/208/3 connections were observed to be damaged.

The main concourse portable cart power at each end zone and the upper concourse appeared to not have an adequate quantity of power connections for the current portable concessions

needs. During the assessment, multiple extension cords were observed being utilized to distribute power to multiple carts, which is shown.

Upper Concourse Portable Carts Serviced by Extension Cords

Damaged Portable Cart Connection

Upper Concourse Cart Receptacle Missing Cover

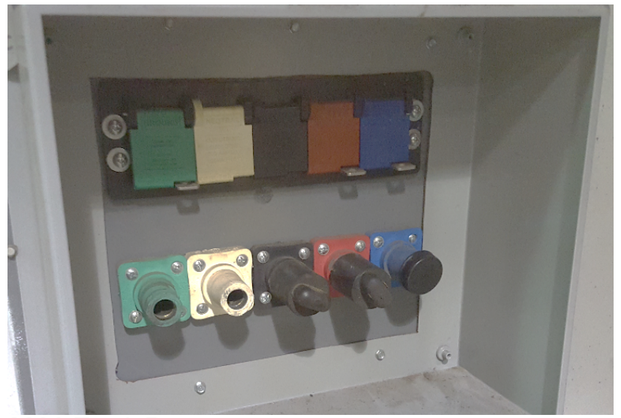
Show/Truck Power

Broadcast truck and tour bus power is located in the loading dock area. There are currently (2) 208Y/120V 200A Cam-Lok and one (1) 208Y/120V 400A Posi-Lok connection that are served from a show power distribution board located on the service level. Currently this power is adequate for most events.

Show power is also provided on the field in the north end zone and is comprised of four (4) 208Y/120V 400A disconnect switches. Additional temporary power is provided on the field with a mobile 45 kVA step-down dry-type transformer connected to a 60A panel that feeds a variety of 120V receptacles.

Observations

The existing show power equipment appeared to be in good condition for the age of the facility. The maintenance staff expressed the lack of available temporary/show power on the field, in the locker rooms and in the truck dock.



200A Truck Power

400A Posi-Lok Power Connections

Show Power Disconnect Switches.

Temporary Show Power

Emergency Generation System

Emergency power for the facility is provided by two (2) 1000KW 480Y/277V Caterpillar diesel generators located inside the building on the main concourse level in Quadrants ‘A’ and ‘B’. Each generator serves a 2000A, 480Y/277V distribution board located in the same room. The generator distribution boards then serve two (2) Caterpillar automatic transfer switches (ATS) located in each Quadrant’s main electrical room. Each ATS feeds an emergency distribution board providing the emergency power for that respective quadrant of the stadium. The generator located in Quadrant ‘A’ also serves an additional AST for the building’s 50Hp fire pump. The emergency power is then distributed vertically to each riser room via a bus duct run adjacent to the normal power bus ducts serving the quadrant’s electrical riser rooms.

The generators serve basic life safety functions including emergency lighting, fire alarm, telephone, elevators, smoke evacuation equipment, etc.

The facility maintains two day tanks of diesel fuel, one for each generator, located in each generator room. The generators are exercised weekly for 20 minutes which includes recording the temperature and pressure readings. Load bank testing is performed yearly along with routine maintenance.

The facility added a 600kW 480Y/277V Cummins diesel generator outside in an enclosure to provide standby power to the facility’s new sanitary lift station pumps. This generator was installed in the last few years and appears to be in excellent condition. Staff indicated that they exercise this unit weekly with the other two.

Observations

The generators appear to be in good condition, and the facility appears to have a preventative maintenance plan in place.
The emergency distribution equipment was observed to be in excellent condition. The generators appear to only serve life safety loads. No standby loads were observed to be connected to the generator.

1000 KW Diesel Generator

Diesel Generator Day Tank

Generator Distribution Board

Site Lighting

Site lighting for the stadium is comprised of the following:

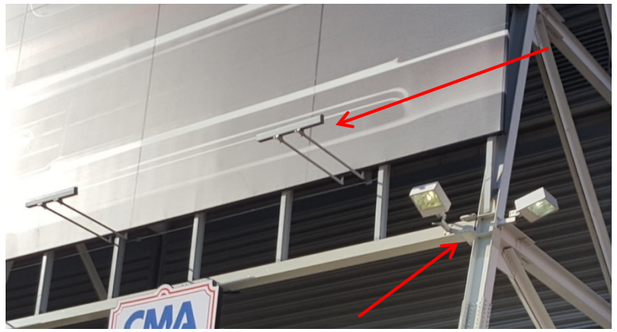
- Parking Area Lighting
- Pedestrian Walkway and Area Lighting
- Façade/Signage Lighting

Parking area lighting for the stadium is currently pole mounted metal halide type luminaries. Each pole has a cluster of fixtures that can be lowered for maintenance with the use of a pulley system integral to the pole. Due to the pole signage its more cost effective to use a lift than to remove signage to utilize pulley system.

Pedestrian walkway and area lighting is a variation of building mounted metal halide luminaires and LED pedestrian poles. The LED pedestrian poles were recently installed in 2015.

Facade lighting mainly consists of LED linear flood luminaires that are mounted to the building's facade to illuminate advertisement signage. This new LED sign lighting is controlled wirelessly with a separate lighting control system manufactured by Autani. This separate lighting control system is not fully integrated into the building's overall network lighting control system.

LED illuminated marquee signage was added to the east and west sides of the stadium. These were added as part of the stadium's rebranding to Nissan Stadium. The LED marquees are some of the largest stadium signs in the world.



Metal Halide and LED Luminaires (on during the day)

Parking Area Lighting Fixtures

Pedestrian Poles

LED Illuminated Signage

Observations

The parking area pole lighting has banners and signage mounted to the poles which blocks the use of the pulley system to lower the fixtures for maintenance or to replace burnt out lamps. Many of the parking fixture lamps were noted by the maintenance staff as needing to be replaced at the time of visit.

The LED pedestrian poles appear to be in excellent condition except for one that was observed on the west side of the stadium to be damaged.

Several of the building mounted metal halide fixtures utilized for pedestrian area lighting along with the LED sign lighting were observed to be ‘ON’ during the daytime. Maintenance staff noted that several of the fixtures are not controlled by the stadium’s main network lighting control system and remain on 24/7.

Lighting Control System

The lighting control system for the stadium is comprised of a computer-based network lighting control system manufactured by MicroLite and was installed during original construction. The system is tied into the overall building’s automation system (BAS) and is controlled from the building’s security command center.

The sports lighting is original to the building and is controlled by the original Musco system and the Square-D contractors.

The suites have local dimmers and switches for individual controls. Currently there are no aisle lights in the suites for egress lighting which does not allow for the facility to ‘blackout’ the bowl during events due to safety concerns. The suite lighting currently remains ‘ON’ during events.

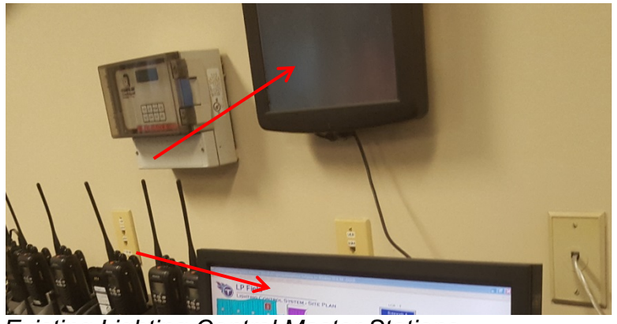
The facility utilizes emergency night lights in all public spaces which remain on 24/7 when the given control zone is turned ‘ON’.

Observations

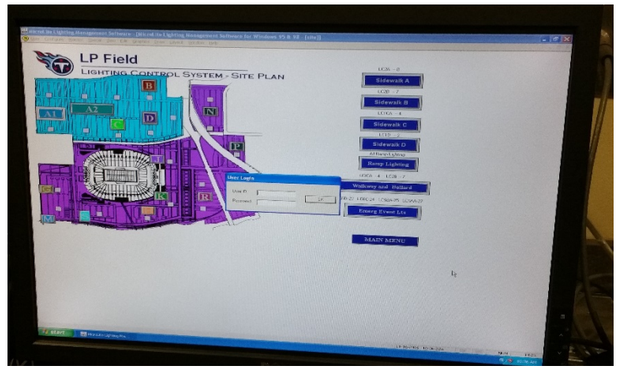
The original MicroLite main control touchscreen panel located above the PC screen was observed to be no longer functional. The maintenance staff is having difficulty finding replacement parts for the system since the product is no longer manufactured.

No occupancy sensors were observed, and the concourse egress lighting was observed to be ‘ON’ during the day.

Existing MicroLite Relay Panel



Existing Lighting Control Master Stations



MicroLite Lighting Control Master Station

Existing Suite Lighting Controls

Sports Lighting Contactors

Interior Lighting System

The facility has replaced some of the interior lighting fixtures with LED type fixtures, but most the lighting is original to the building.

New LED light fixtures were installed throughout the main concourse and in the recently remodeled main entrances, pedestrian ramps and club level atrium. The new LED fixtures were installed in 2016 as part of the stadium's plan to convert the existing concourse and area lighting to energy efficient LED fixtures.

The stadium remodeled 30 of the 71 suites which included all new LED lighting.

The following lists the facility's current light fixture types per space:

Main Concourse:
- LED high bays
- LED downlights at main entrance
- LED column up/downlights

Vomitories:
- fluorescent wall mounted fixtures

Concessions:
- 2x4 recessed fluorescent troffers

Back of House areas:
- Linear fluorescent strip lights
- Metal Halide high bays

Locker Rooms:
- Indirect fluorescent strip lights above lockers utilized as night lights
- Fluorescent recessed downlights
- 2'x4' fluorescent recessed lensed troffers

Restrooms:
- Recessed light coves with fluorescent T8 strip lights located above the sinks and water closets.
- Recessed fluorescent downlights

Suites:
- Fluorescent recessed downlights

Remodeled Suites:
- LED pendants
- LED recessed downlights

Upper Concourse:
- Wall mounted metal halide flood lights

Atrium:
- LED high bays

Clubs:
- 2x2 recessed fluorescent troffers
- recessed fluorescent downlights

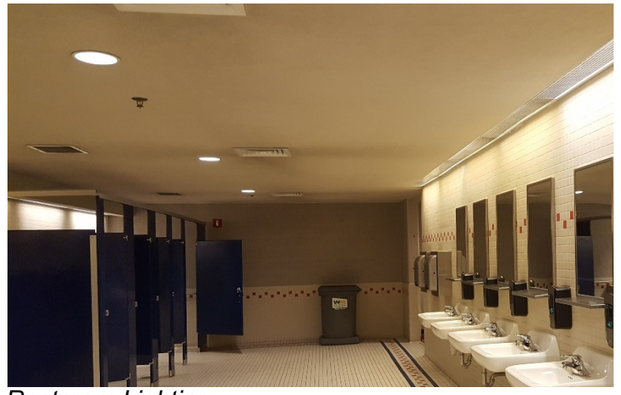
Office spaces:
- 2x4 recessed fluorescent troffers
- Recessed fluorescent downlights

Observations

The maintenance staff noted that several of the retrofitted LED high bay fixtures on the pedestrian ramp have been replaced due to the fixture's integral drivers failing.

The lighting in the suites does not include egress lighting illuminating the stairs for the suites box seating. This does not allow the suites to have sweep off safety during an event or concert.

Locker Room Lighting

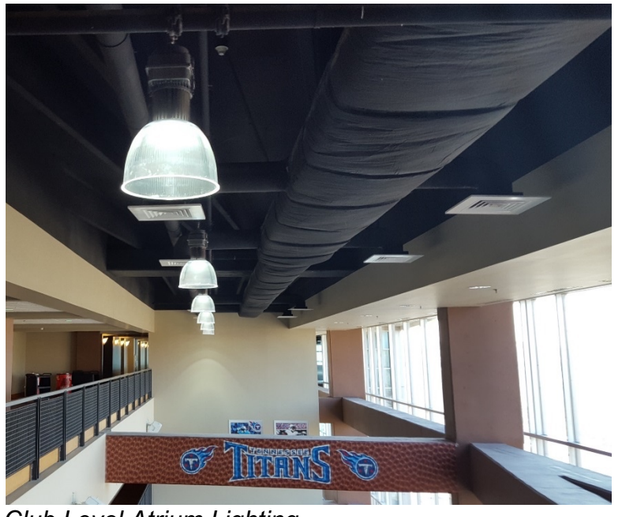


Restroom Lighting

Newly Remodeled Suite Lighting

Upper Concourse Metal Halide Flood Lights

Main Concourse New LED Column Lights



Club Level Atrium Lighting

LED High Bay Fixture Located on the Main Concourse

LED High Bay Fixtures Located on the Pedestrian Ramp

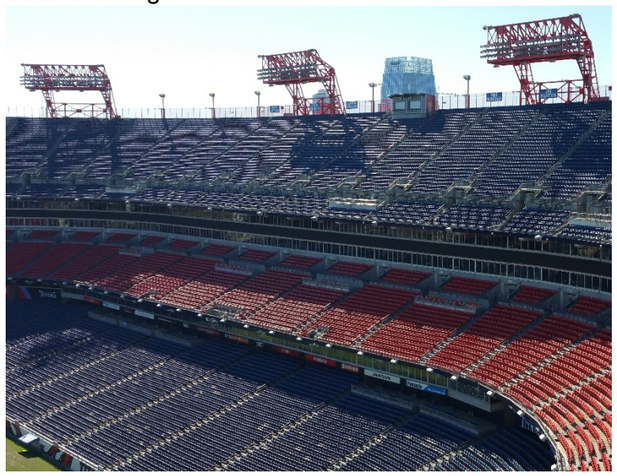
Sports Lighting System

The sports lighting system is original to the facility and was manufactured by Musco. There are 600 1,500 Watt metal halide luminaires divided into eight (8) banks of lights mounted above the upper bowl seating. The sport lights were last re-lamped in 2008.

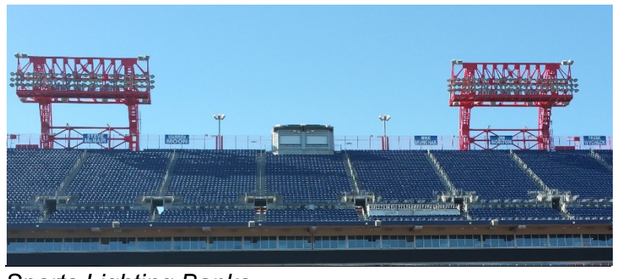
The emergency lighting for the bowl consists of 24 metal halide flood lights with hot re-strike capability. These lights were manufactured by GE and installed in 2008, replacing the original Musco fixtures.

Observations

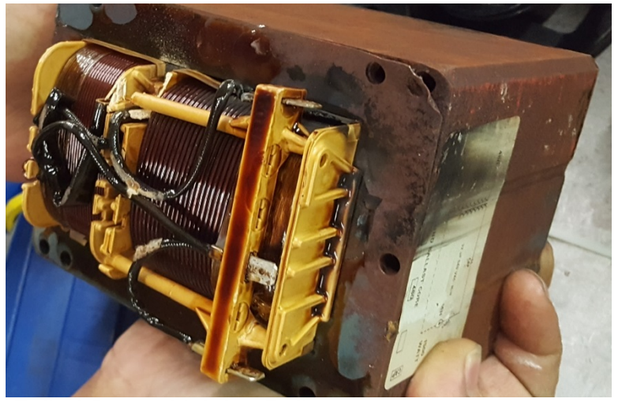
It was noted that the sports lighting ballasts have started to fail on a more regular basis.



Sports Lighting Banks



Sports Lighting Banks



Failed Sports Lighting Ballast

Fire Alarm System

The fire alarm system is original to the facility and is a fully addressable system manufactured by Edwards. The main fire alarm control panel is located in the stadium command center.

Visual notification is provided in all public spaces, including the concourses, suites and clubs. The facility's PA system is utilized for audio notification of the public spaces. The bowl ribbon boards and a portion of the scoreboard are utilized for visual notification of the bowl. A portion of the PA system in the bowl is utilized for audio notification.

Smoke detection for the facility is provided in the following areas:

- Elevator lobbies: to initiate elevator recall procedures
- Club level corridors: for initiation of the smoke evacuation system
- Service level tunnel: for initiation of the smoke evacuation system
- Stairwells: for initiation of the smoke evacuation system

The fire alarm system is inspected yearly by Koorsen Fire & Security, who are contracted by the facility. The system was last inspected in April 2016.

There currently are two (2) FM-200 dry-type fire suppression systems manufactured by Siemens located in the video control booth server room and adjacent IDF room. These were installed as part of the facility's upgrade that took place in 2012.

Observations

The main fire alarm system was installed as part of the original construction. The main fire alarm control panel has been experiencing frequent nuisance alarms.

The fire alarm riser panels located in the electrical riser rooms were observed to be in excellent condition.

Maintenance staff noted that strobe synchronization has not been able to be accomplished with the existing fire alarm panel.

Fire Alarm Riser Panel

Fire Alarm Control Panel

Recommendations

1. Upon a significant major renovation/addition, modifications to the site electrical distribution system may be required, but at this time, the primary distribution is adequate to serve the building's needs.

2. The main and tie Masterpact circuit breakers in the stadium's main switchgear are not manufactured anymore and are problematic for the maintenance staff to acquire. It is recommended that spare main breakers be kept at the facility in the event one fails. Procure replacement spare breakers or replace all existing main and tie breakers with molded case breakers still being manufactured.

3. Connect the existing power meters on the main switchboards to the facility's centralized monitoring system or consider installing a new centralized monitoring system for the main switchgear lineups. This will allow for the facility to record and monitor power usage and quality for all of the main switchboards.

4. Continue to perform infrared scans annually, and address any issues discovered by the scans promptly.

5. Close all junction/pull boxes and wireway covers in the electrical rooms and throughout the facility. Many covers appear to be missing entirely.

6. The NEC requires separation of emergency and normal power systems. Separate the emergency and normal power systems as required by NEC.

7. Be sure all enclosure doors are closed and latched. This is especially important with the fire alarm and the lighting controls, but should be practiced for all.

8. Identify all potential locations where the PVC jacketed MC cable has shown signs of failure, and initiate a replacement plan to re-feed these loads. Consider having these feeders tested to determine if the conductivity has been compromised by the breakdown of the conduits.

9. Clear all electrical rooms of trash, and equipment should be eliminated from these spaces as well. If storage is to take place in these spaces, it needs to be limited to electrical items used on a regular basis, but should never be stored where access to equipment is blocked. The electricians should not be required to step over items to walk through the space or to access equipment. Schedule monthly inspections of the electrical rooms to be sure the above remains in check. Also, consider having the pathways and clearances for the equipment delineated on the floor for reference.

10. Clean all dusty electrical equipment located in the stadium's upper concourse level electrical rooms. Allowing dust to accumulate in the riser rooms will reduce the useful life span of the equipment.

11. Remove all storage items from the top of or surrounding the concession transformers and maintain clearances to minimize overheating and damage from items falling into them. Provide dedicated concession storage space to minimize storage in each concession. Consider adding signage stating the area is not for storage.

12. The minimal amount of portable power for carts on the concourses limits the flexibility and quantity available for possible portable cart locations to generate revenue. It is recommended that additional locations be studied. There is sufficient power at the main distribution switchgear to accommodate this; however, it may be necessary to add panels or swap out distribution panel breakers and feeders to accommodate the added loads. It was observed that most electrical room spaces had the sufficient space to achieve this if necessary.

13. Replace all damaged portable cart receptacles and covers throughout the facility. Implement a monthly maintenance plan to verify all receptacles are not damaged and replace covers/devices at that time.

14. Expand or add additional show/truck power distribution at the field and truck dock. Also, add additional temporary power locations adjacent to the locker rooms that can be accessed during events, providing additional power for event staff and event equipment.

15. Continue to perform an annual or bi-annual full load test. Use NFPA 110 as a guide.

16. Verify there is a written schedule for the generator testing and a procedure for logging information from the tests.

17. Upgrade all pedestrian area and plaza lighting to LED type fixtures, allowing for reduced energy usage and instant 'ON' capability for egress lighting.

18. Integrate the sign lighting and building mounted area lighting into the building's lighting control network, allowing for these areas "to be sweep off" when not being utilized. Also, install photo sensors to eliminate lights being turned 'ON' during the day.

19. The damaged pedestrian pole fixture should be replaced.

20. Replace the existing outdated lighting control system that currently is problematic and costly to maintain. Parts for the relay panels are very difficult to obtain, costing the maintenance staff valuable time, and the parts tend to be very costly to replace.

21. Integrate the existing site lighting that is not currently being controlled by the overall building lighting control system. Install occupancy/vacancy sensors in BOH spaces.

22. Install photo sensors to control all exterior lighting, including the concourses normal and emergency lighting.

23. Continue to convert all lighting fixtures to LED fixtures. LED fixtures will dramatically reduce operational costs and reduce maintenance cost due their long-life span. Also, LED fixtures typically greatly reduce the amount of time the maintenance staff spend to maintain and replace the existing fixtures and light bulbs. Focusing on continuing to replace the concourse metal halide light fixtures with LED type fixtures will show the biggest return on investment.

24. Perform an energy audit of the facility to understand how the lighting efficiency is impacting the monthly utility rates.

25. Many concerts and events request that venues have the ability to 'blackout' the bowl or 'sweep off' all bowl lighting including the lighting in the suites. Currently the stadium does not have this ability. Install dimmable emergency egress step lighting in all suites allowing for the suites to be remotely 'swept' off safely during events. Also, in the event the stadium loses normal power, these lights would be required to instantly turn 'on' at full light output for egress, overriding any dimming controls.

26. Replace existing sports lighting fixtures with LED fixtures, which in the next few years will become more prominent within stadiums of this size and usage. Advantages of LED sports light fixtures include the ability to instantly turn fixtures ON/OFF and much greater flexibility within the control system, including various scene settings. LED source also allows for better control of the light distribution. Additional advantages include the capability to capture further energy savings via lower wattage output fixtures.

27. Institute a program of group re-lamping of existing sports lighting fixtures to maintain proper lumen output. The re-lamping time should be based on the lamp manufacturer's recommendation, but in general, it is approximately at 75% of lamp life. Metal halide lamps in this type of application typically have a life span of approximately 10,000 – 12,000 hours.

28. Replace the existing head-end fire alarm control panel and have the system recertified.

29. Continue to implement the existing preventative maintenance plan and service records for the fire alarm system in accordance with the NFPA-72 and the local A.H.J. requirements.

Plumbing Systems

Observations - Domestic Cold Water System

The domestic water service to the stadium enters the building with a 12-inch ductile iron water main. This pipe is divided into (2) 10-inch mains that are connected to 10-inch reduced pressure backflow preventers.

Both backflow preventer outlets are joined together to a 12-inch galvanized water main. The remaining portions of the domestic cold water main is galvanized steel throughout the stadium.

The water main serving the lower floor levels of the stadium is connected to a pressure reducing valve station. City pressure entering the station is approximately 110 PSI, and the pressure reducing valves are set to provide approximately 75 PSI to the building. All pressure reducing valves have the same set point.

There is an express main or high pressure line that connects ahead of the pressure reducing station. This main serves the upper levels of the stadium. Operating pressure on the upper levels varies from 60 to 70 PSI, depending on the floor level.

During major events at the stadium such as a Titans game, the water utility will add one additional pump to the water system. This boosts the city system pressure to approximately 125 PSI as well as increases the flow available for the stadium. Because the water utility can provide reliable pressure and flow, a domestic water booster pump is not required.

The galvanized coating inside all of the cold water piping has deteriorated over the years, and now the piping is oxidizing at an accelerated rate. Currently the maintenance staff is flushing the entire cold water piping system four (4) days before an event. (Example: Flush Thursday before a Sunday Titans game.) The staff has installed flushing ports at the event level and upper concourse level. These flushing ports consist of a 2 ½-inch valved hose connection. There are four (4) on the low-pressure zone system at the event level and six (6) on the high-pressure zone system at the upper concourse level.

10-inch Reduced Pressure Backflow Preventer on Domestic Water Main

Building Pressure Reducing Valve Station

Domestic Water Flushing Port – Upper Concourse

Water Closet Upper Concourse – Discolored Water from Corrosion

This observation was performed Wednesday and Thursday after a Titans game on the previous Sunday afternoon. After flushing the water closets and urinals in one of the men's restrooms on the upper concourse for approximately 5 minutes, we began to see evidence of additional buildup of corrosion in the domestic cold water main. The flushing procedure requires two (2) technicians dedicated to this effort for 8 hours each time. As the corrosion continues, more time may be necessary to flush the system until clear water is present in all fixtures at all levels of the stadium.

Annually, there are ten (10) Titan home games, two (2) TSU football games, one (1) monster truck rally, one (1) CMA week-long event/year and two (2) US national team soccer games. This indicates there is approximately (20) events per year that would require the system to be flushed. It is estimated that approximately 681,600 gallons of water each year are used for the flushing procedure. Consideration was given in this calculation regarding flushing requirements for the low zone cold

water system and the high zone cold water system. Smaller events such as a TSU football game may only use the lower bowl or low zone system. Larger events such as a Titans game would require both the low zone and high zone to be flushed.

The domestic cold water system has been drained down over the last (3) years. Drainage connections with isolation valves have been provided in the system that allow for a 2 ½-inch drainage hose connection.

Urinal Upper Concourse – Discolored Water from Corrosion

Domestic Water Drainage Port – Event Level

Water Heaters – Event Level

<u>Observations - Domestic Hot Water System</u>

Domestic hot water is generated with natural gas and electrical energy at various locations.

There are four (4) gas fired water heaters using natural gas with two (2) large hot water storage tanks in a dedicated room on the event level. Each water heater is rated at 2,070,000 BTUH input each. The capacity of each hot water storage tank is 3,500 gallons. This system serves the event level and west main concourse and the north end zone and east main concourse. This system operates at 140 degrees F and is connected to a Holby mixing valve that tempers the hot water temperature for the plumbing fixtures on this system to 120 degrees F.

Hot water at other locations on the main concourse level and the upper concourse, suites and club areas uses local electric water heaters with integral storage tanks. The heaters vary in size from 30 gallons up through 50-gallon and are wired for simultaneous and non-simultaneous element operation, depending on

location and service. Currently these heaters are replaced as they fail.

The electric heaters provided in the concession stands appear to be undersized. Typically, a 40 or 50-gallon heater has been provided. The 3-compartment sink in the concessions is the hot water user in the concession stands. This fixture will use all the available hot water to fill all three compartments when a 50-gallon heater is used, leaving no hot water for hand washing until the electric heater has recovered.

Holby Mixing Valve Station

Concession Water Heater

Observations - Plumbing Fixtures

Flush valve water closets and urinals are predominately used throughout the stadium. Flush tank type water closets were observed in the suites along the 50-yard line. Waterless urinals were found on the club level. Lavatories are either wall hung or countertop mounted vitreous china. Manual single lever faucets are at most locations, and sensor operated faucets were found at a few locations. Stainless steel countertop mounted with single lever faucet are in the majority and appear to be in good condition.

Water closets are 3.5 Gallons Per Flush (GPF). They are wall hung type but use a 3-bolt pattern wall carrier. Currently there are only two (2) fixture manufactures, Kohler and American Standard, that still can provide fixtures with this bolt pattern.

Typical Flush Valve Water Closet

Flush valve urinals are 1.0 GPF. Lavatory faucets are currently being replaced and are assumed to be units that allow for only 0.5 GPM flow rated. Original faucets remaining in service are assumed to be 2.0 GPM each.

Typical Flush Valve Urinal

Electric water coolers are provided along the main and upper concourses. The refrigeration units serving these fountains are manufactured by Halsey Taylor or Sunroc and located in a closet behind the fountains. Parts are becoming scarce for these units. The fountain is a stainless-steel product and appears to be in good condition.

Shower tiled spaces have a shower valve, shower head and hand held shower at ADA installations. Existing shower valves are Symmons products and original to the building construction.

We observed structural damage to tiled shower floors and walls in gang shower rooms in the players and staff shower rooms. Several tiles were cracked and missing on the shower room floors and there are cracks in the walls of the shower areas.

Stainless Steel Drinking Fountain

Observations - Exposed Floor Drain Traps

There are numerous locations where floor drain traps are exposed at the top of the main concourse level. During construction of the stadium, electrical power was routed to locations where heat trace cable could be provided for each of these traps.

Observations - Natural Gas Piping

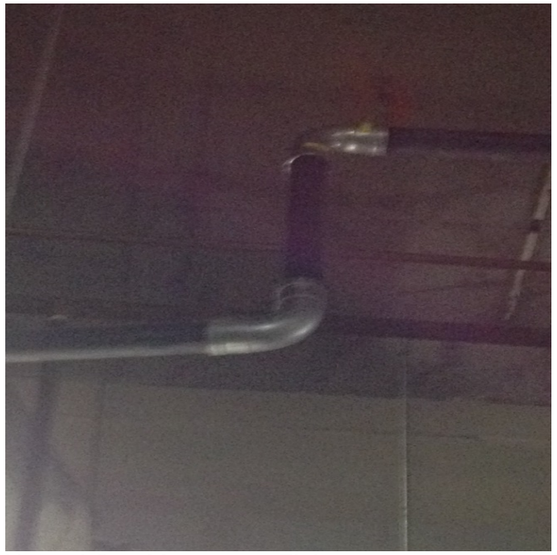
Natural gas is piped throughout this building to the main kitchen, event level water heaters and cooking concessions. This system also provides fuel to heat the players' benches on the field. The gas pressure used for distribution is 2 PSI. Piping is black steel with Megapress fittings.

Observations - Grease Traps

The main kitchen on the event level is connected to a below slab grease trap that is accessible from the service corridor on the event level.

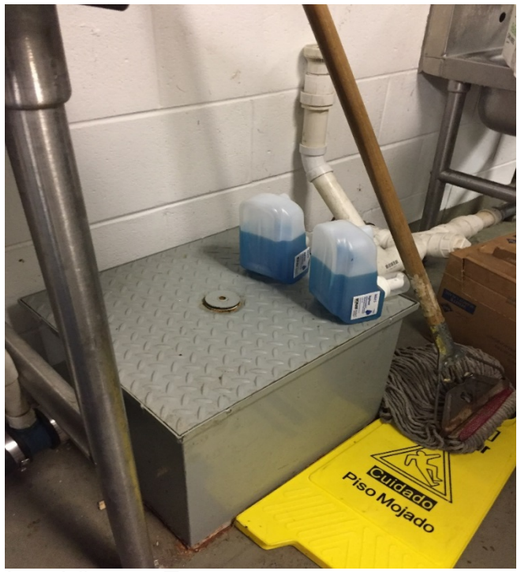
Local grease traps are used at the 3-compartment sinks in the concessions. Testing proved the existing selection was adequate for the sink size provided.

Exposed Floor Drain Trap



Natural Gas Megapress Fitting

Natural Gas Pipe



Local Grease Trap

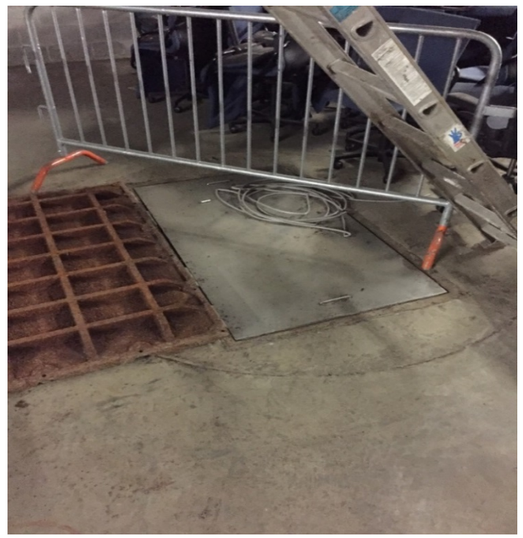
Observations - Sewage Lift Pumps

The stadium is using submersible sewage lift pumps at two (2) locations that discharge to the city sewer system. Pump capacities have proven to be adequate for the building loading.

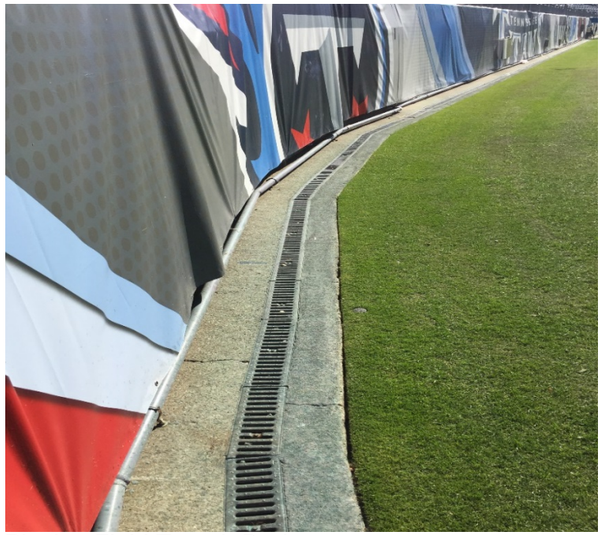
Observations - Storm Water Drainage

There are two (2) storm water systems. The first system collects rain water from roof areas and is connected to the city storm water system. The second system collects storm water from the field drainage system, area drains in the main concourse, area drains in the upper concourse and seating tub drains. This system is connected to a large storage tank before discharging to the river.

Open Sewage Lift Pump Pit



Closed Sewage Lift Pump Pit



Playing Field Trench Drain

Recommendations

1. The galvanized cold water pipe and fittings should be replaced. In addition to the ongoing cost for regular flushing, the condition of the inner wall is a potential breeding ground for bacteria and viruses such as legionella. Suggested replacement piping materials would be type “L” copper, stainless steel, Schedule 80 CPVC or Aquatherm. Victaulic type fittings could be used for either copper or stainless steel.

2. An option for consideration would be to replace the larger main sizes that are 4-inches through 12-inches with one of the suggested piping materials. There are contractors that specialize in lining existing piping within existing walls and chases. This is usually limited to pipe sizes 3-inches and smaller. The liner is typically an epoxy, plastic or glass product and would need to be NSF approved. The lining is applied after the interior wall of the existing piping has been cleaned/prepped for the application of the liner. This method minimizes demolition and rebuilding of wall cavities and chase walls.

3. We wouldn’t recommend draining the cold water system down in the future until the piping could be replaced as previously discussed. Several maintenance issues occur during the refilling of the system that requires replacement of flush valve diaphragms, removal of some water closets to remove debris from the rim water supply channel, and replacement of lavatory faucet “O” rings and aerators. Draining the system allows more oxygen into the piping system. This only promotes increased oxidation.

4. The natural gas fired domestic water heating equipment serving the event and main concourse fixtures is original to the building. Both the tanks and all four (4) heaters are at or near the end of expected service life. This equipment could be replaced with new smaller and more energy efficient equipment. An analysis of the connected fixtures and load would need to be performed to determine how much small equipment could be used. As a minimum, a phased replacement schedule of the existing heaters and tanks should be considered.

5. The existing Holby mixing valve station is near the end of its expected service life. There are two (2) valves at this location. The piping was originally designed incorrectly to allow for operation of both valves. After one valve was isolated with the remaining valve in service, it was discovered that only one valve is required to satisfy the hot water load. We recommend replacing with newer technology that allows for variable flow conditions and a system that can communicate with the building automation system.

6. Replacement of the existing multiple electric water heaters should be on an as needed basis. Consideration should be given to increasing the size of the heaters in the concessions to provide adequate hot water quantities at temperatures the health department may require.

7. The three bolt water closet carriers are going to present a problem. As manufacturers phase out this product, the stadium will need to begin a program of replacement. This will involve demolition and rebuild of the chase walls where the fixtures are installed. When the fixtures are replaced, we would recommend replacement with a 1.28 GPF fixture as this uses 64% less water than the current water closets. There are 772 water closets in the stadium.

8. We recommend replacement of the existing 1.0 GPF urinals with pint flush urinals. Each urinal will save 7 pints of water each time the fixture valve is operated. There are 346 urinals. If all 346 urinals were flushed at the same time, they would use 346 gallons of water. If they are replaced with pint flush urinals, only 43 gallons of water is used to flush all 346 urinals.

9. We recommend continued replacement of lavatory faucets. Replacement units should include 0.5 GPM aerators.

10. We recommend replacing all refrigeration units with a manufacturer that can provide replacement parts in the future; removing the refrigeration feature to convert the electric water coolers to non-refrigerated drinking fountains; or replacing the existing fountains with new drinking fountains. The plumbing code doesn’t require public drinking water to be refrigerated.

11. Shower valves could be rebuilt as a minimum but should be considered for replacement due to length of existing service.

12. Add heat trace cable and insulation on exposed floor drain traps to reduce maintenance, and trap replacement should be considered.

13. The existing sewage pumps are original, and a phased replacement of the pumps, valves, controls and control panels is recommended.

14. Debris including cigarette butts, peanut shells and paper should be cleaned from all drain locations. Several cigarette butts and peanut shells were noted in the trench drain system serving the playing field.

15. It was noted that some of the area drains in the concourse and ramped walkways were not heavy duty and were bent. Maintenance is currently exploring a replacement strainer that will withstand forklift and heavy cart wheel traffic.

16. The city storm water storage tank should be accessed to see how much debris has accumulated in the bottom and the unit should be cleaned out.

Observations - Fire Pump

The stadium is considered a fully sprinklered building. All occupied spaces are protected by automatic sprinklers with exception to the high bay spaces in the main and upper concourses. The fire pump serves the west side, north end zone and east side of the stadium. There is a separate fire supply that serves the food service spaces at the south end zone.

The fire pump is in a dedicated room at the north end of the east side of the stadium and is rated at 1250 GPM with a 50-horsepower electric motor. The pump is complete with a test header and an automatic transfer switch. The pump is tested regularly with records of each test available on site. A jockey pump is also provided to maintain system pressure during non-fire pump operation. Koorsen Fire and Security is the current contractor that performs the required testing of the fire pump and fire protection systems.

It was observed that the fire pump casing is showing only minimal amount of corrosion build up for the age of the pump.

Caps with chains are missing from both fire department connections. The missing caps and chains should be replaced to prevent intrusion of foreign materials. Both fire department connections are within the acceptable distance from a city fire hydrant.

Fire extinguishers and fire department hose connections appear to be properly spaced throughout the facility to meet the requirements of the National Fire Protection Association.

Fire Pump Casing

Fire Department Connection South End Zone Missing Caps and Chains

Fire Pump Controller

Fire Department Connection West, North and East Sides Missing Caps and Chains

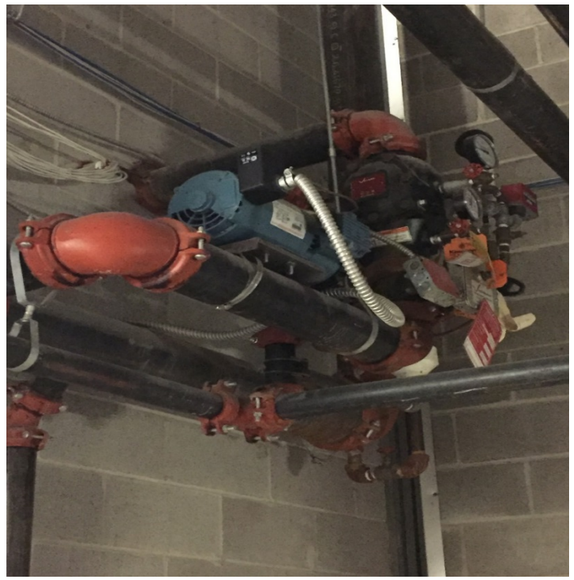
Observations - Sprinklers

We observed interior corrosion of fire protection piping sections that had previously developed leaks and required replacement. Buildup of corrosion appears to be acceptable for the age of the piping.

There are multiple dry pipe systems that serve exterior spaces and concessions on both concourse levels. We noted several sprinkler heads located in exterior areas where rust is beginning to accumulate. The sprinkler operation or performance shouldn't be affected; however, the 2008 Edition of NFPA 25 Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems states that dry pipe sprinklers that have been in service for 10 years shall be replaced, or representative samples shall be tested every 10 years (5.3.1.1.1.5). Paragraph 5.3.1.2 outlines an acceptable test procedure.

Interior Pipe Corrosion

Automatic Sprinkler Head Corrosion



Dry Pipe Valve Assembly and Air Compressor In Stairwell serving Upper Concourse Concessions

Interior Pipe Corrosion

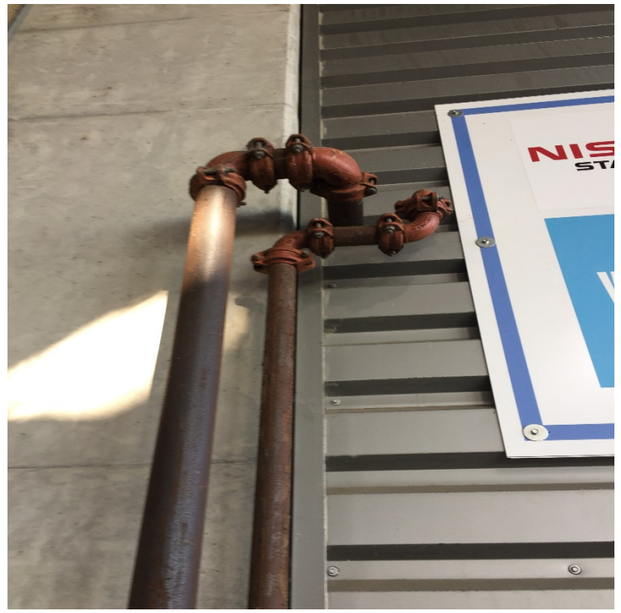
Observations - Stand Pipes

We observed exterior corrosion of fire protection piping sections that are exposed to weather conditions in the lower and upper concourse areas. Most of this piping is located on the upper level concourse.

Several freeze-proof fire department connections were noted in the main level concourses, upper level concourses and the south end zone areas.

The exterior floor finishes are currently being resurfaced and/or recoated. Noted that floor piping supports had been removed and not replaced at one location.

We noted that interior sprinkler head trim rings were missing in a few locations.



Rust on Exterior Dry Pipe System Piping

Piping Missing Floor Supports

Freeze-Proof Fire Hose Cabinet

Interior Automatic Sprinkler Head Missing Trim

Recommendations

1. We recommend continuing the routine testing, maintenance and cleaning of the system.

2. Microbiological Induced Corrosion (MIC) testing could be done to determine an expected remaining life expectancy of the existing piping.

3. We recommend replacement of the dry pipe sprinkler heads on all dry pipe systems or testing as outlined by the quoted NFPA Standard. If head replacement is selected, brass finish heads can be used in unfinished spaces and white polyester coated heads may prove to be less resistant to rust and may provide a more attractive finish in the existing ceiling surfaces. The cost for chrome plated or white polyester is the same.

4. NFPA 25 also outlines that sprinklers manufactured using fast-response elements that have been in service for 20 years should be replaced, or representative samples should be tested. If tested, they should be re-tested every 10 years (5.3.1.1.1.2). This building is approaching the 20 years of service. Paragraph 5.3.1.2 outlines an acceptable test procedure.

5. The exterior surfaces of the existing piping and fittings should be cleaned and painted to extend the remaining life of the piping or replaced with new pipe and fittings. At this point in the life of this piping, this comment is a cosmetic type recommendation to clean up the appearance of the stadium.

6. We recommend that expanded foam insulation be provided around the valve stem and fire hose connection inside the freeze-proof fire hose cabinets. Split ring chrome plated escutcheon rings should also be provided to conceal the insulation at the valve stem and fire hose connection.

7. Missing sprinkler trim rings should be replaced to match the finish of the existing head and should be provided by the same sprinkler head manufacturer.

STRUCTURE

VENUE Solutions group

STRUCTURE

The structural evaluation of the stadium assessed the current condition of the structural systems at Nissan Stadium. The assessments conducted were visual in nature and did not include destructive testing.

The visual observation of the facility was intended to identify potential structural defects or other structural causes for concern. The observation was limited to those portions of the structure which were exposed and readily observable without the use of scaffolds or the removal of existing finishes.

The review included the following elements:

- Review of structural drawings
- Evaluation of representative structural components through visual observations of the facility, including the following:
    - Elevated concrete framing
    - Precast seating units
    - Scoreboard framing
    - Precast double tee floor framing
    - Composite slabs and steel framing at exterior ramps
    - Expansion joints
    - Slab on grade
- Discussions with building maintenance personnel, as appropriate

DESCRIPTION OF STRUCTURE

The facility features seven levels, as listed below:

- Service Level — Elevation +/- 6'-0" (Below Grade)
- Main Concourse Level — Elevation 26'-0 1/2" (Street Level)
- Press/ Suite Level — Elevation 38'-0"
- Club Level — Elevation 63'-6"
- Lower Suite Level — Elevation 76'-2"
- Upper Suite Level — Elevation 88'-10"
- Upper Concourse Level — Elevation +/- 103'-6"

The complex also features exterior ramps at all four corners, two exterior scoreboard structures (north and south), several miscellaneous ticket booths and gate structures, and an upper seating level that extends above the upper concourse. Two south elevator towers were added in 2012 to service only the upper concourse.

The foundations for the stadium consist of cast-in-place piles caps with steel HP 12x53 piles located beneath building columns and retaining and basement walls.

The service level is a partial level below grade that extends from the 30-yard line on the west side (grid 31) to the 30-yard line on the east side (grid 56) and consists of a conventional, soil-supported slab on grade on drainage fill that varies between 6" thick at typical areas, 10" at loading docks, and 8" at equipment and storage spaces.

The main concourse level is located at street level and consists of a 6" slab and beam elevated structure over the service level and a 6" cast-in-place concrete slab on grade on drainage fill outside the service level extents. Several large cast-in-place concrete girders form the support for the plaza above the column free loading dock on the northwest side. There are concession and restroom buildings around the bowl that are framed with 8" load bearing masonry wall with joist framed steel deck roofs. The lower bowl is constructed of precast seating units supported by precast columns and rakers over the service level and 8" minimum cast-in-place stepped seating on grade outside the service level.

The east and west press/suite levels consist of cast-in-place concrete beams and 5 ½" thick slabs. There are flying cast-in-place concrete beams, and the suite tubs are cast-in-place concrete.

The east and west club levels consist of cast-in-place concrete girders with a precast double tees floor system and a cast-in-place concrete beam and slab system around the curved perimeter. A split slab waterproofing assembly with a lightweight topping slab covers the framing. The club seating consists of cantilevered cast-in-place concrete rakers supporting precast seating units.

The east and west lower and upper suite levels consist of cast-in-place concrete girders with a precast double tees floor system and a cast-in-place concrete beam and slab system around the curved perimeter. Portions of the floors are open to the club level below with flying concrete beams between columns and along the perimeter to support the exterior cladding. The suite tubs are precast double tubs supported on cast-in-place concrete rakers.

The east and west upper concourse levels consist of cast-in-place concrete girders with a precast double tees floor system and a cast-in-place beam and slab system around the curved perimeter. A split slab waterproofing assembly with a lightweight topping slab covers the framing. Load bearing masonry concessions and restrooms with steel joists and metal deck roofs line the concourse. The vomitories lead out to seating supported by cast-in-place concrete rakers supporting precast seating units.

The upper seating consists of cast-in-place concrete rakers with precast triple seating units. Steel trusses cantilevering from the exterior concrete columns over the bowl support the sports lighting. The aisle steps are cast-in-place concrete. Precast panels frame the sides of the bowl

The exterior ramps are at the northwest, northeast, southwest, and southeast corners of the stadium and consist of 2½" normal weight concrete on 2" composite metal deck supported by structural steel beams, girders and columns with a steel braced frame lateral system. The ramps extend from the main concourse to the upper concourse and stop at all levels between.

The scoreboard structures consist of steel framing and braces cantilevered vertically from the main concourse level. The scoreboard structures have several levels of catwalks to service the boards, and the north scoreboard structure also includes several party decks.

The lateral load resisting system of the primary framing consists of uniformly distributed, cast-in-place concrete moment frames in the concrete superstructure.

The lower seating bowl consists of precast, pre-stressed concrete stadia units supported by either raker beams or precast concrete vomitory walls. The lower seating bowl is supported by structural steel raker beams, while the suite seating areas and upper bowl is supported by cast-in-place concrete raker beams.

There are 5 primary expansion joints through the building. From our discussions with facility management and maintenance staff, the facility is currently undergoing replacement of the expansion joints, starting with the east club level. The west and east upper concourse have been replaced to about one-third of the upper seating.

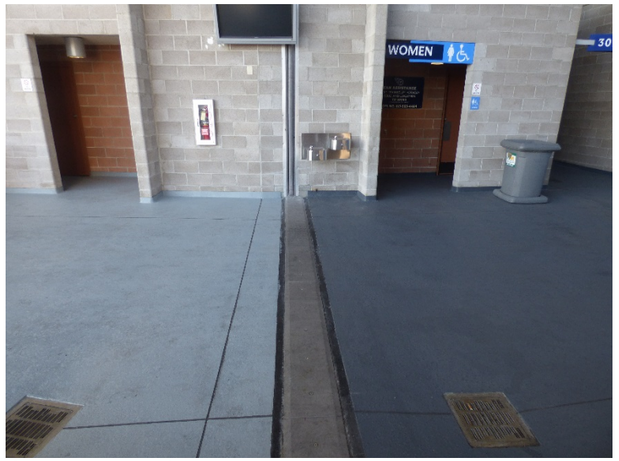
The stadium façade consists of precast concrete panels and glazing. The stadium sports light supports at the upper bowl had been recently painted.

Visual Observations

From our visual observations of the stadium structure, we concluded that the overall condition of the structural elements was fair. The primary structural elements observed (floor slabs, beams and girders, columns, masonry walls, precast seating units, raker beams, exterior steel and composite deck ramps) did not exhibit significant cracking, spalling or evidence of active corrosion or other damage except as noted below. The facility appears to have been adequately maintained to prevent damage or deterioration to critical structural elements.

Concourses

Expansion Joints: The header material on the new expansion joints installed on the upper level concourse on the East side of the stadium exhibited minor damage.



Overall view of new expansion joint on upper concourse

Damage of header material for expansion joint

Sealants at older expansion joints, the joints between concourse perimeter walls, and the joints in the topping slab on the main concourse slab appear to have reached the end of their service life and had failed.

Overview of older expansion joints

Failed sealant on perimeter of plates over older expansion joints

Vertical joint between concrete perimeter walls

Failed sealant at topping slab joints in the Main Level concourse

Concrete spalls and delamination on face of beam and slab

Failed sealant at joint between perimeter walls

Concrete spalls and delaminations on face of slab and beam on southeast corner of upper concourse level, on the flanges and stems of double tees at various locations throughout the stadium, and on one column on the Main Level concourse. The delaminations and spalls do not appear to be caused by overloading of the structure, but rather by either corrosion of the reinforcing steel, reinforcing steel with low concrete cover, or damage during construction in the case of precast members.

Concrete spall on double-tee flange on the underside of press level, southwest corner of stadium

Concrete spall on double-tee stem

Concrete spall on column at Gridline 10 on main concourse level

Cracking of concrete masonry units (CMU) at two locations on the stadium. The CMU walls are not part of the main structural system for the stadium, but are part of the bathroom and concession facilities. Cracking does not appear to be of structural concern, but repairs are recommended to prevent further deterioration.

Cracks in concrete masonry units (CMU)

The ends of vertical and horizontal tubes at the east and west stair towers are unsealed, allowing water inside the tubes, which has resulted in corrosion of the interior of the tubes and in rust staining on stair surfaces below. The corrosion inside the tubes appeared to be limited to surface corrosion with no apparent section loss of the tube.

Open ends of steel tubes

Rust staining of horizontal surfaces below open-ended tubes

Cracks and spalls on slab-on-grade at service level. Typical cracking on slab-on-grade is of no structural concern. Cracks could be a result of localized overload or localized failure of the subgrade which resulted in loss of support of the slab.

Concrete spalls on slab-on-grade

Seating Bowl

Cracks on top surface of precast seating risers do not appear to be caused by overloading of the structure but rather by volumetric changes due to shrinkage of the concrete or expansion/contraction due to changes in temperature.

Cracks on seating risers

Failed concrete patches on west club level seating risers. The concrete repairs do not appear to have been performed following ICRI criteria.

Failed concrete patches on seating risers

Cracking and leaching on concrete steps was evident, and it appears that some of the cracks had been sealed prior to the application of the waterproofing membrane; however, additional cracks have formed since then and are reflecting through the existing waterproofing membrane. It is our understanding that testing has been performed on the steps and that evidence of alkali-silica reaction was found which explains the leaching observed. Replacement of steps on the lower rows of the Upper Level had been recently completed.

Cracks and leaching in concrete steps

Failed expansion joint covers on seating areas. The existing expansion joint covers appear to be a premolded joint. In areas above occupied space, the joints have been covered with sealant to prevent water intrusion into the occupied space below. It is our understanding that the expansion joints have been recently replaced in the lower rows on the upper level and are currently scheduled for replacement on the east side of the club level.

Failed expansion joint on seating areas

Expansion joint covered with sealant

Failed sealant at horizontal joints on precast seating risers. Sealant had been recently replaced on the lower rows on the upper concourse level and was in the process of being replaced on the east side of the club level.

Failed horizontal sealant on precast seating riser

Exposed wire mesh on precast seating risers, which appears to be a result of very low concrete cover and inadequate consolidation of the concrete. The exposed wire mesh is not of structural concern and does not appear to be negatively affecting the structural member. At this time, no correction measures are recommended.

Exposed wire mesh on precast seating riser

Missing nuts on the base plates for the guardrails on the seating areas were observed at two locations. Missing anchors on the guardrail attachments were noted in two locations at the club level.

Missing nut on handrail base plate on club level

Missing bolt on handrail anchorage plate in club level

Cracks and spalls were observed at the corner of precast concrete stairs on the club level. In some cases, corroded reinforcing steel was also observed. In the cases where the reinforcing steel was visible, it appeared to have very low concrete cover which might have led to cracking of the concrete and subsequent corrosion of the steel, which resulted in the concrete spalls.

Cracks and spalls at corner of precast stairs

Deteriorated coating and concrete delaminations on the first row of the Lower Level seating areas.

Deteriorated traffic coating

Concrete delaminations on first row of lower level seating area

Spalls on underside of precast seating risers. The spalls appear to be a result of low concrete cover, and in some cases, corrosion of the embedded reinforcing steel.

Concrete spall on underside of seating riser.

Delaminations at clip angles on the underside of precast seating risers. It is our understanding that as part of a recent renovation, these clip angles were installed at locations where concrete had spalled at locations of welded connections between precast seating risers. The welds were ground off, and the new clips were installed. The documented delaminations may be caused by differential movement between the precast seating risers that causes stresses at the connection points.

Concrete delamination at clip angle location

One of the connections of the ribbon board on the northeast corner of the club level seating area had failed.

Loose connection of ribbon board

Pedestrian Ramps

The traffic coating on the pedestrian ramps that provide access to the upper levels is aged and has been damaged by vehicles and other equipment. Traffic coatings typically require recoating every 5 years, and replacement once the base coat shows excessive deterioration.

Aged traffic coating on pedestrian ramps

Damaged traffic coating on ramp

Corrosion of the metal deck and structural steel beams on the pedestrian ramps. It appears that the corrosion is a result of water intrusion from the top of the ramps through the side, which did not have cove sealant originally. Cove sealant appears to have been installed along with the traffic coating on the top surface of the ramps. However, significant corrosion of the metal deck and minor corrosion of the top of the beams has ocurred. In one area, the corroded metal deck had been coated; however, it appears that the corrosion products were not removed prior to coating.

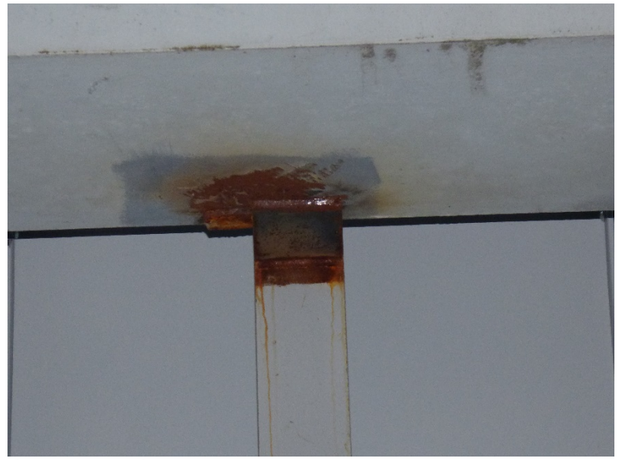
Corrosion of metal deck on pedestrian ramp

Close up of metal deck damage due to corrosion

Corroded metal deck which has been painted over at exterior, visible from exterior of stadium sidewalk

Scoreboard Structures

Corrosion of clip angles and structural steel beams on scoreboard structures. Some of the clip angles had been previously recoated; however, evidence of rust was also observed on these angles as shown. Some of the structural steel I-beams had been installed with the web at a slight angle from the horizontal direction which causes water ponding on top of the web. Even though holes had been drilled on the web, they were not located in the low spot.

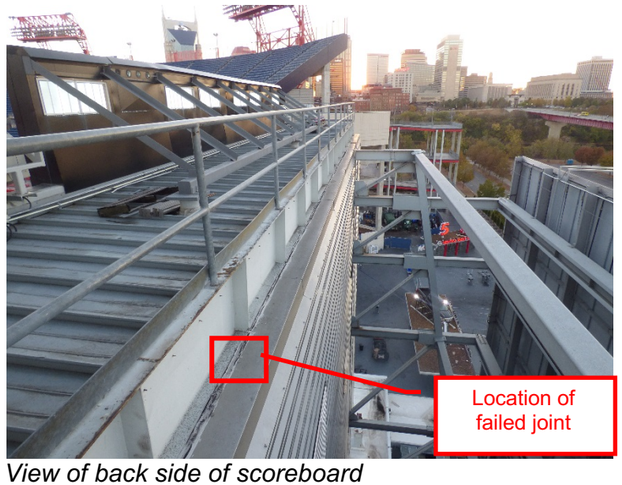


Corrosion of clip angle

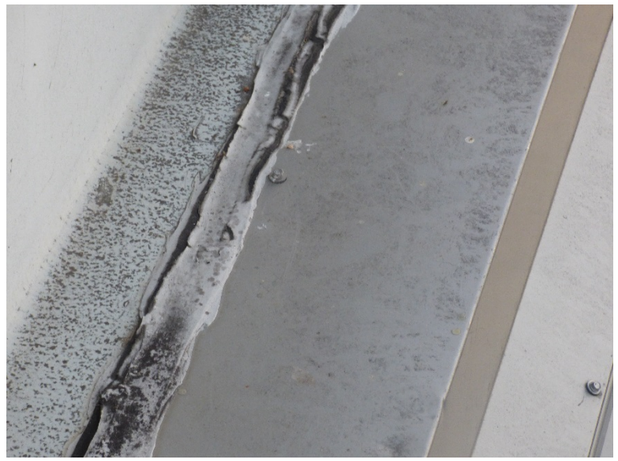
Evidence of rust on previously coated clip angle

Corrosion of web on structural steel beam. View looking down.

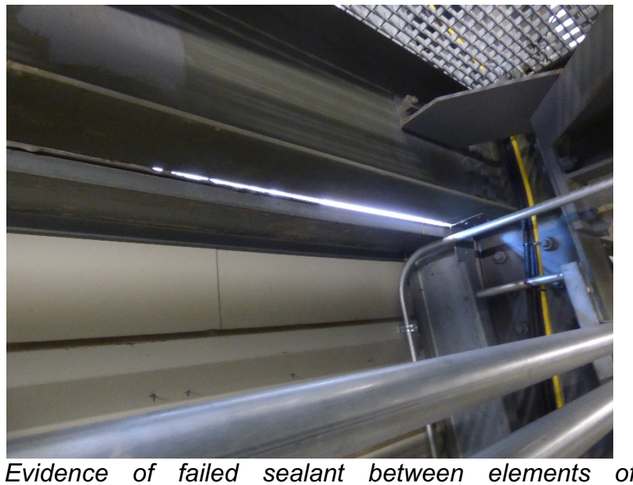
Failed sealant at joints between exterior elements of scoreboard structure



View of back side of scoreboard



Deteriorated sealant at joint on scoreboard elements



Evidence of failed sealant between elements of scoreboard elements (notice daylight through joint)

Exterior

Concrete cracks and spalls on slab-on-grade. Typical cracking on slab-on-grade is of no structural concern. Concrete damage could be a result of localized overload or localized failure of the subgrade which resulted in loss of support of the slab.

Delaminated concrete in slab-on-grade

Severely damaged concrete in slab-on-grade

Failed cove sealant along the perimeter of the building. The sealant appears to have reached the end of its service life and requires replacement.

View of exterior wall location of failed cove sealant

Failed cove sealant at exterior wall

Concrete spall on precast concrete wall panel. The spall was observed on one of the exterior wall panels but does not appear to be of structural concern. Spall may have been caused by minor damage during construction that with time resulted in the spall observed.

Concrete spall on precast wall element

Missing or loose grout at base of precast concrete walls. The grout originally placed at the base of precast concrete walls on the perimeter of the building was either missing or completely loose and could be removed by hand. It does not appear that the grout is used to support the walls, as they are typically attached directly to the columns. However, the grout will prevent water from penetrating into the structure.

Missing grout below exterior precast wall panel

Damage to header material on exterior expansion joint located over loading dock.

Damage to header material on exterior expansion joint over loading dock

Surface Parking Lots

The surface parking lots were in fair condition. We observed cracks in the pavement. Some of the cracks had been previously sealed but had cracked again. We also documented isolated locations of significant pavement distress which could have been caused by overload or subgrade deterioration. The degree of weathering of the pavement varied throughout the different lots.

Previously sealed pavement crack

Severe pavement deterioration

Weathering of pavement

Recommendations

1. Replace damaged header material on new expansion joints installed on upper concouse.
2. Replace failed sealants at older expansion joints that have failed.
3. Replace missing nuts and bolts on railing in club level seating.
4. Repair concrete spalls following ICRC guidelines.
5. Replace broken CMU blocks and repoint cracked joints.
6. Seal the ends (top and sides) of the tubes with a steel cap plate. Bottom end of the tubes shall remain open to allow water to exit the tube.
7. Repair deteriorated concrete and perform localized subgrade replacement, if required.
8. Cracks greater than 1/32-inch should be routed and sealed to prevent moisture intrusion that could lead to corrosion of the reinforcing steel.
9. Remove delaminated patches and install approved concrete repair material following ICRI guidelines.
10. Replace deteriorated concrete steps.
11. Replace failed expansion joints.
12. Replace all failed sealants.
13. Perform concrete repairs per ICRI guidelines and replace deteriorated coating in seating areas.
14. Review deterioration at clip angles between precast seating risers by original designer.
15. Replace broken connection on ribbon board.

16. Recoat traffic coating with replacement at isolated locations on pedestrian ramps.

17. On pedestrian ramps, remove all corrosion products and coat with a high-performance coating. At isolated locations, installation of supplementary sections of deck may be required.

18. Remove all corrosion products on scoreboard structures and coat with a high-performance coating. On the structural steel beams, add holes at the low spots to prevent water ponding, or install caps over the beams.

19. Replace failed sealants on exterior of scoreboard structures.

20. Repair deteriorated exterior concrete and perform localized subgrade replacement, if required.

21. Replace failed cove sealant along perimeter of stadium.

22. Repair spalled concrete on the perimiter per ICRI guidelines.

23. Install grout at base of precast concrete walls.

24. Replace deteriorated header material on exterior expansion joint cover.

25. In surface parking lots, seal cracks and replace pavement in heavily damaged areas. In areas with severe weathering, an overlay will be required. In areas with minor weathering, we recommend application of a seal coat.

Opinion of Probable Costs

The items listed above should be included in the regular maintenance program for the stadium.

REPAIR ITEM	UNITS	UNIT COST
Install missing nuts and bolts	LS	$1,000
Replace broken connection on scoreboard	LS	$500
Clean and coat corroded metal deck and structural steel	SF	$25
Joint sealant replacement	LF	$7
Concrete repairs on horizontal surfaces	SF	$100
Concrete repairs on vertical and overhead surfaces	SF	$200
Traffic coating replacement	SF	$6
Install grout at base of precast walls	LS	$2,000
Seal coat on pavement	SF	$0.15
Crack sealing on pavement	LF	$1
Mill and overlay on pavement	SF	$5
CMU replacement	EA	$50
Repoint mortar joints	LF	$15
Install cap plates at ends of structural steel tubes	LS	$2,000
Routing and sealing of cracks	LF	$6
Replace deteriorated concrete steps	EA	$200

Description of Abbreviations:

LF = Lineal Feet
SF = Square Feet
LS = Lump Sum
EA = Each

Notes:

1. Opinion of probable repair costs are in 2016 dollars.
2. Opinion of probable repair costs are based on historical records of similar types of work
3. Cost may vary due to time of year, local economy, or other factors.
4. Cost based on normal workweek and daylight hours.

Glossary of Terms

The definitions of terms used in this report are given below. Note that when terms are applied to an overall system, certain portions of the system may be in a different condition.

ABRASION RESISTANCE: Ability to resist being worn away by rubbing and friction.

CONCRETE: Mixture of Portland cement, fine aggregate, coarse aggregate, and water, with or without admixtures.

CORROSION: Disintegration or deterioration of steel or reinforcement by electrolysis or by chemical attack.

COVE SEALANT: Sealant installed at the intersection of a vertical surface with a horizontal surface.
.

DEFLECTION: A variation in position or shape of a structure or element due to effects of loads or volume change, usually measured as a linear deviation from an established plane.

DELAMINATION: In the case of a concrete slab, a delamination is the horizontal splitting, cracking, or separation of a slab in a plane roughly parallel to, and generally near, the upper surface. De-laminations are typically caused by corrosion of reinforcing steel or separation between concrete topping and underlying elements.

DETERIORATION: Disintegration or chemical decomposition of a material during service exposure.

DOUBLE TEE: Precast concrete structural member with thin flanges that extend beyond two stems.

DURABILITY: The ability of concrete to resist weathering action, chemical attack, abrasion, and other conditions of service.

EPOXY CONCRETE: A mixture of epoxy resin, catalyst, fine aggregate, and coarse aggregate.
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HAIRLINE CRACKING: Small cracks of random pattern in an exposed concrete surface.

HEADER MATERIAL: Material installed along the edges of certain types of expansion joints which helps to anchor the joint.

JOINT SEALANT: Compressible material used to exclude water and solid foreign material from joints.

ICRI: International Concrete Repair Institute.

LEACHING: Typically, a result of lime compounds draining from the concrete matrix as a result of water infiltration through the concrete member. It can also be a result of silica gel caused by alkali-silica reaction draining from the concrete.

MAINTENANCE: Taking periodic actions that will either prevent or delay damage or deterioration or both.

OVERLAY: A layer of concrete or mortar, seldom thinner than 1 inch, placed on and usually bonded to the worn or cracked surface of a concrete slab to either restore or improve the function of the previous surface.

PRECAST CONCRETE: Concrete cast elsewhere than in its final position.

ROUTING: Using a grinder to create groove along a crack to allow for proper installation of sealant.

SPALL: A dish-shaped cavity or void formed by the broken surface, edge, or corner of a larger mass such as a floor slab, beam, column, wall, etc. Spalls are usually the result of weathering, pressure, or volume change of the larger mass.

TECHNOLOGY

VENUE Solutions group

TECHNOLOGY

Information Technology ("IT")

The stadium's structured cabling system spaces and pathways are generally in accordance with current telecommunications industry guidelines and standards, providing a solid telecommunications infrastructure for future renovations and expansion of the Stadium.

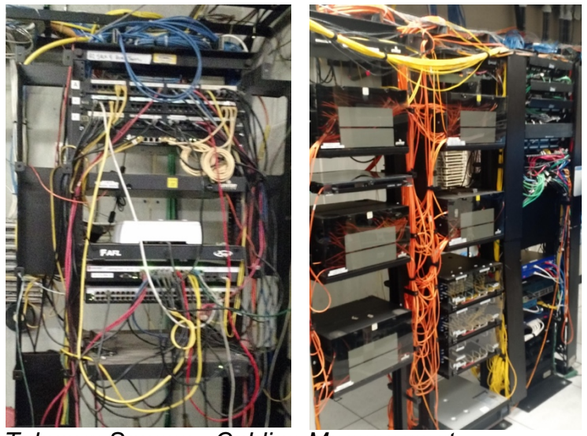
Overall, the IT System/LAN (Local Area Network) meets current Internet protocol ("IP") industry trends in a reasonable fashion, recently upgrading the LAN (local area network) to an enterprise class LAN core with a 10 GB (Gigabit) fiber optic backbone to a limited set of the IDFs.

The WLAN (Wireless LAN) is Wi-Fi compatible, deployed as an IEEE 802.11a/g/b/n 2.4/5 GHz compliant wireless network with Enterasys Access Points (AP).

The phone system is a legacy phone system and is well past the manufacturer announced end-of-support date of March 31, 2014.

Structured Cabling System (SCS) Infrastructure

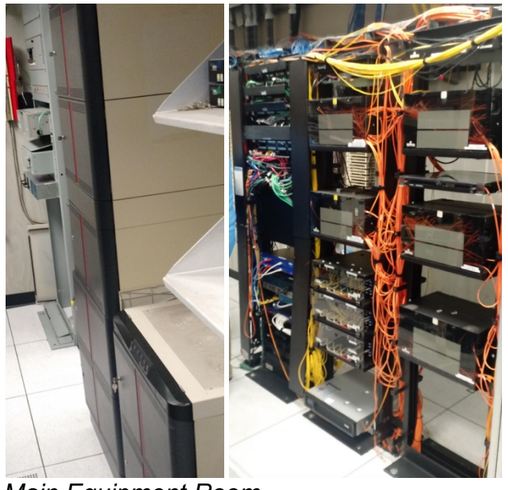
The structured cabling system infrastructure, spaces and pathways, are primarily the results of the initial construction of the stadium and are generally in accordance with current guidelines and standards: Building Industry Consulting Service International ("BICSI"), American National Standards Institute ("ANSI") and Telecommunications Industry Association ("TIA"). To further achieve compliance with published guidelines and standards, minor housekeeping is recommended to address cable management/routing/support issues in the IDFs (intermediate distribution frame/telecom room).



Telecom Spaces - Cabling Management

Existing telecommunications spaces' (IDF and main equipment room) electrical power and cooling appear to be adequate.

Updates and additions to the existing SCS infrastructure continue to embrace industry guidelines and standards, providing a solid telecommunications infrastructure for future renovations and expansion of the Stadium.



Main Equipment Room

The service level IT main equipment room houses the main fiber optic and copper backbone distribution frame, LAN equipment, telephone system (PBX) and entrance facility, meeting operation's current requirements.

The existing fiber optic backbone is a mix of the originally deployed multi-mode fiber optic 1G backbone and a newly deployed single-mode fiber optic 10G backbone. The 10G fiber optic backbone, with limited capacity and not deployed to all IDFs, limits IT ability to deploy future fan experience and required stadium operations IP based technologies, i.e., IP video surveillance, VoIP PBX, IPTV, etc. We recommend expanding the 10G fiber backbone to all IDFs and increasing the single-mode fiber optic strand count to a minimum of 48 strands to each IDF. Recent similar venues have deployed fiber optic backbone strand counts as high as 96-strands to each IDF for future infrastructure improvements.

The copper backbone cabling plant was installed as part of the initial stadium construction and is currently utilized to support the legacy phone system and other telecom services.

The stadium's structured cabling system horizontal link infrastructure meets current industry standards. The infrastructure is a mix of the original deployed horizontal links of Category 3 and 5 (100MB) cabling, with more recent expansions utilizing CAT 5e and CAT 6 (1GB) to workstation/device outlets.

Local Area Network (LAN)

The stadium LAN was recently upgraded to an enterprise class core with new stacked access switches deployed in the IDFs that bring it to a current state of the art design. We recommend extending the Structured Cabling System 10GB backbone to all IDFs, enabling IT to establish a converged network (one physical LAN) to support future data system requirements i.e. IP Video Surveillance, VoIP PBX, IPTV, etc. with the flexibility to integrate and quickly expand current and deploy new IP based solutions/systems.

Wireless Local Area Network (WLAN)

Stadium WLAN (Wireless LAN) is Wi-Fi compatible, deployed as an Enterasys IEEE 802.11a/g/b/n 2.4/5 GHz AP WLAN with 500 Access Points. The BOH (back-of-house) WLAN is reported to meet stadium operations current coverage requirements.
The public WLAN, seating bowl and concourses, is deployed as a High Density WLAN equivalent to earlier deployments in similar venues. It is reported to meet current operation's and owner's fan experience requirements. To support future state of the art fan experience mobile applications and the explosion in social media and video usage, it is recommended the system be upgraded to IEEE 802.11ac Wave 2.4/5GHz compliant APs. The upgrade will increase the number of simultaneous connections of each AP, providing a higher density WLAN design from the existing AP placement/coverage.

Telecommunications

The phone system is a legacy phone PBX, NEC NEAX 2400 IMS. The manufacturer announced End of Support of the PBX as of March 31, 2014. Support and refurbished parts availability is becoming more difficult to obtain. We recommend upgrading the PBX within the next 1-2 years to an enterprise Voice-over-IP (VoIP) PBX solution.

Legacy Phone System

Distributed Antenna System (DAS)

The Stadium's DAS (Distributed Antenna System) is an AT&T sponsored solution with the support of Verizon on the same system. It is reported the system adequately meets stadium Ownership requirements for operations and fan experience.

Recommendations

1. To further achieve compliance with Structured Cabling System guidelines and standards, minor housekeeping effort is recommended to address cable management/routing/support issues in the IDFs and IT Main Equipment Room.

2. The 10G fiber optic backbone, with limited capacity and not deployed to all IDFs, limits IT ability to deploy future fan experience and required stadium operations IP based technologies, i.e. IP Video Surveillance, VoIP PBX, IPTV, etc. Recommend expanding the 10G fiber backbone to all IDFs and increase the single-mode fiber optic strand count to minimum of 48 strands to each IDF. Recent similar venues have deployed strand counts as high as 96-strands to each IDF to future proof the infrastructure.

3. Recommended IT establish a converged network (one physical LAN), with the expansion of the 10GB fiber optic backbone to all IDFs, to support future data system requirements i.e. IP Video Surveillance, VoIP PBX, IPTV, etc. with the flexibility to integrate and quickly expand current and deploy new IP based solutions/systems.

4. For the seating bowl and concourses High Density WLAN to support future, unrealized, state of the art fan experience, mobile applications, and the explosion in social media and video usage, it is recommended to upgrade to IEEE 802.11ac Wave 2 compliant APs. The upgrade will increase the number of simultaneous connections of each AP, providing a higher density WLAN design utilizing the existing AP placement/coverage.

5. Upgrade the phone system to current industry technology Voice-over-IP (VoIP) PBX.

Security Technology

The security control room, located on the service level near the loading dock, provides security staff a central location to monitor the video surveillance and access control systems. The space provides adequate room, lighting and environment with the necessary furniture and technology to allow staff to properly monitor the security systems. The technology in the control room incudes some upgraded components as well as many outdated components.

The CCTV security camera technology is a legacy analog system and is sub-par with recent similar venues. The system utilizes 145 cameras to provide coverage of the seating bowl, concourses, building entry points and the stadium's exterior perimeter.

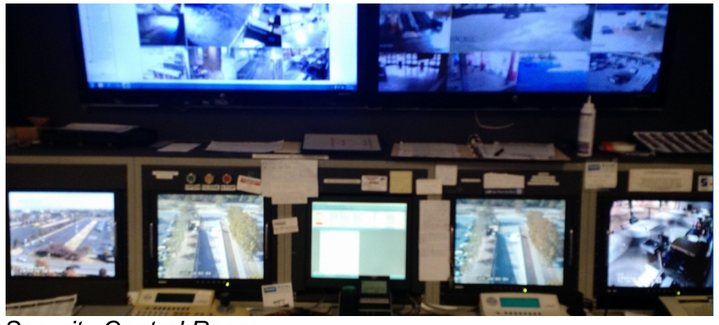
Physical security barriers have been placed along avenues of approach and around the entire perimeter of the stadium. These barriers include concrete bollards/planters, jersey barriers, removable bollards, vehicle gates and a K12 vehicle barrier at the loading dock entrance.

Control and Monitoring

The security control room is located on the service level near the loading dock, providing stadium security a central location to monitor the video surveillance and access control systems. The space provides adequate room, lighting and an environment with the necessary furniture and technology to allow staff to properly monitor the security systems.

The room is utilized as the game day command center with a conference table behind the security command desk that provides adequate seating for operations staff, departmental representatives, security officers and local law enforcement.

The security technology in the control room incudes some upgraded components, and many outdated components. It is recommended that the viewing monitors be upgraded when the video management system (VMS) is upgraded.



Security Control Room

Video Surveillance System

The current CCTV security camera technology is a legacy analog system and is sub-par in relation to similar newer venues. It is recommended that the system be replaced with an IP based video management system.

There currently are 145 cameras deployed on the analog CCTV system. Camera coverage includes the seating bowl, concourses, building entry points and the stadium's exterior perimeter. Recent similar venues deployed 70 fixed IP cameras in the seating bowl and 500 IP cameras for the interior and perimeter of the stadium. It is recommended as a part of the video surveillance system upgrade to review camera placement/views with council from the team's liability officer.

In addition, it is recommended the new VMS be a unified platform that allows the inclusion of video analytics to compliment the operations notifications of events with predetermined alarm response condition, i.e. analytic alarms, package left behind, loitering, wrong direction of travel, and other more custom scenarios. The unified platform enables the operator to pull pieces of data from the video, access control, intrusion detection and emergency communications systems into a situational awareness system.

Access Control System

The access control system is comprised of smart card style card readers connected to a recently upgraded head end software and server. The newly upgraded system is the Level system which is one of the current product offerings in this space and capable of performing the operator and liability department tasks such as reports, logging events, notification of alarms, etc. The door position switches throughout the stadium are connected to the access control system for monitoring by security control room staff. The system is meeting operation's current shorter and longer term requirements.

Mechanical Security

Physical security barriers have been placed along avenues of approaches and around the entire perimeter of the stadium. These barriers include concrete bollards/planters and jersey barriers. Operations staff reported these as functional and meeting their operational needs. Each entrance to parking areas had bar gates that were staffed during venue events and games. The dock entry is protected with a 12K crash barrier that appears to be in working order and operated by staff during on game days.

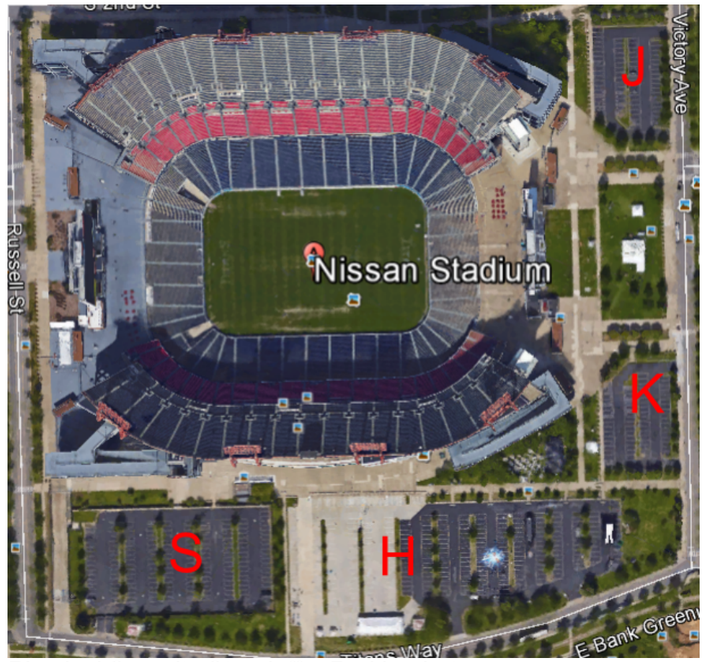
Physical Security Barriers - Planters

Physical Security Barriers – Removable Bollards and Gates

Physical Security Barriers – Jersey Barriers

K12 Vehicle Barrier – Loading Dock Truck Entrance

It is recommended a further review of the standoff Safety Act Designation criteria be completed for parking lots H, J, K and S to be on par with similar venues.



Physical Security Standoff – Parking Lots

Recommendations

1. The current video management system is a legacy analog CCTV system with 145 cameras. It is recommended the system be replaced with an IP based video management system.

2. When the operator upgrades the VMS, it is recommended the new system be a unified platform that allows the inclusion of video analytics to compliment the operations notifications of events with predetermined alarm response condition, i.e. analytic alarms, package left behind, loitering, wrong direction of travel and other more custom scenarios.

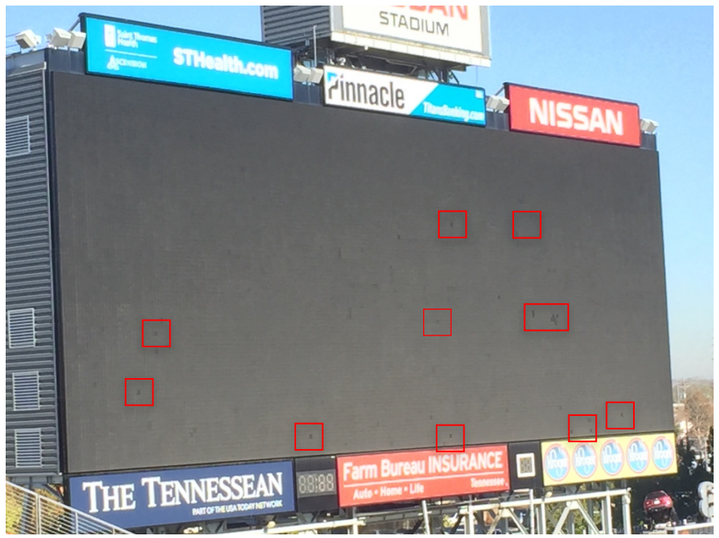
3. Recommend further review of threat standoff distances as it relates to the Safety Act Designation criterion. Specifically, parking lots H, J, K and S which appear to be different than those of similar venues' physical security standoff distances.

LED Display System

The LED display system consists of two large end zone displays, two ribbon displays and miscellaneous scoring/clock systems. The system was upgraded by ANC in 2012.

The team has a yearly maintenance contract with ANC, but there are several items worth noting if obligations are not being met by the provider:

- There are issues with the uniformity between modules as highlighted below on the North display.



North Display

- Vertical seams between modules are present on both displays.
- It appears as though there is a mix of broken/damaged pixels and cobwebs giving the displays many areas where pixels aren't viewable and thus compromising the video image.
- We recommend displays are cleaned.

Control Equipment

This equipment was installed during the 2012 work and remains functional at this time. Computer based control equipment generally has a useful life of 7 to 8 years as at that point, the operating systems and software platforms become obsolete and increasingly difficult to maintain.

- The Click Effects units are now five years old, and upgrading the software and functionality is something that should be considered.

- Adding a Click Effects Blaze to the system is something worth exploring as this platform would allow for simultaneous triggering and control of all displays, and the addition would enhance the production value.

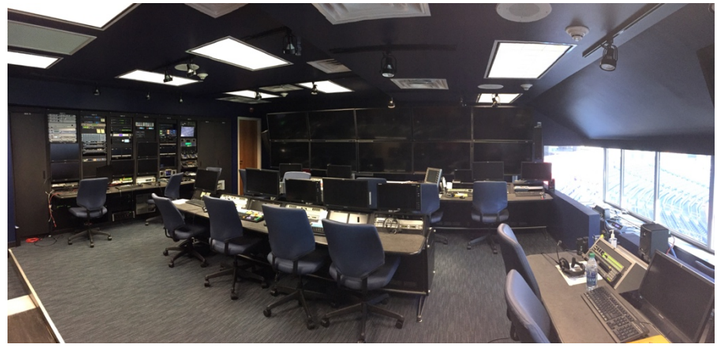
Recommendations

1. The system is approaching five years of age and should have another 3-5 years of useful life left before replacing/upgrading is considered.

2. Recommend the LED displays be cleaned.

3. Recommend servicing contractor review the LED displays visual performance and correct any issues found.

Video Production Control Room



Video Production Control Room

The control room is responsible for producing the show that is seen on the LED displays, scoreboards and ribbon boards in the facility. This is a mix of live video, replay video, graphics, animations, etc.

Most of the system was upgraded in 2012.

The system has been well maintained and appears to be operationally in sound shape, but there are several items worth noting:

- The UPS does not appear to be fully operational during "brown out" events. This was part of the 2012 replacement.
  - The ability to add redundant power or outlets is limited as it will overload the UPS.
- There are three wireless cameras in the system including a mix of two manufacturers (two NuComm/IMT from the 2012 replacement and one Wave Central in the past couple of years).
  - The NuComm/IMT products are end-of-life and should be replaced.
  - More range is desired in the wireless camera coverage, mainly in concourses and player tunnels.

- The intercom panels and wireless intercom were not replaced in 2012 and thus are older models approaching limited support and operational instability.
- The multi-image viewer is approaching capacity, and there is a desire to increase the number of I/O.
- The router is approaching capacity, and expanding its I/O should be considered in the future.
- Some items were added between the 2012 upgrade and our site visit:
    - Frame Sync
    - Social Media functionality to Chyron
    - Closed Captioning
    - IP Director to EVS
    - Dante audio interface
    - TV Production studio on the Event Level

- Certain elements that provide increased functionality were added in recent years, and the overall system is in good shape.

Recommendations

There are a few items worth considering upgrading or replacing to enhance the production of the in-house show and increase the stability and reliability of the operation of the machines.

1. The Click Effects Crossfire and Chyron Operating Systems are out of date (Windows XP) and should be upgraded.

2. Wireless camera systems need to be replaced.

3. Wireless intercom and intercom panels need to be replaced.

4. Repair/upgrade existing UPS.

Stadium Sound Systems

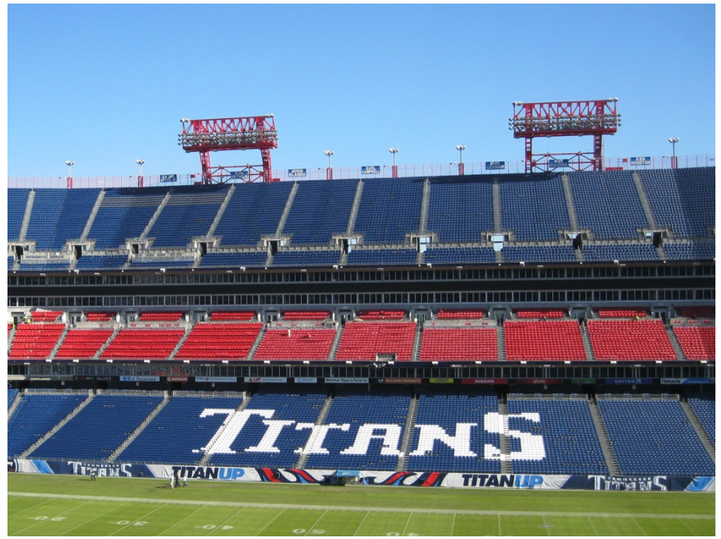
The main loudspeaker system serving the spectator seating bowl was replaced and updated for the 2012 season. The current system performance is at or above the performance of NFL stadiums with distributed sound systems. Also during the 2012 upgrades, all the exterior concessions speakers were replaced along with processing and amplification for the concessions and restrooms throughout the stadium. The exception to the 2012 upgrade work was the clubs on both the East and West sides of the stadium.

Main bowl view

The sound system signals interconnecting the sound system to the clubs, ticket booths, broadcast truck parking, writing press, and press booths at the stadium still relies heavily on analog connections. The cabling for these connections is original to the building. This part of the system could be updated to current digital technology and take advantage of the building's network cabling and fiber optic tie lines; this would provide audio signal distribution to the other AV systems in the venue to provide a more reliable and consistent game day production.

Review of Current System

Loudspeakers – The main system consists of a few hundred weatherized loudspeakers mounted to various structural elements throughout the stadium such as concrete structure, lighting towers, scoreboards, and dedicated poles in the upper deck. These speakers vary in size from custom small format speakers located at the rear of the lower deck to large format speakers on the fascia of the upper deck, scoreboards, and lighting towers; there are multiple locations for medium throw speakers under the decks and on the lighting towers as well.

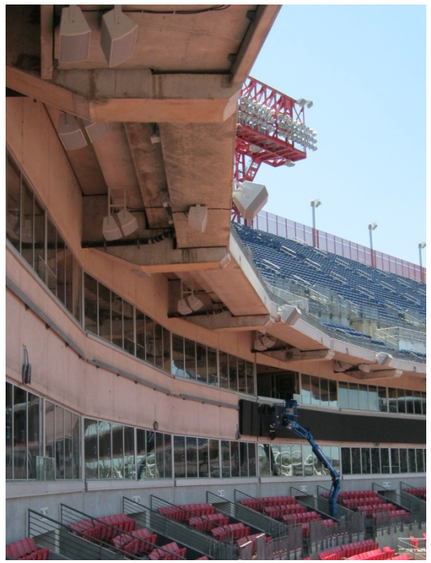


Typical speaker locations at stadium sidelines

Typical lighting tower speakers

While the deck overhangs are minimal at the stadium, there are areas that currently have small and medium format delay speakers for improved sound performance for the patrons seated below the overhangs.

Lower deck overhang speakers



Typical club level overhang speakers

Assuming the system remains well maintained, the useful life expectancy of on outdoor loudspeaker system is between 10 and 15 years. Any digital signal processing components used to control the loudspeakers will tend to have a shorter life expectancy in the range of 8 to 12 years, due to the serviceable life of software based products and ongoing technical development by the manufacturers. The current loudspeakers were just serviced prior to the 2016 season.

Minor surface rust was noted on some of the speaker brackets throughout the facility. During the bidding process, there was a VE option selected to change the brackets from aluminum to steel in order to bring the project within budget. At bid time, the additional finish maintenance of the steel bracketing was discussed and the option accepted. Repainting of the bracketing with the appropriate coating should be considered within the next few years.

Existing speaker bracket showing rust

System Measurements – While it was not within the scope of this work to take exhaustive acoustical measurements of each individual loudspeaker, we did observe and measure the general performance of the system from various locations

throughout each seating level. The parameters measured were sound pressure level (SPL) at the 4 kHz octave band and intelligibility (STIPA). We use the 4 kHz octave band as it has a strong influence on the intelligibility measurements and directly correlates to the STIPA measurement. Intelligibility is measured between 0.00 (unintelligible) and 1.00 (perfect), with the minimum acceptable measurement being 0.50 and the average observed in this type of building being 0.55 to 0.65. It should be noted that a perfect score 1.0 is not attainable in an environment such as an NFL stadium.

Lower deck measurements – Typical SPL 4 kHz octave measurements indicated a +1 dB to -2 dB variation in level relative to a +/- 0 dB reference. Generally, the measurement was very consistent throughout the seating. The STIPA measurements were in the acceptable range between 0.54 and 0.59.

Suites level measurements – The SPL 4 kHz measurements for this area indicated a +2 dB to -1 dB variation in level with STIPA readings ranging between 0.56 and 0.69.

Upper deck measurements – The measurements taken throughout the upper deck range from +2 dB to -2 dB variation in level with STIPA readings averaging between 0.57 and 0.64.

Amplifiers – The amplifiers for the entire audio system were replaced in 2012 except for those in the club.

Audio Processor and Amplifier Equipment

Audio Processor and Amplifier Equipment

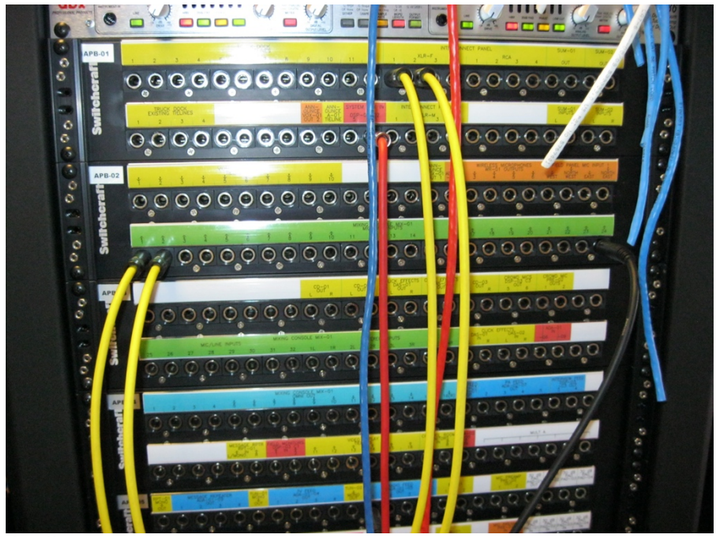
Audio Control Room – The sound system operator is located in a dedicated booth and houses the audio mixing console, playback equipment, and patchbays. Much of this equipment was also replaced in 2012, with a new mixing console installed in 2015 to provide the operators with more capabilities not available in the console installed in 2012. The patchbays are where the tie lines from the various connections around the stadium field and the connections to broadcasters as well as in-house video production come together in this room to connect into the various devices in the system.

Audio Control Desk - Yamaha QL5

The sound system equipment at the operators' control room also includes wireless microphone systems, audio playback devices like CD players, and digital based audio file playback. Directly behind the operator in the control room is the distribution and patching systems to send the various audio feeds to back-of-house systems, broadcasters, and to the main speaker processing and amplifiers. The feeds to broadcasters and back of house systems are mostly analog lines and are routed from the patch bays at the control position.

Audio control room racks

Audio control room racks

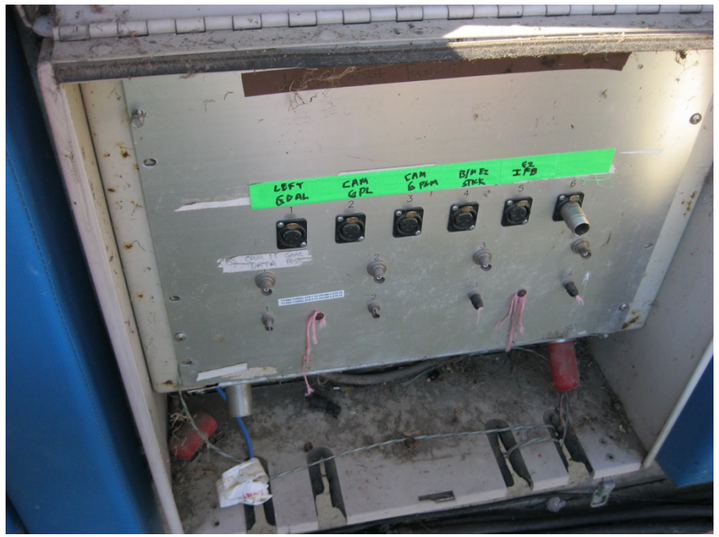


Audio control room racks

General cleaning of amplifier and processor air intake filters is recommended as many are loaded with dust. This is a time consuming task, but easily accomplished.

Dirty processor filters

Field Audio Cabling and Panels – The audio cabling routed to the field wall is original to the building except for the portion damaged in the 2010 flooding. The original design as well as common practice is to route this cabling from origin to destination without splices. The flood remediation work installed splice points in the field cabling which eventually will lead to service issues due to corrosion or failing contacts. The connectors at the field wall panels show considerable corrosion and should be replaced. It would also be prudent to replace and upgrade the field wall enclosures to stainless steel when any cabling and panel repairs are made.



Field wall panel example

Back-of-House Audio Systems

Loudspeakers serving public areas, such as concourses at the concessions and restrooms, deliver voice messaging and game day audio for patrons in these public spaces. The concessions speakers were replaced in 2012, although the restroom speakers are from the original installation.

Concourse area speakers are from the 2012 upgrades and should safely have another 10 years of useful life. The large East and West concourse areas could be supplemented with column speakers, such as Community ENT212 or JBL CBT100, which would update the presentation and provide more uniform and full sounding audio for the larger open concourse areas. The tall slender speakers would integrate well with the TVs on the columns and facades of the structure, as well as in other areas of the stadium.

Typical Concessions Speaker

There are two restroom zones on the upper concourse level and in the North end zone of the main concourse where the speakers are not operating properly and need to be serviced as soon as possible. This is likely a wiring issue caused by construction work conducted over the years and not associated with the sound system.

Typical Restroom Speaker

Existing restroom rusted speaker

The stadium also has dedicated speaker systems serving the exterior perimeter gate entrances and the ticket booths. The gate systems receive an audio program as selected from the sound control room equipment. The current speakers can only provide sound to the area very near the ticket scanning gates. While this design was appropriate when the stadium was constructed, the addition of longer throw speakers should be considered to provide security or other messages to the patrons approaching the stadium security screening areas.

Typical entrance speakers

The ticket booths have a stand-alone system in each booth and may not provide features desired by the owner at this time. Upgrade options for ticketing will need to be discussed in detail with the owner, as they are currently not using these systems.

Typical ticket booth speakers

The sound system and broadcast cabling serving the post-game Press Interview room are from the original installation. While currently functional for press needs, the system could be upgraded and integrated into the main processing system and networked to receive digital audio feeds.

Club spaces in the stadium are equipped with sound systems to play background music and audio reinforcement. These systems have been partially upgraded over the years, although some equipment dates to the original installation. Local AV racks in each space provide control and interfacing with the stadium's sound and TV distribution systems as connections to allow. Poor installation practices were observed for some of the upgrades as seen in the AV rack photos below. It should also be noted that a large percentage of the audio equipment housed within the club AV rack is obsolete, no longer manufactured, and in most cases, not even serviceable.

The audio systems within the club spaces are all currently standalone, self-contained systems with only analog connection to the main audio system. In new facilities, the AV systems serving these spaces are designed to service not only game day events, but also designed to handle other events such as press,

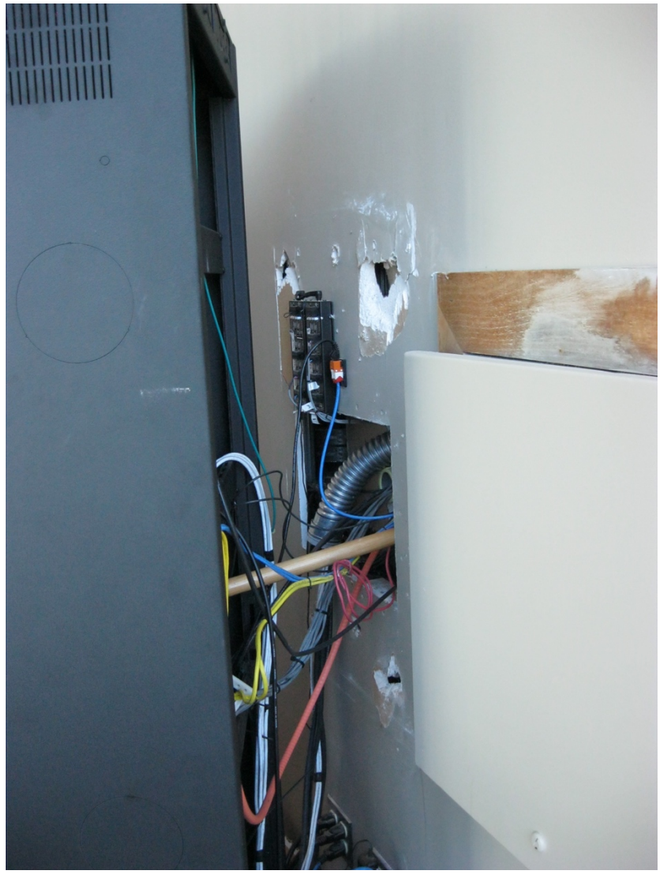
corporate parties, and banquets. The use of fiber optic and Ethernet cabling and highly configurable, intelligent products for audio signal distribution and control are key in creating this AV environment. Spare fiber optic cabling, if any, at the local equipment rack locations may potentially be used for that upgrade without the need for any new cable. Adding a DANTE enabled DSP device at each system and connecting to the network would effectively extend the stadium sound system and allow for a wide range of flexibility as far as where audio originates and where/how it is controlled. New loudspeakers located and zoned specifically to accommodate various stage or platform configurations could help generate revenue by rental of the system and reduce the need for portable equipment for almost all non-game day events.

The video control portion of the club system, while functional, is not fluid and easy to operate. Newer control technology from AMX, Crestron, or Extron could integrate the video functions with the audio for a more intuitive operation of the system. The larger format LED displays, two in each club, could also integrate into a consolidated video routing system to provide display of event sponsor content and could also provide IMAG (Image Magnification) for larger events.

Live bands also provide pregame entertainment in the club areas and currently bring in temporary sound systems.

Existing club speakers

Existing club rack



Poor installation workmanship at club AV rack

Press and Interview Areas – The systems in these areas are currently operating properly, although many components date back to the original building of the stadium and should be considered for replacement.

Recommendations

1. General cleaning of amplifier and processor air intake filters is recommended. This is a time-consuming task, but easily accomplished.

2. Repainting of the bracketing with the appropriate coating should be considered within the next few years.

3. System control computers, operating systems, and signal processing system will likely require updating in 3 to 4 years due to software development or obsolescence and hardware failure.

4. Concourse area speakers in the large East and West concourse areas could be supplemented with column speakers.

5. Restroom speakers were installed with the original building and should be considered for replacement in the next 3 to 5 years.

6. The 20-year old entrance speaker design does not meet current security needs for the building and should be considered for replacement within the next couple of years.

7. Press and Interview area equipment dating back to original installation should be scheduled for replacement.

8. Installation of a new system to accommodate the variety of stage and corporate events should be considered soon to minimize down time from failing equipment and provide a marketable feature for dark day events.

9. Replace field wall audio cabling.

Broadcast Cabling System

The broadcast cabling system is provided for national and regional TV broadcasters to connect their production trucks to the building and gain access via cabled locations around the facility. This system is largely original to the construction of the stadium and needs service.

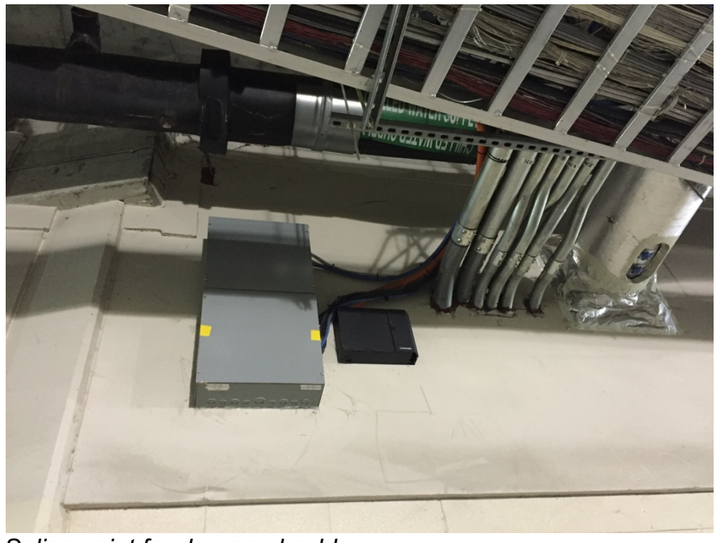
TV Truck Connection Area

The overall system is in poor condition, thus causing the facility to be inadequate for today's NFL broadcasting requirements. Many of the issues have to do with the following:

- Most broadcast box connectors are rusted or corroded.
- Certain broadcast boxes have non-functional electrical outlets.
- The single mode fiber quantities are light
- Drains in some of the camera wells are clogged, letting water pool up to the electrical outlets and connectors
- Most coaxial connections are not useable.

After the 2010 flooding of the Cumberland River, insurance did not pay to fully replace the damaged cable coming from the eight field level locations to the TV truck connection panel; only to splice and reconnect the already affected cables.

- The fiber cable is not fusion spliced. Instead, a cross-patched connector system was used which causes a signal loss.
- Copper lines (audio, video, triax, etc.) also use a cross-patched connector system, which causes a signal loss.
- Some conduits observed are damaged and/or filled with sediment eroding the cable.



Splice point for damaged cable

Site Observations

- At the TV truck connection, there are 50 triax camera connectors of which eight were observed to be labelled as unusable.

- Corrosion was observed on most the panel mounted connections at the field wall.

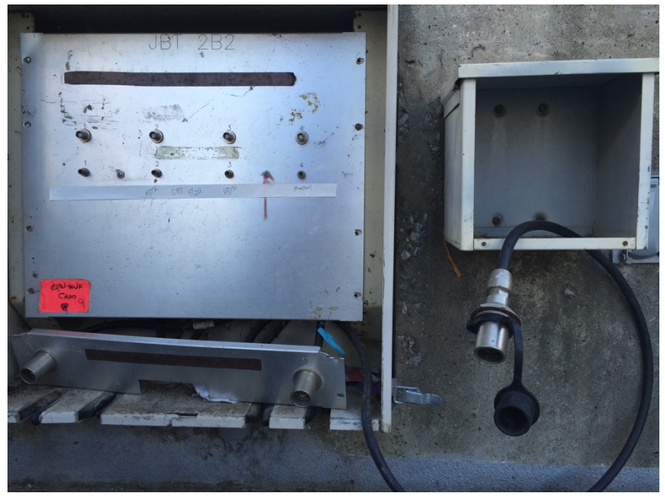
TV Truck Connection Triax Panel

Various Broadcast Connection Panels

Damaged and Corroded Broadcast Box Panel (Typical of most)

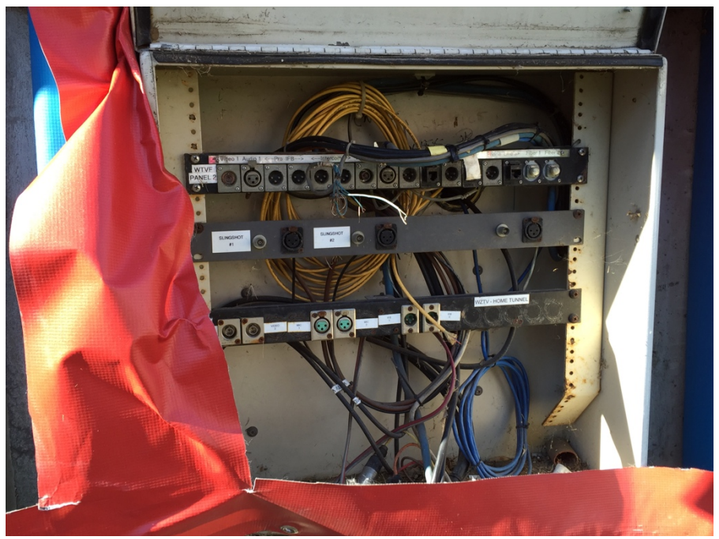
Close Up of Corroded XLR Connectors (Typical of Most)

Non-weatherized outlet subject to standing water



Triax with panel mount connector but not connected to panel

Close Up of Corroded Coax and Fiber Connectors and non-panel terminated triax.



Rusted and corroded coax and audio connections in corroded connection box

Same connector with corrosion in interior

General Comments to the Broadcast Amenities

Nissan Stadium is not on par with other NFL stadia in the following capacities:

- All camera and broadcast positions are short on single mode fiber optic cable. Most connections have 4-6 ST style connections. At a *minimum*, other NFL facilities are putting in 12 at each, with certain positions having 24 strands.
- Seating Bowl Broadcast Positions
  - There is only one slash position (on the southeast corner). Most facilities have two slash positions.
  - There is only one cabled position at the South hash marks.
  - There is an auxiliary broadcast camera position at the South entry that is not cabled.
- For Thursday Night Football (TNF):
  - No fiber at Skycam locations
  - No pregame set location is cabled.
- There is no broadcast program distribution to the press box broadcast booths.
- Broadcast Booths
  - There is only one dedicated TV broadcast booth with Booth 9 being an auxiliary broadcast position. For non-NFL events (soccer, international soccer, etc.) this might pose a problem for a second broadcaster (second language, visitor, etc.).
  - The Main TV Broadcast booth is deficient on the following:
    - Lack of useable lighting grid.
    - A stage/platform that is configurable. It needs to be in smaller pieces in order to fit the size of the room. Now, it is not able to breakdown at all.
    - Fiber to the TV truck
    - Audio to PR/Writing Press
  - TVs are set on the counters, taking away counter space from the talent. Most facilities have these mounted to the ceiling corners.
  - Booth 9 is an auxiliary broadcast position and is also used for Skycam control position.
    - All cabling for Skycam purposes is temporarily run.
    - There are not enough video and audio lines to the TV truck to support a second broadcast position.

Main TV Broadcast Booth

Recommendations

1. Replace entire broadcast cabling plant to meet current TV broadcast requirements.

2. With the facility being short on broadcast fiber optic cabling, it is recommended that single-mode fiber optic cable gets added to meet current TV broadcast requirements. This fiber cabling could be installed separately, although it would be most practical to install fiber while replacing other damaged cabling.

3. Since the overall broadcast cabling plant has damage to it and does not align with systems being installed currently, full replacement is recommended. At a minimum, sweep tests

should be conducted of all connection points and connectors or cabling repaired or replaced at deficient locations.

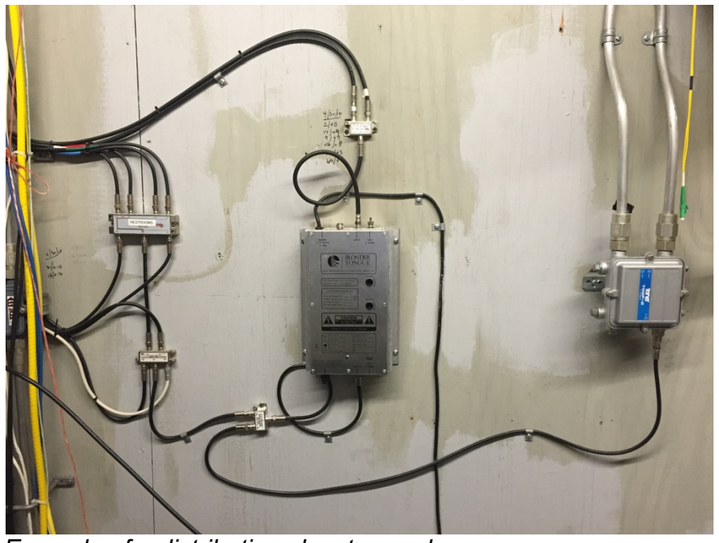
Distributed Television System

The distributed television system provides signals, displays and content to the televisions throughout the facility (suites, concourses, concessions, press area, clubs, etc.).
The system is a trunk and tap coaxial design utilizing LG Pro:Idiom headend transcoding and distribution equipment to encode DirecTV satellite services. In-house encoded signals are also utilized for content.

DirecTV Receivers, ZeeVee and LG Encoders

Distribution equipment is a variety of amplifiers, modulators and splitters from Blonder Tongue and Toner. These are located at the headend and at various distribution closets around the facility. Coaxial cable connects closets or nodes around the facility.

Distribution Equipment at Headend



Example of a distribution closet or node

Televisions

There are over 900 televisions in the facility. These are comprised of:

- A variety of LG sets
- NEC sets at interior concessions
- Sunbrite sets at certain exterior locations

Older Model LG Television

The LG televisions pare with the LG headend components for Pro:idiom encryption purposes.

Exterior Sunbrite Television

Distribution System

Today, HD content distribution in facilities of this size is typically handled via fiber optic cable between closets or nodes. This provides a more stable and reliable transportation method that can handle distances and bandwidth that traditional coaxial cable cannot.

Certain TV locations are experiencing artifacts in some of the content. We believe this is a product that the distance limitations of the coaxial based trunk and tap system have.

Example of TV Location with Artifacts

Example of Same TV Location with Different Artifacts

The LG headend equipment deployed in the system is a discontinued product, no longer supported and should be considered for replacement.

The content, roughly 50 channels, is mostly comprised of DirecTV satellite channels, including local channels. If DirecTV service is interrupted or down from weather or device failure, the channel availability is cut down by 90%. Content from local stations (NBC, CBS, FOX, etc.) could be derived from more reliable off-air antenna instead of through DirecTV.

The ZeeVee encoders add a one second delay to the system and could be updated to a more current product with lower throughput delay.

Televisions

The televisions are manufactured by LG and NEC and varies in deployment dates from 2009 and 2012. The units deployed in 2009 are quickly reaching their end-of-life. and frequent failures can be expected.

Sunbrite televisions have been deployed in exposed outdoor locations. These televisions are out of warranty and will be difficult to support.

The location of some of the concession televisions can cause damage due to the food prep equipment as shown in the photo below.

Concession Location with TV Damage from oil splatter

There are many television displays that are at least 8 years old and nearing or past typically end-of-life cycles. These aging

televisions will exhibit frequent failures and should be considered for replacement.

Recommendations

1. The headend equipment of the system is no longer supported by the manufacturer, so any failures might result in a large system crash. Upgrading the headend equipment is recommended.

2. Television replacement is typically served by a repair or replace as needed on an occurrence basis. The televisions past the typical 8-year life span should be considered for replacement.

3. To extend the life of the system, it is recommended that the system cabling and connectivity be sweep tested and measured to make sure signals are operating within industry parameters.

4. If the coax cable system is to be maintained long term, consideration should be given to upgrading the cable plant to support 850MHz or 1GHz to handle the larger bandwidth of HD content.

5. The current trend for distributed televisions systems is to transport the signal to each television over the building data network. This is known as Internet Protocol television (IPTV) and offers integrated advertising and other possible revenue generating opportunities.

Radio Repeater System

The repeater system is how the operations staff (at times up to 250 people) can quickly and efficiently communicate with each other on a daily basis. It is a critical element during events and day-to-day operations.

System Observations

At 20 years, the system is quite out of date and lacking the features required in a modern system. Parts are also unavailable. Some of the features of new systems:

- At least four channels
- Security features
- Emergency features
- Digital instead of analog
- Expanded antennae coverage

Repeater System in Room 7.56.03

Recommendations

1. Due to age, the radio repeater system should be planned for replacement.

ROOFS

ROOFS

The stadium utilizes a combination of structural steel and precast concrete framing, cast-in-place concrete floors, precast concrete seating bowls, and (primarily) metal roof decks.

Two additional structures, elevator towers, located near the southeast and southwest corners of the stadium, were constructed in/around 2012-13 and appear to utilize precast concrete exterior walls and roof decks.

The roofs are typically divided into many small, separate roof areas, most of which require separate access points. There are only very few roof areas that exceed 1,500 square feet in area, and there are no roof areas larger than an area of 3,500 square feet.

Various low-slope ("flat") roofs on the stadium utilize one of two generic types of roof covering membrane systems: Most of the roofs above concession stands, offices, and other above-ground structures utilize EPDM single-ply membrane roofing/flashing membrane systems that are either fully-adhered to the underlying roof insulation, or ballasted with crushed stone. There are also many roof areas, particularly atop certain concession stands and the new elevator towers, that utilize thermoplastic (PVC or TPO) single-ply membrane roof covering systems, some of which are adhered to the roof insulation and others of which are ballasted with crushed stone. The difference between these membranes is that EPDM is typically black in color and considered thermoset membrane (sheets are joined with adhesive), and PVC and TPO membranes are typically white or light in color and are thermoplastic (sheets are joined by hot-air welding).

Roofs atop the end zone scoreboards and (former) loudspeaker enclosures, (what appears to be) a communications equipment building, and a storage building (south end zone) utilize pre-fabricated pre-finished metal panels that are mechanically attached to the steel roof framing.

There are also several small facade roofs on concession stands that utilize asphalt shingle and/or pre-finished metal panel roofing, and a storage building with an asphalt shingle roof covering system. One structure located in the south end zone, a telecommunications equipment building, is constructed of precast concrete panels with a flat precast concrete slab roof.

The facility also has several canopies above entry gates, elevator doors, exterior concession stands, and exterior equipment, as well as canopies above team entrances to the field. Most canopies utilize conventional canvas that is stretched over a lightweight steel tube frame; however, the canopies above the elevators at the upper concourse level (northeast and northwest corners) utilize glass panels supported by steel framing.

It could not be fully determined why two different generic types of single-ply membrane roof covering systems were being utilized on various roof areas; however, based upon our visual examination of the roofs and purposes of individual spaces beneath the various roof covering systems, it appears that EPDM roof covering systems were more generally utilized above restroom facilities, offices, and some retail/concession areas, and the PVC roof covering systems were primarily utilized on areas of roofs atop concession stands where food products were prepared, presumably since thermoplastic (PVC or TPO) membranes may be more resistant to damage from cooking oils/grease, heat, or steam. There are very few PVC-covered roof areas in the facility that are not food-service-related.

Water is removed from the roofs via a combination of interior roof drains that discharge into the storm water system, or gutters/downspouts that discharge into the storm water system, and/or through-wall scuppers that allow water to cascade down exterior wall faces to the concourse floor (and eventually via floor drains to the storm water system).

It appears that all the existing low-slope roof covering systems, except for roofs atop the two relatively new elevator towers, are from original construction of the building.

According to our conversations with members of the stadium maintenance staff, they have typically experienced 3-4 roof leaks annually that have required repairs by a roofing contractor. We understand that the roof repair work is usually performed by Donelson Roofing Co., Inc. of Mt. Juliet, Tennessee.

During our review of the original construction drawings, we noted references on drawings to "metal sub-roofs" above certain interior spaces on four different levels of the building, including the Service Level (1), Press/Suite Level (3), Upper Suite Level (6), and Upper Concourse Level (7). The purpose of the sub-roofs is to protect interior spaces from moisture infiltration transmitted through a closely-overlying seating bowl.

Staff members informed us that the only known active moisture leakages at this time are associated with the metal sub-roofs above the service level (one location) and in several of the suites. We were informed that they have had substantial leakage from expansion joint covers, and they recently completed a project to repair/replace many expansion joint covers and believe this project has been effective in eliminating numerous moisture leaks into interior spaces. We were informed that the suites were currently undergoing interior repair/renovation work, and they were inaccessible to us at the time of our visit.

During the site visit/roof inspections, we requested any available information/documentation regarding the roof covering systems (design/contract documents, manufacturers'/contractors' warranties, repair/maintenance records, etc.). Apparently, there is no roofing warranty on record, nor is any on-site staff sure which roofing manufacturer(s) supplied the original roofing materials. During the roof inspections, we noted a loose piece of PVC membrane on the roof labeled "Firestone", so it is probable that the roof covering systems are manufactured by Firestone Building Products Company. We have contacted Firestone to request any information they may have regarding the stadium roofs. As of the date this report was submitted, we have not received any reply from Firestone; however, if we learn any new information from them, we will revise/resend our report.

As previously mentioned, we were informed that there are no roofing warranty records on file at the facility, and it is unknown if any warranties were ever issued by a manufacturer. Members of the maintenance staff stated that they have contracted and paid in full for all repair work performed on the roofs since the original construction of the facility.

A breakdown of the various roof covering system types, with the total (approximate) area of each type, is summarized as follows:

Roof Covering System Type	Area (Sq. Ft.)
Single-Ply Membrane (EPDM)	72,940
Single-Ply Membrane (PVC/TPO)	42,429
Metal Panels (various types)	6,059
Metal Sub-roofs	99,811
Asphalt Shingles	1,354
Precast Concrete	192
Canopies (Canvas)	3,522
Canopies (Glass)	1,076
TOTAL ROOF AREA (Sq. Ft.)	**227,383**

Interior Moisture Damage

According to maintenance staff, there has been recurring leakage into several suites, and attempts were recently made to detect and repair the leaks. We understand that the sub-roof gutters above the suites were recently repaired, and so far, this area has not leaked since the repair work was completed. We understand there was a previous leak into the service level, and the leak has been repaired.

We were informed by the maintenance staff that extensive repair/replacement work to expansion joint covers was made throughout the building, this work was recently completed, and this work appears to have eliminated several previously-occurring areas of leakage.

EPDM Single-Ply Membrane Roof Covering Systems

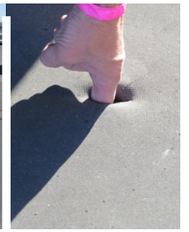
Roofs above most offices, concession stands, restroom facilities, entry gates, etc. utilize EPDM single-ply membrane roof covering systems (photos above and next column). On most areas, the EPDM roof membrane is fully-adhered to the underlying insulation, that is mechanically fastened to the metal roof deck; on some areas (particularly canopy roofs above entry gates), the EPDM roof membrane and insulation are loose-laid atop the metal deck, and ballasted with crushed stone.

Roofs atop most concession stands, restrooms, offices, mechanical rooms, and other interior areas of the building utilize EPDM single-ply membrane roof covering systems. These roofs appear to utilize a 0.060”-thick EPDM (synthetic rubber) roofing/flashing membrane. On most of these areas, the EPDM roofing/flashing membrane is fully-adhered (with adhesive) to the underlying roof insulation that is mechanically fastened to the metal roof deck. There are, however, several roof areas (particularly canopy roofs above stadium entry gates/ ticket collection areas) on which the EPDM membrane is loose-laid atop one (or more) layers of rigid roof insulation that is also loose-laid atop the metal roof deck, and the entire roof covering assembly is ballasted (held in place) with washed river stone.

Based upon our visual examination of the existing EPDM single-ply membrane roofs, the general, overall condition of the existing EPDM single-ply membrane roof covering systems is fair-to-very poor. Compared with the existing PVC membrane roof coverings on the facility, the EPDM membrane systems appear to be more severely deteriorated, deficient, and nearing the end of their useful service life. The general condition of various EPDM roof covering systems also varies, depending upon exposure of the roof covering system to the elements (rain/snow/ice, UV, freezing, etc.). Many of the existing roofs on this facility are at least partially protected, and some areas are nearly fully protected from the elements by overlying seating bowl areas, while other areas are fully exposed to the elements.

Throughout the facility, we noted and photo-documented numerous areas of roofs where the EPDM roof membrane is compromised or has sustained damage, with several various causes. In many areas, very heavy equipment (particularly electrical transformers) is installed on wood sleepers atop the roof surface. Some of the wood sleepers/supports are in direct contact with the thin, vulnerable roof membrane, and as a result, the weight of the equipment may press the sleepers into the membrane (and the typical relatively low-density insulation beneath the membrane) to the extent that it could puncture the membrane and cause leakage/damage. Protection of the roof membrane beneath the surface was inconsistent; in some areas, a sheet of membrane was placed beneath rooftop equipment, but in some other areas, there was no protection. In a few places, the rooftop equipment had shifted or been moved, and was no longer fully protecting the roof membrane. During the roof inspections, we noted one blister in the EPDM roof membrane.

Several heavy electrical transformers, as well as other rooftop equipment are installed on wood sleepers, some of which rest directly on the (unprotected) EPDM roof membrane (above, and below left). The weight of such equipment can cause damage to the roof membrane, and may potentially puncture the thin membrane, causing leakage/damage. A blister in the EPDM roof membrane was noted on one upper roof area (below center). Blisters occur when air becomes trapped between the EPDM roof membrane and underlying roof insulation. An open hole was also noted on an upper roof area (below right). This hole is non-watertight and appears to have resulted from a heavy object falling onto the roof surface, or from damage caused by workmen on the roof.



During our inspection, we noted a hole of approximately 1½ inches in diameter through the EPDM roof membrane. The puncture appears to have been caused either by falling debris or possibly by workmen on the roof. The puncture is wide open to moisture infiltration/damage.

Fragments of concrete were found lying on the roof surface in many areas (photos above and at top left of next column), having spalled and fallen onto the roof from the underside of precast concrete sections of the upper seating bowl (photo at top right of next column). In some areas, the concrete fragments may have fallen up to 40 feet directly onto the thin, vulnerable EPDM roof membrane. The jagged/sharp-edged concrete fragments may damage/puncture the roof membrane, causing leakage/moisture damage. This condition was noted in several areas around the stadium beneath the upper seating bowl.


During our inspection, we also noted several areas where fragments of concrete, from the precast seating bowl structures above the roofs, are spalled and falling directly onto the unprotected roof membrane, potentially damaging/puncturing the roof membrane. We noted more than 25 such fragments of spalled/ fallen concrete throughout the facility.


Several roof areas utilize EPDM single-ply membrane roof covering systems on which the roof membrane and underlying roof insulation are loose-laid atop the metal roof deck and ballasted with washed river stone (above). On only a couple of these areas, a ply of polyester filter fabric is installed atop the EPDM roof membrane beneath the stone ballast (above left). The fabric helps protect the roof membrane from damage/abrasion by the stone ballast and fines in the stone. In several places, equipment is installed directly atop the stone ballast (above right); additional weight atop the stone may cause damage to the underlying EPDM roof membrane.

There are some inconsistencies in the canopy roofs above the entry gates as well as other areas with the ballasted roof covering systems. On a few areas, a ply of polyester filter fabric is installed atop the EPDM roof membrane, beneath the crushed stone ballast; the filter fabric is generally effective to help protect the roof membrane from damages caused by sharp edges of the stone ballast and/or abrasion by fines in the stone.

There are numerous areas with excess accumulated dirt/debris on the roof surfaces. Debris on the roofs, if stepped upon, may potentially damage/puncture the thin EPDM roof membrane, causing leakage and moisture damage. We noted at least one instance of a chair with thin metal legs sitting directly on the EPDM roof membrane, and the chair legs may easily puncture the membrane if a heavy person sits on the chair as it is.

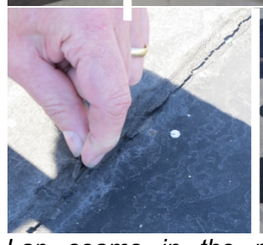
Loose dirt/debris was also noted in the drainage elements in several areas; dirt/silt/debris can potentially clog drainage elements and/or storm drainage plumbing, and may result in retention of water on the roofs. It generally appears as if the roofs have not been thoroughly cleaned for at least several years.





Debris is accumulated on roof surfaces in many areas throughout the facility. Debris on the roofs may cause damage to the EPDM roof membrane (particularly if sharp-edged debris or broken glass is stepped upon), and dirt/silt/debris may clog roof drains and/or storm drainage plumbing (photos above). Pieces of broken furniture on the roofs can also cause cuts, punctures, or other damage to the roof membrane, causing leakage (photos below).



Lap seams in the roofing/flashing membrane are failing, delaminating, and non-watertight in many places throughout the facility. This condition was more common in areas with more exposure to the elements. It appears that adhesives utilized in the seams are badly deteriorated, and many patches and sections of flashing membrane are delaminating, particularly at outside corners in the membrane.

Membrane Seam Failure: Throughout the facility, many lap seams in the roofing/flashing membrane are failing, and more frequently on roof areas with direct exposure to the elements. Dozens of lap seams are delaminated, particularly at outside corners of patches/flashing membrane; many corners are upturned, allowing moisture infiltration into the seam. Moisture enters beneath open membrane seams and freezes/expands, further delaminating the seam until, eventually, the seam will leak.

The existing EPDM-covered roof covering systems appear to have been repaired in very few locations. Most of the repairs appear to have been properly installed and tied-into the existing EPDM roofing/flashing membrane (above left and center); however, one poorly installed patch that was noted does not appear to be properly tied-into the existing membrane system, and is dependent upon sealant for water tightness (above right). The sealant utilized around the repair/patch is poorly installed.

Membrane Repairs: There are very few visible repairs/patches on the existing EPDM membrane throughout the facility. Generally, the membrane patches/repairs that we noted appear be properly installed, functional, and watertight; however, we saw one patch that was poorly installed, and is dependent upon sealant for watertightness.

It should be noted, as mentioned above, there are numerous failing seams in the existing EPDM roofing/flashing membrane throughout the EPDM-covered roofs, most of which could be patched/repaired to restore the roof covering system to a watertight condition and help prolong the service life of the roof covering system. It generally appears that the roofs and drainage elements have not been cleaned in recent years, and roof repair work has generally been aimed at finding and repairing known leaks that cause visible interior moisture damage.

Water is removed from most low-slope roof areas via interior roof drains (above left) or open-cut through-wall scuppers (2nd photo above). Many areas also utilize open-cut overflow scuppers (3rd photo above) functioning as "secondary" (overflow) drainage elements. The interior roof drains are connected to the storm drainage system, but most scuppers allow water to simply cascade down the exterior face of CMU walls (photos below). As a result, there are moisture stains on the CMU walls beneath many through-wall scuppers (photos far below). A few metal scupper liners are badly rusted (photos above right and immediately below); leakage/damage may occur if a scupper liner were to become rusted completely through. Many scupper openings are poorly located, being placed nearly or directly above wall-mounted electrical boxes and/or light fixtures (3rd and 4th photos far below). Water effluent from the scuppers could damage the electrical system and/or cause electrical hazards.

Drainage Elements: Roof drainage on this facility is rather simplistic; some roof areas utilize interior roof drains that are connected to the storm drainage system. The roof drains appear to be in fair condition; however, a few roof drains are badly clogged with silt/debris, mostly due to the lack of periodic cleaning/maintenance of the roofs and drainage elements. Clogged drainage elements can cause water retention on the roofs, often resulting in shortened service life.

Most of the roof areas (particularly the areas that extend beneath overlying seating sections) drain via through-wall scuppers. More typically, the scuppers are "open-cut" (open on top)" in the CMU walls, most scuppers lack conductor heads/ downspouts to control/direct drainage, and water simply cascades down the face of the masonry wall. There are numerous scuppers with staining/discoloration on the walls beneath the scuppers. There are also a few metal scupper liners/flashings that are badly rusted and may potentially leak if the metal scupper liner were to become rusted completely through.

There are also "open-cut" overflow scuppers (secondary drainage) that are elevated higher above the roof surface than the primary drainage scuppers. Overflow drains/scuppers

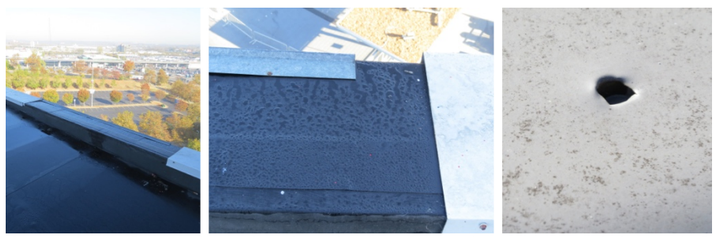
function as “back-up” drainage elements, should the “primary” drains become clogged or otherwise dysfunctional.

Several electrical boxes and/or lighting fixtures are installed on the CMU directly beneath open through-wall scuppers, potentially causing issues with the electrical and/or premature deterioration of electrical equipment/wiring.

Perimeter Flashing Conditions: Most of the roof perimeters utilize elevated parapets with sheet metal copings. The metal copings are generally intact, but one missing section was noted. Some joints in the metal copings do not appear to be watertight; however, the missing section of coping showed that the EPDM membrane flashings are extended up and across the top of the parapet. One instance was noted of a hole punched through the metal coping and underlying membrane flashing.

A few junctions between metal copings and concrete walls or columns are dependent upon caulk/sealant for water tightness. The sealant joints along some junctions are cracked/deteriorated, and do not appear to be watertight.

Perimeters of the EPDM membrane roof atop the video camera booth, at the very top of the upper seating bowl, utilize metal edge flashings along the flush roof edges. The EPDM membrane strip-flashings along the edge flashings are poorly installed and do not appear to be watertight.



A section of metal coping is missing from the parapet (above left and center); it should be noted that the EPDM flashing membrane is (properly) extended atop the parapet, helping to protect the parapet structure from moisture infiltration. A joint between two sections of metal edge flashings is poorly flashed with membrane and does not appear to be watertight (photo immediately below left). Expansion joints that intersect roofs are flashed with pre-manufactured EPDM/metal expansion joint flashings (photo immediately below right). Junctions between parapets and vertical walls/columns are flashed with EPDM membrane that is extended above the metal coping and terminated with a metal termination bar. The existing sealant along some junctions between parapets and walls/columns is deteriorated and does not appear to be watertight (photos at bottom).

Expansion joints transverse the building at all levels, and they also pass along perimeters of several roofs at various levels. Expansion joints that penetrate roofs are flashed with pre-manufactured expansion joint covers that utilize flexible EPDM membrane with integral sheet metal flanges. The expansion joint covers are typically installed atop roof curbs, and in some areas, one flange of the expansion joint cover is extended vertically up a wall with a metal counterflashing. The pre-manufactured expansion joint covers generally appear to be in fair condition and functional. Perpendicular junctions between pre-manufactured expansion joints and concrete walls are typically flashed with an extra ply of EPDM flashing membrane.

Flashings for numerous small roof penetrations (pipes, vent stacks, conduits, equipment supports, etc.) are in very poor/failing condition, and many are non-watertight. Some small roof penetrations are flashed with pre-manufactured EPDM flashing boots, while others are flashed with a “field-wrap” of EPDM sheet membrane. Adhesives, utilized to adhere the membrane flashings to the EPDM roof membrane, are failing, rendering many membrane flashings non-watertight.

Roof Penetrations/Flashings: Most small items penetrating the roof (vent stacks, pipes, conduits, etc.) are flashed with pre-manufactured EPDM flashing boots that are adhered to the EPDM roof membrane with adhesive. The adhesive utilized to secure many such flashing boots is failing, and many of the EPDM flashing boots are detached and non-watertight. It appears that none of the EPDM flashing boots have ever been repaired or replaced since original construction.

Several penetrations for pipes/conduits appear to have been installed more recently. Some of the penetrations are flashed with a "field-wrap" of EPDM membrane (which is an acceptable method of flashing penetrations); however, the flashing membrane lacks proper termination along the top edge (such as elastomeric sealant). One roof penetration for a new non-watertight flexible electrical conduit is simply caulked with silicone sealant; this type of detail does not meet minimum industry standards, and is not watertight.

EPDM membrane patches, generally applied over corners of roofing/flashing membrane, are delaminated in many places (top left), potentially allowing moisture infiltration into the roof covering system. A few roof penetrations were noted that are not properly flashed in accordance with industry standards (top center and right). These penetrations have only a poorly-installed application of elastomeric sealant; this type of detail does not meet minimum industry standards, and these penetrations do not appear to be watertight. Several roof penetrations for steel supports, pipes, and conduits are flashed with EPDM membrane; however, the membrane on some penetrations is not properly extended up onto the penetration min. 8 inches (photo immediately above left), as compared with other pipes that appear to be properly flashed (photo immediately above center). Another roof penetration for a conduit appears to be properly flashed (photo immediately above right); however, the unused conduit is open on top, potentially allowing moisture into the electrical system. Another conduit exiting the roof is missing a cover on the LB (angle) fitting (below left). Open pitch pocket flashings are utilized for flashing some irregularly-shaped/angled roof penetrations (below center and right). The filler material in many open pitch pocket flashings on this project is shrunken, cracked/split/deteriorated, retains water on top, and in some pitch pockets, does not appear to be watertight. Pitch pocket flashings typically require regular maintenance/refilling.

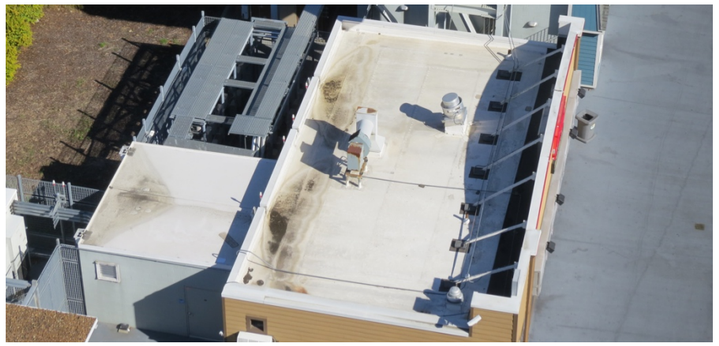
It appears that additional roof penetrations and structural members were recently constructed on the eight canopy roofs above entry gates (end zones) to display vehicles atop the roofs. The square steel tube supports are flashed with EPDM membrane, but the membrane flashings are not properly terminated along the top edge. Some roof penetrations (such as electrical conduits) on other roof areas are also more recently installed, and EPDM flashing membrane surrounding such penetrations is not properly terminated at the top. Current industry standards generally require a metal draw band and sealant to terminate the flashing membrane around the top edge.

Roof curbs for mechanical equipment are flashed with EPDM membrane (sheet membrane) that is also adhered (with adhesive) atop the roof membrane, and the adhesives are failing in many areas. Edges of EPDM sheet membrane flashings are loose/delaminated in many areas, allowing moisture infiltration and potentially larger areas of damage.

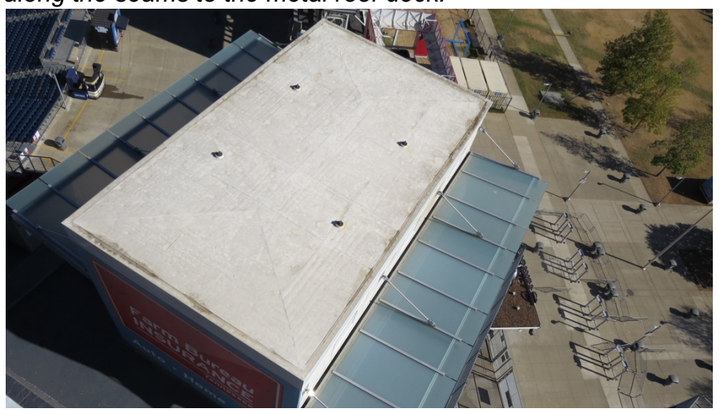
There are several irregularly-shaped and/or angled roof penetrations, particularly on some end-zone concession stands that are flashed with open pitch pockets. The filler material in many of these pitch pockets is shrunken (retaining water on top), and/or cracked/split/deteriorated, and some are non-watertight. In our opinion, open pitch pocket flashings are not the best design choices for roof penetrations; while they are not always avoidable, when they are utilized, open pitch pockets require regular inspection/repair/refilling.

PVC Single-Ply Membrane Roof Covering Systems

Based upon our visual examinations of the roofs and review of the original construction drawings, it appears that the roofs utilize a single-ply 60-mil-thick, reinforced, white (surface) polyvinyl chloride ("PVC") roofing/flashing membrane system that is installed atop (one or more layers of) rigid roof insulation (most likely polyisocyanurate) that is mechanically fastened to the metal roof deck. The single-ply membrane systems on the two elevator towers, constructed in/around 2012, may utilize TPO (thermopolyolefin) roofing/flashing membrane systems. TPO membrane is very similar to reinforced PVC membrane in appearance and installation method, and the use of TPO membrane is much more common in recent years.



Several roof areas utilize reinforced PVC single-ply membrane roof covering systems (photos above, below, and at top of next column). A few more-recently-constructed roofs may utilize TPO membrane systems (similar to PVC). On most areas, the PVC/TPO single-ply membrane is fully-adhered to the underlying roof insulation (photos at bottom of center column, above, and immediately below), but on some other roof areas, the membrane (and insulation) are loose-laid atop the roof deck and ballasted with crushed stone (photo at bottom). Also, on a few roof areas, the roof membrane is mechanically fastened along the seams to the metal roof deck.



There are three different methods of PVC/TPO roof membrane installation/securement utilized on the stadium, as described below:

1. *Fully-Adhered*: The roof membrane is adhered with adhesive to the underlying roof insulation assembly; the insulation assembly is mechanically-attached to the metal roof deck.

2. *Mechanically Attached*: The roof membrane is loose-laid atop the (mechanically-attached) insulation assembly, and the membrane is mechanically fastened (with screws and plates or with screws and a continuous strip of metal) through the insulation assembly to the metal roof deck along lap seams in the membrane. The fasteners/plates and membrane lap are covered-over by the adjacent sheet of membrane.

3. *Loose-Laid and Ballasted*: The insulation assembly and roof membrane are loose-laid atop the metal roof deck, and then ballasted (held in place) with stone ballast.

Lap seams and membrane flashings in the PVC (and TPO) membrane system are typically overlapped and heat-welded, utilizing super-heated air. PVC (and TPO) membranes are typically white (or light) in color on the surface, giving the membrane enhanced reflectivity from UV degradation and/or heat gain over typical black-surfaced EPDM membrane. In our opinion, PVC/TPO roof membranes are generally more impervious to damage from chemicals (and particularly, to cooking oil/grease and heat/steam) than EPDM membrane. Also, the heat-welded seams utilized in PVC/TPO membranes are generally stronger against delamination/shear/failure than the adhesive-based seams utilized in EPDM membranes, particularly since heat-welded seams do not require adhesives.

Condition: The general, overall condition of the existing PVC/TPO single-ply membrane roof covering systems ranges from fair-to-poor. When compared to the EPDM roof covering systems on the facility, the PVC/TPO roof coverings generally appear to be in a considerably better and more serviceable condition, with much fewer visible deficiencies, seam failures, and/or other non-watertight conditions. There were, however, several minor deficiencies noted that, in our opinion, require attention, as described below:

Roof Membrane Damage: There are several areas on the PVC/TPO-covered roofs where heavy rooftop equipment is installed atop wood sleepers that rest directly on the (unprotected) surface of the roof membrane. The weight of the heavy equipment can potentially compress the wood sleepers into the membrane and underlying insulation, causing damage to the roof membrane, and possible puncture/leakage.

Several large/heavy pieces of rooftop electrical/mechanical equipment are installed atop wood sleepers (above), and the wood sleepers (improperly) rest directly on the unprotected surface of the roof membrane. The weight of heavy equipment can potentially compress sharp edges of the wood sleepers into/through the single-ply roof membrane, causing damage/leakage. Fragments of spalled concrete have fallen from overlying seating bowl sections onto the roof membrane,

potentially causing damage/leakage (below left). Several places were noted with spalled/cracked/missing concrete from the seating bowl structures (below center/right).

There are several roof areas with debris, fallen fragments of concrete (spalled from the overlying precast concrete seating bowl structure), and/or deposits of grease/oil (from exhaust fans/vents from food preparation areas below) on the roof surfaces. Any of such items may potentially damage the roof membrane, and sharp-edged debris/concrete fragments may potentially cause a puncture in the roof membrane if they were to be stepped upon.

A few small areas of roof were also noted with evidence of water retained on the roof surface. Although all such areas were dry at the time of our inspection, water stains and silting on the roof surface were indicators of retained water. Water retention on the roofing/flashing membrane may contribute to accelerated degradation of the membrane, and could potentially result in more severe damage should a roof leak occur in an area of ponded (retained) water.

One open/non-watertight lap seam was noted in an area of flashing membrane— the only such incident noted on the PVC/TPO roofs facility-wide. In contrast, dozens of similar conditions were noted on the existing EPDM roof covering systems.

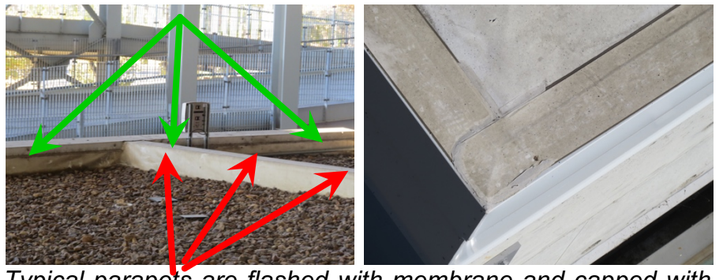
Debris and grease/oil deposited from rooftop exhaust fans/vents onto the roof surface can cause hazardous conditions to persons walking/working on the roof, and may potentially cause damage to the single-ply roof membrane (four photos, above). Some small areas of roof appear to retain ("pond") water on the roof surface (photos below left and far below left). Although the roofs were dry at the time of our inspection, water stains/silt deposits on roof surfaces are an indication of areas that retain water. At least one open/non-watertight lap seam was noted on the PVC/TPO-covered roof areas (below right). This was the only such condition noted during our inspection of the roofs.

<u>Roofing/Flashing Membrane Repairs</u>: Generally, there appear to be very few areas of the PVC roofing/flashing membrane that have sustained repairs. There were, however, some roof repairs made with membrane that does not match the original PVC/TPO membrane system; several repairs are made with (what appears to be) self-adhering EPDM membrane, rather than with matching membrane that is heat-welded atop the original membrane. In our opinion, this type of repair cannot be expected to perform for the duration of the existing PVC/TPO membrane roof covering system, and may require additional repairs with time.

Several patches/repairs to the existing PVC/TPO roof covering systems are (improperly) made utilizing black self-adhering membrane (presumably EPDM), rather than membrane that matches the existing/adjacent membrane, heat-welded to the existing roof membrane (above). A roof drain appears to have been repaired with some type of sealant (below left); however, the sealant is poorly installed and does not appear to be compatible with the roof membrane, nor does it form a reliable bond with the membrane. This repair does not appear to be watertight. A through-wall overflow scupper appears to be blocked by signage installed on the exterior wall (below right). Another through-wall scupper is damaged/non-watertight (bottom left), and may allow moisture infiltration into the masonry wall system. Metal conductor heads are utilized on some scuppers where water drains onto a lower roof area (bottom right).

Drainage Elements: Drainage elements on the PVC/TPO-membrane-covered roofs are nearly identical to those on the EPDM-membrane-covered roof areas, and utilize a combination of interior roof drains that are connected to the storm drainage plumbing system and "open-cut" through-wall scuppers/overflow scuppers that allow water to cascade down the face of CMU exterior walls. There are a couple small roof areas on end-zone concession stands where through-walls scuppers are connected to conductor heads/downspouts that discharge onto lower roof areas. Generally, the drainage elements are in the same condition as those on the EPDM roofs.

One metal through-wall scupper liner was noted as damaged/non-watertight. We also noted one interior roof drain that appears to have either been added sometime later than original construction, or was replaced; the roof drain is much smaller than those typically utilized on the project. The PVC membrane drain flashing membrane is covered-over with some type of sealant material. The sealant does not appear to have formed a reliable bond with the underlying membrane, is cracked/delaminated in areas, and does not appear to be watertight.



Typical parapets are flashed with membrane and capped with metal copings (green arrows, above left); however, a few areas were noted on which parapets between roof areas are flashed only with membrane, and lack metal copings (red arrows, above left). Flush edges on the elevator tower roofs are flashed with metal edge flashings that are strip-flashed with membrane (above right). The membrane strip flashings utilize self-adhering membrane, rather than heat-welded membrane. Walls and columns are flashed with membrane, and the membrane is terminated with a metal termination bar and elastomeric sealant (below left). Expansion joints that traverse roofs are flashed with pre-manufactured EPDM/metal expansion joint flashings. Depending upon the configuration, the expansion joints are flashed with either a curb-to-curb expansion joint flashing (below center), or a curb-to-wall flashing (below right).

Perimeter Flashing Conditions: Typical parapets along roof perimeters are flashed with metal copings. It can only be assumed that the PVC/TPO flashing membrane is extended up the full height and across the top of parapets (as was noted on EPDM-covered roofs). The metal copings appear to generally be in fair condition, and no damage was noted.

There are a few sections of parapets between roof areas that are flashed only with PVC membrane. These sections of membrane-covered parapets are limited only to roof areas atop main concourse concession stands, and all such areas are well protected from the elements by the overlying upper seating bowl.

Flush edge roof perimeters (new elevator tower roofs) utilize pre-finished metal edge flashings that are strip-flashed with membrane. It was noted that the membrane strip flashings on these two roof areas utilize self-adhering membrane, rather than heat-welded membrane. Most manufacturers of TPO membrane also provide TPO-clad metal for such applications so that membrane flashings that meet at the metal (such as strip flashings) can be heat-welded into place; however, this type of metal and flashing detail was not utilized on this project.

Walls and other vertical surfaces (columns, etc.) are typically flashed with membrane that is extended vertically up the face of the wall/surface, and the flashing membrane is terminated with a metal termination bar and elastomeric sealant along the top edge of the flashing membrane.

Expansion joints that traverse roofs are typically flashed with pre-manufactured curb-to-curb or curb-to-wall expansion joint flashings that utilize flexible EPDM membrane with sheet metal curb or wall flanges along both edges. The existing expansion joint flashings appear to generally be in fair condition.

One very unusual perimeter flashing condition was noted on the two Logan's Road House concession stands in the north and south end zones. It appears that when the stands were retro-fitted/converted to Logan's (in/around 2010), taller parapets were constructed along the storefronts of the stands, and at that time, the parapets were re-flashed with single-ply membrane. For some reason, sheets of black EPDM membrane were incorporated into the white (PVC or TPO) roof covering system. The purpose of this type of flashing detail is unknown. Combining different membrane materials into one roof covering system in this manner does not meet minimum industry standards; it would not comply with any roof covering system manufacturers' specifications/recommendations, nor would it be acceptable for issuance of a manufacturer's warranty for the roof covering system.

Parapets on the two end-zone Logan's Road House concession stands are (improperly) flashed utilizing black EPDM flashing membrane, rather than white membrane to match the existing roof covering system.

Roof Penetrations/Flashings: Curbs for rooftop equipment are typically flashed with PVC/TPO membrane that is heat-welded into the roof covering system. Smaller penetrations (pipes, conduits, equipment supports, etc.) are typically flashed with either a field-wrap of membrane (heat-welded to the roof membrane), or pre-manufactured roof flashing boots. During our inspection of the roofs, we noted several pre-manufactured flashing boots that are poorly installed, and at least one that is completely failing and detached from the roof membrane. Sealants on many flashing boots are poorly installed, and several do not appear to be watertight.

There are several electrical conduits that penetrate the roof and are flashed with pre-manufactured flashing boots; however, the conduits are unused, not capped, and wide open to moisture infiltration into the conduits.

We noted one instance where a flexible electrical conduit (more recently-installed) is simply inserted through a hole in the roof membrane and caulked with silicone sealant; this condition does not meet minimum industry standards, and can be expected to fail in a relatively short length of time.

Numerous small roof penetrations, particularly on the roofs atop the end-zone Logan's Road House stands and the new elevator tower roofs, are flashed with open pitch pockets. The filler material in most of the pitch pockets is badly shrunken, causing retention of water atop the pitch pockets. Several pitch pockets do not appear to be watertight. Open pitch pocket flashings typically require regular inspection/maintenance. Also, the pitch pockets on the Logan's Road House roofs (end zones) are (improperly) strip-flashed with black self-adhering EPDM membrane, rather than membrane to match the original roof covering system.

A steel rooftop mechanical unit support frame is badly rusted and needs to be properly cleaned/prepared/primed/painted.

Many small roof penetrations are flashed with pre-manufactured flashing boots that are (supposedly) heat-welded/sealed to the roof membrane (above); however, some flashing boots are poorly installed (above left), and one was noted as totally failing and non-watertight (above center and right). Several unused electrical conduits penetrate the roofs that are not properly capped and allow moisture infiltration (below left). A flexible electrical conduit penetrates the roof and is simply (improperly) caulked with sealant, rather than being properly flashed (below center); this roof penetration does not appear to be watertight. The filler materials in many open pitch pockets is poorly installed and shrunken, causing water retention on top (photos below right and bottom left). A steel support frame for a rooftop mechanical unit is badly rusted (bottom right) and needs to be properly cleaned/prepared/primed/painted.

Metal Sub-Roofs

As previously mentioned, the original construction drawings indicate metal "sub-roofs" at four different levels on the facility; however, per our conversations with the maintenance staff regarding the sub-roofs, we understand that the sub-roofs are installed beneath overlying floors or seating bowl areas, totally enclosed, and generally inaccessible for viewing/inspection. Therefore, we were unable to visually inspect any areas of the sub-roofs, and the information herein is based upon our review of the project drawings and verbal information as shared by the stadium maintenance staff.

Based upon our conversations with members of the maintenance staff regarding the construction, history, performance, and/or deficiencies associated with the sub-roofs, we understand that the sub-roofs are fabricated of sheet metal and sloped to metal gutters that discharge into the storm drainage system.

We also understand that the sub-roofs and associated metal gutters have a long history of leakage, particularly sub-roofs above the suites at the club level, and most of the leaks are associated with the sub-roof gutters/drainage outlets. We

further understand that staff has installed plastic sheeting and buckets in strategic locations above the suspended ceilings in several suites to help control/contain the leakage and avoid further interior moisture damage.

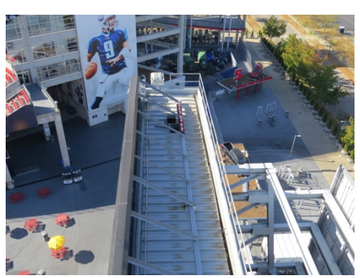
We learned from the maintenance staff that repairs were recently made to the sub-roof gutter system in one area, and to access the sub-roof/gutter to perform the repairs, it became necessary to break through a CMU wall.

Metal Roof Covering Systems

Several different types of metal roof covering systems are utilized throughout the stadium, and all such roofs are relatively small in area. The metal roof covering systems typically utilize pre-finished, pre-manufactured metal panels that are screw-fastened or secured to the underlying roof framing with metal clips beneath seams.

Scoreboard & Loudspeaker Enclosure Roofs: The premanufactured metal panel roof covering systems atop the scoreboards/ loudspeaker enclosures appear to have been repainted at some time since original construction; however, the paint/finish on the metal roofing is generally in poor condition, and the metal roofs are rusted in many areas. There are unused materials and debris accumulated on the roofs and gutters, potentially clogging the gutters/downspouts and/or damaging the paint/finish on the metal roof covering systems.

Many roof penetration flashings and fastener heads are covered-over with elastomeric sealant. This type of repair is temporary, at best, requiring regular maintenance/replacement.



Roofs atop the scoreboards and loudspeaker enclosures utilize pre-manufactured pre-finished metal roofing panels that are screw-fastened to the steel roof framing. The metal roofs appear to have been repainted at some time since original construction; however, the metal panels are surface-rusted throughout, and badly rusted in some areas (photos top right and immediately above left). Abandoned/unused materials are stored on roof surfaces, and trash/debris is accumulated on the roofs in some areas (photos immediately above right and immediately below left). Gutters are also clogged with trash and debris (photos immediately below right and bottom left); clogged gutters can result in water retained on roof surfaces and potential leakage. Fastener heads and some roof flashings are coated with elastomeric sealant (photos immediately below right and at bottom). The sealant is poorly installed and cannot be expected to perform over a long period.

Storefront Mansard Roofs: There are several small mansard roofs on storefronts and end-zone concession stands/restroom buildings that utilize a combination of metal roofing and asphalt shingle roofing. These roofs are generally architectural in nature; however, they do function to protect the exterior building envelope from the elements. The metal roofs generally appear to be in good condition.

Mansard roofs on end-zone concession stand storefronts utilize pre-finished standing-seam metal panels (above); the metal roofs appear to generally be in good condition. Four pre-manufactured buildings utilize pre-finished metal roof panels (below); these roofs appear to be in good condition. A pre-manufactured storage shed, placed on overhead staging (north end zone) also utilizes a pre-manufactured/pre-finished metal roof (bottom), and the shed/roof generally appears to be in good condition.




Pre-Manufactured Buildings/Roofs: There are three small pre-manufactured metal buildings on-site; two buildings are utilized as retail/ novelty shops, and one appears to be utilized for telecom equipment/operations. The pre-manufactured/pre-finished metal panel roof covering systems on these buildings generally appear to be in good condition.

Storage Shed: A pre-manufactured storage shed is installed on an overhead stage area in the north end zone. The shed utilizes a pre-manufactured/pre-finished metal panel roof covering system. The shed appears to be relatively new, and the metal roof covering system appears to be in good condition.

Asphalt Shingle Roof Covering Systems

Only very few roofs on this facility utilize asphalt shingle roof covering systems. All such areas utilize architectural (laminated) asphalt/fiberglass shingles that are nailed, through a felt underlayment, to the roof deck.



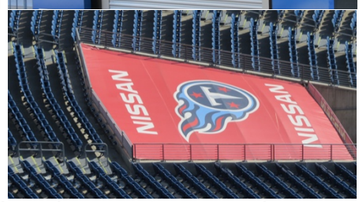

Mansard roofs on end-zone concession stands and restroom building storefronts utilize laminated asphalt/fiberglass roofing shingles that are nailed, through a felt underlayment, to the roof deck (photos above and at top). A small pre-manufactured storage shed, near Entrance Gate 10, also utilizes a laminated asphalt/fiberglass shingle roof covering system (below left). All of the shingle roofs generally appear to be in good condition. A small radio/telecom equipment building in the north end zone utilizes precast concrete walls and roof slab (below right). The concrete roof slab is simply painted and does not utilize any other type of roof covering system. The concrete roof slab and paint/coating appear to be in good condition.

Storefront Mansard Roofs: As previously mentioned, there are several mansard roofs on the end-zone concession stands/restroom buildings that utilize a combination of metal roofing and asphalt shingle roofing. The asphalt shingle roof covering systems generally appear to be in good condition.

Storage Shed: A pre-manufactured storage shed is installed near the southeast entrance to the facility (Entrance No. 10). The shed appears to be relatively new, and the asphalt shingle roof covering system appears to be in good condition.

Pre-Cast Concrete Building/Roof

A small building in the north end zone appears to be utilized for radio/telecom equipment. The building, including the roof, is constructed of pre-cast concrete. The concrete slab roof is simply painted, and does not utilize any other type of roof covering system. The slab/roof appears to generally be in good condition.

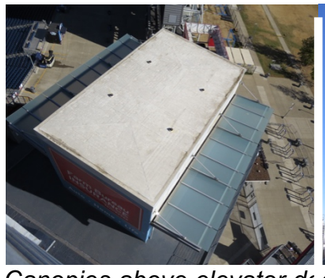


There are several small canopies above entrances, elevators, retail counters, ATM machines, etc., that utilize conventional canvas and/or plasticized canvas, which is stretched over and secured to a lightweight metal frame (photos above/below). The canvas canopies generally appear to be in fair-to-good condition.

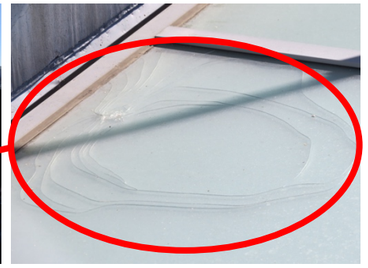

Canopies

There are numerous small canopies around the stadium, above entrances, elevators, team field entries, retail counters, ATM machines, etc.

Canvas Canopies: Most of the canopies on the facility are of this type; these canopies utilize canvas (or plasticized canvas) which is stretched over, and secured to, lightweight metal framing. These canopies vary in size and age, and they generally appear to be in fair-to-good condition. There are two small canopies on the sidelines (along field perimeters) where the canvas canopy was covered by fabric tarps, and these canopies were not visible for inspection.



Canopies above elevator doors, at upper concourse level (new elevator towers) utilize translucent laminated (safety) glass panels that are supported/secured by steel framing (photos above/below). One glass panel is badly cracked, and may pose a safety hazard if the panel were to collapse.

Glass Canopies: There are 4 canopies above elevator doors at the Upper Concourse level (recently-constructed elevator towers). Each of these canopies utilizes a series of translucent, laminated glass panels that are supported/secured on steel framing. These canopies also incorporate metal built-in gutters and downspouts that discharge into the storm drainage system. These canopies appear to generally be in good condition, except that one glass panel was noted to be badly cracked; this cracked glass panel appears to pose a potential safety hazard if the panel were to collapse.

Recommendations

Long-Term Recommendations

1. It is our opinion that all EPDM single-ply roof covering systems in areas exposed to the elements will require complete removal and replacement within the next year, and PVC/TPO roof covering systems and EPDM membrane systems in more protected areas will require complete removal and replacement within the next 6-7 years.

2. When the existing roof covering systems are replaced, we recommend complete removal of all existing roof coverings (including insulation) down to the metal roof deck; repairs be made to the metal roof deck as necessary; and placement of a new, redesigned roof covering system, including a roof insulation assembly (mechanically fastened to the metal roof deck) and a new white, thermoplastic (PVC or TPO) single-ply membrane roof covering system that is fully-adhered to the roof insulation/ substrate. The white membrane surface will help enhance reflectivity of the roof surface and translate into some energy savings, particularly with cooling interior areas of the building during warmer seasons. New thermoplastic roof covering systems are available with up to a 30-year manufacturer's no-dollar-limit warranty of workmanship and materials. Thermoplastic membrane seams are typically heat-welded, which produces a much stronger bond and longer-lasting seam than can be achieved with adhesives.

   The replacement of the existing roof covering systems on this project may be somewhat costlier, mostly because the roofs are divided into many small areas, making the project more detail/labor-intensive.

3. Phasing the roof covering system replacement work project-wide into two (or more) construction phases may be easier (by spreading the work over two or more budget years); we believe that significant cost savings can be realized by removing/replacing all of the existing single-ply roof covering systems under one contract.

4. When the roof covering systems are replaced, we recommend that certain other design improvements be considered, including (but not limited to) the following:

   a. Making any necessary design revisions/renovations to rooftop mechanical equipment and associated duct work, supports, etc., particularly installing above-roof supports or some other means of protecting the roof surfaces from damage by heavy rooftop equipment.

   b. Redesigning and replacing all expansion joint covers, utilizing shop-fabricated metal flashings, or with roof membrane covers acceptable and covered under the roofing manufacturer's warranty.

   c. Continue to Inspect and repair precast concrete seating bowl structures above the roofs to help prevent spalling and concrete fragments falling onto the roofs.

   d. Closely monitoring any roof covering system repair/replacement work that takes place on the project to help ensure the best qualities of workmanship and materials, and to enhance longevity of the roofing/flashing work.

   e. Verify that the maintenance of grease collection systems on all rooftop exhaust fans above areas where food is prepared/heated is being performed.

5. The existing metal roof covering systems, concrete roof slab, and asphalt shingle roof covering systems are (in our opinion), generally functional and serviceable. With proper maintenance over the years, the metal, concrete, and asphalt shingle roof covering systems may last for several more years. The one exception to this is the metal roofs atop the scoreboards/loudspeaker enclosures. There are several badly rusted areas on the metal roof covering systems. The service life of these roofs can be extended if the metal roofs are thoroughly cleaned, prepared, primed, and painted/coated. We recommend adding a protective surface in areas of frequent foot traffic on game days.

6. Significant expenditures have been made to repair leaks in the sub-roofs and associated drainage elements, as well as for the costs to access these areas for repair and for repair of interior construction resulting from moisture infiltration through the sub-roofs. Based upon our review of the project construction drawings and conversations with the maintenance staff, we can only conclude that the metal sub-roof systems (at four different levels of the building) are poorly designed and installed, and the building and sub-roofs were not properly designed/constructed in a way the sub-roofs could be readily accessible for inspection, maintenance, and repair. In our opinion, this failure during the original design/construction of the facility will result in continued and increasing leakage/damage (and continued/increasing repair costs), until such time that the sub-roof systems can be properly and permanently repaired. We recommend that additional investigation be performed (which will require significant destructive/demolition work to access the various levels/areas of sub-roofs), to assess existing conditions and to recommend/design/implement permanent repair/improvements to the sub-roof systems.

7. The existing canvas and glass canopies are generally in fair-to-good condition and can be expected to remain serviceable for at least several more years; however, it is recommended that the cracked glass panel (elevator tower canopy) be removed/replaced as soon as possible to avoid any potential safety hazard. It is recommended that the canopies be periodically inspected and cleaned to help preserve and prolong the service life of the canopies.

<u>Short-Term Recommendations</u>

1. Although it has been recommended herein that some of the roof covering systems be completely replaced within the next 1-2 years, it is our opinion that the remaining roof covering systems require immediate attention/repair to mitigate existing deficient and/or non-watertight conditions, and to help prolong the service life of the remaining roofs. In our opinion, these areas should not remain as they are until the roof covering systems are replaced. We recommend that the following items be designed, bid/contracted and performed as soon as possible:

   a. Carefully and thoroughly cleaning all areas of the roofs and drainage elements, project-wide, to remove all unused materials, trash, dirt/silt, debris, fasteners, oil/grease, etc. from all roof areas and drainage elements.

   b. Removing/replacing all split/deteriorated/failing/non-watertight sealant joints project-wide.

   c. Carefully inspecting all areas of existing single-ply roofing/ flashing membrane for cuts, splits, delaminated seams, and other non-watertight conditions, and making appropriate repairs.

   d. Rake out and replace the filler material in all open pitch pocket flashings; dome the filler material on top to shed water.

   e. Cap-off or remove all unused/open pipes/conduits that penetrate the roofs.

   f. Repair/replace all damaged/rusted through-wall scuppers.

   g. Cleaning/preparing/priming/painting any areas of rusted metal roofing/flashings (particularly on the scoreboard/ loudspeaker enclosure roofs).

   h. Replace the cracked glass panel in the elevator tower canopy.

These summarizations of recommended maintenance, repair and replacement items does not in any way constitute an industry-standard specification or detailed scope of work for the maintenance/repair/replacement work, and the summaries above are not suitable for bidding or construction purposes. We recommend that the design and work scope be prepared by a roofing design professional for the recommended work, and bid/contracted with a reputable local roofing contractor. We also recommend that the recommended short-term items be

designed, bid, contracted, and completed as soon as possible to limit the potential for moisture infiltration-leakage and subsequent structural/interior damage.

Annual Roof Inspections

It is our recommendation that the facility Owner/Management contract with a qualified roofing/waterproofing consulting firm to perform inspections of the existing roof covering systems (as well as new roof covering systems, as areas of roofing are replaced), facility-wide, on an annual basis, and recommend any needed roof covering system maintenance/repair/replacement work that may become necessary in order to maintain the roof covering systems in a watertight condition, ensure that roofs and drainage elements are kept clear of dirt/silt/debris, maintain finishes, and mitigate corrosion of metal roofing/ flashing components. This practice would help to extend the service life of the roof covering systems, significantly reduce the potential for moisture damage to roof covering systems and/or structural/interior components, and reduce the potential for damaging corrosion (rusting) of exposed metal roofing/flashing components. It will also be vital in properly maintaining new roof covering systems (as the existing systems are replaced) to help enable the owner realize the maximum financial and operational benefits from new replacement roof covering systems. Annual roof inspections are generally a requirement of nearly all roof covering system manufacturers' warranties.

Conclusions

In our opinion, performing the maintenance, repair and replacement work, as recommended in this report, will help prolong the service life of the roof covering systems until such time that they are replaced and help keep damage and deterioration of existing structural, interior construction, equipment and furnishings to a minimum, thus reducing costs for other required maintenance/repair work in the future.

In our opinion, there are likely many more existing non-watertight conditions than are currently visible on the roof surfaces and/or as interior moisture damage (particularly since some areas of the existing roof membrane are covered with stone ballast); however, such conditions can cause concealed moisture damage to structural components and interior construction/finishes. Moisture-saturated roof insulation can cause damage/corrosion to the structure as well as diminish the thermal efficiency of the building envelope.

The cost budget projections included in the capital expenditure matrix for replacement of the single-ply roof covering systems are based upon the roof covering system replacement work being divided into at least two separate construction phases/contracts, separated by at least a few years. As previously mentioned, it is our opinion that combining the roof replacement work into one contract will significantly reduce the overall (per square foot) cost of the work, as well as have less of an impact on facility management/operations.

It should also be understood that costs for investigation, design, and repair/replacement of the existing metal sub-roofs is not included in the capital expenditure matrix, as it is impossible to provide a definitive, accurate evaluation and/or provide cost budget info until such time that the sub-roofs can be properly accessed and additional investigative work is performed.

VERTICAL TRANSPORTATION

VENUE Solutions group

VERTICAL TRANSPORTATION

Methodology

We reviewed the condition of the machine room, hoistway and pit condition of each unit, along with the functionality of the equipment. We have provided a rating system of 1 to 5, with 5 being "excellent" and 1 being "extremely poor requiring immediate attention".

Passenger Elevators 1# & #2

The units are 4,500 lbs. capacity operating at 350 Feet per minute (fpm) with seven front stops. Controller is a Montgomery Miprom A-1 with Hollister Whitney 63-OH geared traction machines, 40 HP motors and Alan Bradley SCR Drives.

Doors are one speed center opening operated by MAC PMSSC operators.

Machine Room - Rating 4

The machine room was clean and did have a spare parts cabinet available. Both elevators are up to date with required state inspections, and the required 5-year full load Category 5 tests were performed in January 2015. The Annual Category 1 Test requirement will go into effect in 2017. The governors did have identification indicating the month when the full load tests were performed. The equipment is generally very reliable although there is an obsolescence concern with the solid-state drive components, which can be resolved with an upgrade from ThyssenKrupp or Access Electronics. However, these upgrades can be costly, and since the equipment is eighteen (18) years old and near the end of its expected life-cycle of twenty to twenty-five (20-25) years, consideration should be given to a complete modernization in the near term. The DC drive hoist motors needs to have the carbon dust blown out to help prolong motor life. The machine room temperature was acceptable, and gear oil levels were adequate on that date of the review. Installation of hoist rope lubricators should be considered as a part of the modernization program.

Machine room lighting needed improvement as some lights were out. The overall condition was good.

Typical Passenger 5 Year Test Tag

Hoistway Equipment - Rating 3

Both unit car tops were observed to be clean and free of debris, and we recommend all car top equipment be painted soon to help prevent rust and prolong equipment life. All door operator belts appeared to be in good condition and operating smoothly. This vintage MAC door equipment is considered solid equipment. The door closing torque on #1 was too high and needs to be reduced to 30 pounds or less. Noisy hall door rollers need to be replaced at floors 1 and 2 on elevator #2.

Fixtures – Rating 2

All push button fixtures were standard plastic style buttons that are susceptible to vandalism. It is recommended that they be replaced with vandal resistant fixtures in the near term. Buttons with "Titan" logo and team colors embedded into the buttons are available. Currently there are TV monitors in the elevators.

Pits - Rating 5

The pits are in good order with no water present. Sump pumps and sprinklers are present, and the pit light was not functioning on #1.

Passenger Elevators #1 & #2 – Overall Rating 3

Passenger Elevator #3

4,500 lbs. capacity operating at 350 fpm, six (6) front stops on #3. Controller is a Montgomery Miprom A-1 with Hollister Whitney 63-OH geared traction machines, 40 HP motors and Alan Bradley SCR Drives.

Doors are single speed center opening operated by MAC PMSSC operators.

Machine Room - Rating 4

The machine room was clean and did have a spare parts cabinet available. Both elevators are up to date with required state inspections, and the required 5-year full load Category 5 tests were performed in January 2015. Annual Category 1 Test requirement will go into effect in 2017. The governors did have identification indicating the month when the full load tests were performed. The equipment is generally very reliable although there is an obsolescence concern with the solid-state drive components, which can be resolved with an upgrade from ThyssenKrupp or Access Electronics. However, these upgrades can be costly, and since the equipment is eighteen (18) years old and near the end of its life-cycle of twenty to twenty-five (20-25) years, consideration should be given to a complete modernization in the near term. The DC drive motors need to have the carbon dust blown out to help prolong motor life. The machine room temperature was acceptable, and gear oil levels were adequate on that date of the review. Installation of hoist

rope lubricators should be considered. The machine room lights are burned out and should be replaced as soon as possible.

The overall conditions were good, but the governor cover needs to be installed on #3

Hoistway Equipment - Rating 3

The car top was clean and free of debris, and we recommend all car top equipment be painted soon to help prevent rust and prolong equipment life. All door operator belts appeared to be in good condition and operating smoothly. This vintage of MAC door equipment is solid equipment. Car door gibs need to be adjusted for smooth operation on #3, and the rope data tag needs to be properly affixed at car top rope shackles on the car top.

Fixtures – Rating 2

All push button fixtures were standard plastic style buttons that are susceptible to vandalism. It is recommended that the buttons be replaced with vandal resistant fixtures soon. Buttons with "Titan" logo and team colors embedded into the buttons are available. Currently there are TV monitors in the elevator.

Pits - Rating 4

The pits are in good order, and no water was present. Sump pumps and sprinklers were present, but the pit light was not functioning on #1.

Passenger Elevators #3 – Overall Rating 3.5

Freight Elevator #4

12,000 lbs. capacity operating at 100 fpm with seven stops, five (5) front openings and 2 rear openings. Controller is a Montgomery Ultron DDC with a Hollister Whitney 63-OH geared traction machine, 40 HP motor and Alan Bradley SCR Drives.

Doors are Courion Model D power freight parting doors.

Typical Freight Gate Equipment

Machine Room - Rating 4

The machine room was clean and did contain a spare parts cabinet. The elevator was up to date with required state inspections and the required 5 Year full load Category 5 test, performed on December 2012. Annual Category 1 Test requirement will go into effect in 2017. The governors did have identification indicating the month when the full load tests were performed. The equipment is generally very reliable although there is an obsolescence concern with the solid-state drive components, which can be resolved with an upgrade from ThyssenKrupp, KONE or Access Electronics. However, these upgrades can be costly, and since the equipment is eighteen (18) years old and near the end of its life-cycle of twenty to twenty-five (20-25) years, consideration for a complete modernization should be considered in the near term. The DC drive motors need to have the carbon dust blown out to help prolong remaining life. The existing DC motor commutator needs to be undercut to provide smooth and quiet commutation. Gear oil level was acceptable upon our evaluation, although the machines need to be sealed and wiped down, and the machine room temperature was acceptable. Installation of hoist rope lubricators should be considered.

Hoistway Equipment - Rating 1

The car top was dirty and in need of significant cleaning and painting. The car gate chains were dirty and in need of lubrication. All car and hall door equipment needs a thorough clean down as well as the replacement of the missing junction box plate on the car top car gate equipment. The car top handrail should be considered as the gap between cab and the wall is over 12 inches wide. New infrared detector edges should be considered in lieu of current rubber boot application to help improve door performance and door reliability. The car gate needs to be adjusted for smooth operation, and the cab interior ceiling is damaged and in need of repair.

Damaged Interior Ceiling on Freight #4

Fixtures – Rating 1

All push button fixtures were standard plastic style buttons that are susceptible to vandalism. It is recommended that they be replaced with vandal resistant fixtures including engraved proper freight door operation markings.

Pits - Rating 2

The pits were dirty and need to be cleaned out. No water was present and sump pumps were present.

Freight Elevator #4 – Overall Rating 2

Freight Elevator #5

12,000 lbs. capacity operating at 100 fpm seven stops, six front and 1 rear. Controller is a Montgomery Ultron DDC with Hollister Whitney 63-OH geared traction machines, 40 HP motors and Alan Bradley SCR Drives.

Doors are Courion Model D power freight parting doors.

Machine Room - Rating 4

The machine room was clean did contain a spare parts cabinet. The elevator was up to date with required state inspections, and the required 5 Year full load Category 5 test was performed on December 2012. Annual Category 1 Test requirement will go into effect in 2017. The governors did have identification indicating the month when the full load tests were performed. The equipment is generally very reliable although there is an obsolescence concern with the solid-state drive components, which can be resolved with an upgrade from ThyssenKrupp, Kone or Access Electronics. However, these upgrades can be costly, and since the equipment is eighteen (18) years old and near the end of its life-cycle of twenty to twenty-five (20-25) years, complete modernization should be considered in the near term. The DC drive motors need to have the carbon dust blown out to help prolong the remaining life. The existing DC motor commutator needs to be undercut to provide smooth and quiet commutation. The machine room temperature was acceptable, and installation of hoist rope lubricators should be considered as all ropes need to be lubricated. Gear oil level was acceptable upon our evaluation although the machines need to be sealed and wiped down.

Hoistway Equipment - Rating 1

The car top was dirty and in need of significant cleaning and painting. The car gate chains were dirty and in need of lubrication. The car gate should be properly weighted in lieu of current field modification. All car and hall door equipment needs a thorough clean down. The hall door gate switches at the 4th floor were temporarily field engineered to operate under shutdown conditions and never permanently repaired. Install duct cover plate on the car top car gate equipment. Repair the broken emergency stop switch on car top and the junction box connection on the car top. The car top handrail should be considered as the gap between cab and the wall is over 12 inches wide. New infrared detector edges should be considered in lieu of current rubber boot application to help improve door performance and door reliability. The car gate needs to be adjusted for smooth operation, and the cab interior ceiling is damaged and needs to be repaired. All hoist ropes should have two (2) clips at the dead end above the shackle.

While we were evaluating the pit area from the ground floor, the hall gates at the ground floor attempted to close under power operation while the ground floor hall doors were opened with the car at an upper floor. This condition was brought to the attention of stadium management right away, and we were notified that the issue was remedied by their maintenance contractor.

Doors need to be adjusted for 100% close under Fire Service Phase 2 operation, and adjust all doors so that they do not stall when closing.

Field Engineered Gate Switch in need of Repair

Fixtures – Rating 1

All push button fixtures were standard plastic style buttons that are susceptible to vandalism. It is recommended that they be replaced with vandal resistant fixtures including engraved proper freight door operation markings. Code compliant fire service operation signage needs to be added in the car and in the hall.

Pits - Rating 2

The pits were dirty and need to be cleaned out. No water was present and sump pumps were present.

Freight Elevator #5 – Overall Rating 2

Elevator 6 Passenger

4,500 lbs. capacity operating at 350 fpm. Six (6) front stops. Controller is a Montgomery Miprom A-1 with a Hollister Whitney 63-OH geared traction machine, 40 HP motor and Alan Bradley SCR Drives.

Doors are single speed center opening design operated by MAC PMSSC operators.

Machine Room - Rating 4

The machine room was clean and did not have a spare parts cabinet available. Insulation on the machine room ceiling needs to be secured as it is hanging down, and all ducts needs to be sealed in the machine room. Both elevators are up to date with required state inspections. The required 5 Year full load Category 5 test could not be confirmed by the tag in the machine room, so the date needs to be confirmed by the contractor. Annual Category 1 Test requirement will go into effect in 2017. The governors did have identification indicating the month when the full load tests were performed. The equipment is generally very reliable although there is an obsolescence concern with the solid-state drive components, which can be resolved with an upgrade from ThyssenKrupp, KONE or Access Electronics. However, these upgrades can be costly, and since the equipment is eighteen (18) years old and near the end of its life-cycle of twenty to twenty-five (20-25) years, consideration should be given to a complete modernization in the near term. The DC drive motors need to have the carbon dust blown out to help prolong motor life. The machine room temperature was acceptable. The machine needs to be wiped down, but gear oil levels were adequate on the date of our review. Installation of hoist rope lubricators should be considered, but the overall condition was good.

Hoistway Equipment - Rating 3

Both unit car tops were clean and free of debris. It is suggested that all car top equipment be painted soon to help prevent rust and prolong equipment life. All door operator belts appeared to be in good condition and operating smoothly. This vintage of MAC door equipment is solid equipment. Door closing torque on #6 was too high and needs to be reduced to 30 pounds or less. Noisy card door closer needs to be replaced at the 3rd floor on #6.

Fixtures – Rating 2

All push button fixtures were standard plastic style buttons that are susceptible to vandalism. It is recommended that they be replaced with vandal resistant fixtures soon with buttons that have “Titan” logo and team colors embedded into the buttons. Currently there are TV monitors in this elevator.

Typical Freight Car Station

Pits - Rating 4

The pit is in fair condition and we did observe water in the pit which should be investigated as soon as possible. Sump pumps and sprinklers were present, and the pit light was not functioning on elevators #7 and #8.

Passenger Elevator #6 – Overall Rating 3

Elevators 7 and 8 Passenger

4,500 lbs. capacity operating at 350 fpm with seven (7) front stops. Controllers are Montgomery Miprom A-1 with Hollister Whitney 63-OH geared traction machines, 40 HP motors and Alan Bradley SCR Drives.

Doors are one speed center opening operated by MAC PMSSC operators.

Machine Room - Rating 4

The machine room was clean and did have a spare parts cabinet available. Insulation on the machine room ceiling needs to be secured as it is hanging down, and ducts need to be sealed in the machine room. Both elevators are up to date with required state inspections. The required 5-year full load Category 5 tests could not be confirmed by the tag in the machine room, so dates need to be confirmed by the contractor. Annual Category 1 Test requirement will go into effect in 2017. The governors did have identification indicating the month when the full load tests were performed. The equipment is generally very reliable although there is an obsolescence concern with the solid-state drive components, which can be resolved with an upgrade from ThyssenKrupp, KONE or Access Electronics. However, these upgrades can be costly, and since the equipment is 18 years old and near the end of their life-cycle of 20-25 years, a complete modernization should be considered. The DC drive motors need to have the carbon dust blown out to help prolong motor life. The machine room temperature was acceptable, both machines need to be wiped down and the gear oil levels were adequate. Installation of hoist rope lubricators should be considered, but the overall conditions were good.

Hoistway Equipment - Rating 3

Both unit car tops were clean and free of debris. It is suggested that all car top equipment be painted soon to help prevent rust and prolong equipment life. All door operator belts appeared to be in good condition and operating smoothly. MAC door equipment is solid equipment. Duct cover needs to be installed at the 4th floor on elevator #8.

Fixtures – Rating 2

All pushbutton fixtures were standard plastic style buttons that are susceptible to vandalism. It is recommended that they be replaced with vandal resistant fixtures soon with buttons that have “Titan” logo and team colors embedded into the buttons. Currently there are TV Monitors in these elevators.

Pits - Rating 4

The pits are in fair condition. Water was present in the pit and should be investigated. Sump pumps and sprinklers were present. Pit light was not functioning on elevators #7 and #8.

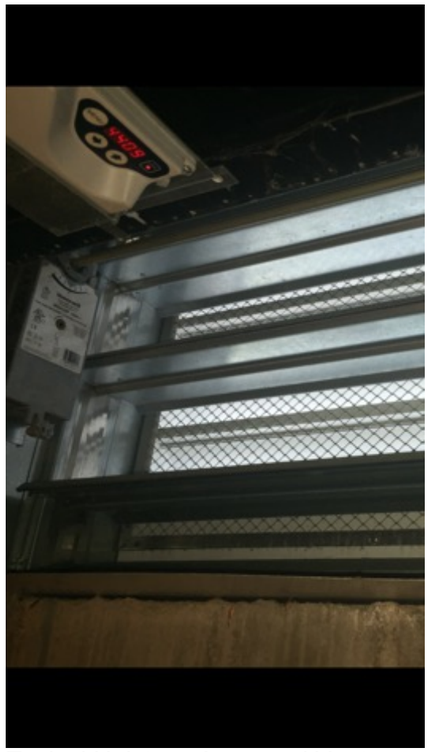
Passenger Elevators #7 & #8 – Overall Rating 3

Elevators 9, 10 and 11 Passenger (Express)

4,000 lbs. capacity operating at 500 fpm 2 stops on all units. Controller is a ThyssenKrupp/Nashville Machine TAC-50 with Synergy Performance Series MRL Overhead permanent magnet gearless machines and variable volt variable frequency A/C drives. Doors are one speed center opening operated by ThyssenKrupp 08- LD Linear door operators.

Machine Room - Rating 4

The machine room was clean and did have a parts cabinet available. All elevators are up to date with required state inspections. The required 5-year full load Category 5 tests were performed in 2012, although exact month is unknown. We recommend that the elevator contractor properly tag all units. Annual Category 1 Test requirement will go into effect in 2017. The equipment is newer than the other elevators in the stadium and is operating as designed. The ride is considered rough, but the arrival to the destination is swift. The machine room temperature was acceptable upon our evaluation, but we were advised by the route mechanic that it gets very warm in the machine room during game day. It is recommended that the machine room HVAC be designed to keep the room between 60 and 85 degrees to help prolong the life of the equipment and improve reliability. All machines and overhead equipment need to be cleaned down and painted, as it is beginning to rust. The automatic louver ventilation at the top of the shaft is open on several of the units and is causing the equipment in the overhead to rust. There are very expensive components including the hoist machine in this area, and damage caused by rust and water intrusion is not typically covered by the maintenance agreement; the probability is high that these repairs will be billed back to the facility down the road. There is a toggle switch at the top of the hoistway that can activate the power louver. It is recommended that the louver be returned to power open, making the louver typically closed at all times on all three (3) units. Installation of hoist rope lubricators should be considered. The overall condition of most of the units was good. Elevator #11 was shut down upon our evaluation. Hoistway access on elevator #10 was not working.



Typical Hoistway Louvered Vent

Hoistway Equipment - Rating 3

All unit car tops were clean and free of debris. It is suggested that all car top equipment be painted soon to help prevent rust and prolong equipment life. All door operator belts appeared to be in good condition and operating smoothly. ThyssenKrupp 08-LD Linear door operators are in use. All elevator equipment in the overhead needs to be painted with rust inhibiting paint.

Fixtures – Rating 4

All push button fixtures were standard ThyssenKrupp metal style buttons. Although these are metal cap buttons, they are considered lighter duty fixtures. It is recommended that they be replaced in the next 5-7 years with vandal resistant fixtures. Buttons with "Titan" logo and team colors embedded into the buttons are available. Currently there are no TV Monitors in these elevators.

Pits - Rating 4

The pits are in good condition and water was not present in the pit. Sump pumps and sprinklers were present.

Typical Rusted Governor Equipment Express

Passenger Elevators (Express) #9, #10 & #11 – Overall Rating 3

Elevators 12, 13 and 14 Passenger (Express)

4,000 lbs. capacity operating at 500 fpm with two (2) stops on all units. Controller is a ThyssenKrupp/Nashville Machine TAC-50 with Synergy Performance Series MRL Overhead permanent magnet gearless machines and variable volt variable frequency A/C drives. Doors are one speed center opening operated by ThyssenKrupp 08- LD Linear door operators.

Machine Room - Rating 4

The machine room was clean and did have a parts cabinet available. All elevators are up to date with required state inspections, and the required 5-year full load Category 5 tests were performed in 2012, although exact month is unknown. We recommend that the elevator contractor properly tag all units. Annual Category 1 Test requirement will go into effect in 2017. The equipment is newer than the other elevators in the stadium and is operating as designed. The ride is considered rough, but the arrival to the destination is swift. The machine room temperature was acceptable upon our evaluation, but we were advised by the route mechanic that it gets very warm in the machine room during game day. It is recommended that the machine room HVAC be designed to keep the room between 60 and 85 degrees to help prolong the life of the equipment and improve reliability. All machines and overhead equipment need to be cleaned down and painted, as they are beginning to rust. The automatic louver ventilation at the top of the shaft is open on several of the units and is causing the equipment in the overhead to rust. There are very expensive components including the hoist machine in these areas and damage caused by rust and water intrusion is not typically covered by the maintenance agreement; the probability is high that these repairs will be billed back to the facility down the road. There is a toggle switch at the top of the hoistway that can activate the power louver. It is recommended that the louver be returned to power open, making the louver typically closed at all times on all three (3) units. Installation of hoist rope lubricators should be considered. The overall condition of the units was good. Cab

lights were out in #13 and need to be repaired, and the car door restrictors need to be adjusted on #12 and #14.

Typical Rust on Equipment in Overhead on Express Cars

Hoistway Equipment - Rating 3

All unit car tops were clean and free of debris. It is suggested that all car top equipment be painted soon to help prevent rust and prolong equipment life. All door operator belts appeared to be in good condition and operating smoothly. ThyssenKrupp 08-LD Linear door operators are in use. All elevator equipment in the overhead needs to be painted with rust inhibiting paint.

Fixtures – Rating 4

All push button fixtures were standard ThyssenKrupp metal style buttons. Although these are metal cap buttons, they are considered lighter duty fixtures. It is recommended that they be replaced in the next five to seven (5-7) years with vandal resistant fixtures. Buttons with "Titan" logo and team colors embedded into the buttons are available. Currently there are no TV monitors in these elevators.

Pits - Rating 4

The pits are in good condition, and water was not present in the pit. Sump pumps and sprinklers were present.

Passenger Elevators (Express) #12, #13 & #14 – Overall Rating 3

Elevators 15, 16 and 17 Passenger (Express)

4,000 lbs. capacity operating at 500 fpm with 2 stops on all units. Controller is a ThyssenKrupp/Nashville Machine TAC-50 with Synergy Performance Series MRL Overhead permanent magnet gearless machines and variable volt variable frequency A/C drives. Doors are one speed center opening operated by ThyssenKrupp 08- LD Linear door operators.

Machine Room - Rating 4

The machine room was clean and did have a parts cabinet available. All elevators are up to date with required state inspections, and the required 5-year full load Category 5 tests were performed in 2012, although exact month is unknown. We recommend that the elevator contractor properly tag all units. Annual Category 1 Test requirement will go into effect in 2017. The equipment is newer than the other elevators in the main building and is operating as designed. The ride is considered rough, but the arrival to the destination is swift. The machine room temperature was acceptable upon our evaluation, but we were advised by the route mechanic that it gets very warm in the machine room during game day. It is recommended that the machine room HVAC be designed to keep the room between 60 and 85 degrees to help prolong the life of the equipment and improve reliability. All machines and overhead equipment need to be cleaned down and painted, as they are beginning to rust. The automatic louver ventilation at the top of the shaft is open on several of the units and is causing the equipment in the overhead to rust. There are very expensive components including the hoist machine in these areas and damage caused by rust and water intrusion is not typically covered by the maintenance agreement. There is a toggle switch at the top of the hoistway that can activate the power louver. It is recommended that the louver be returned to power open, making the louver typically closed at all times on all three (3) units. Installation of hoist rope lubricators should be considered. The overall condition of the units was good, but the hoistway access on #16 needs to be repaired. Elevator #17 would not operate on Fire Service Operation and needs to be repaired. One (1) of the hall call pushbuttons at floor 7 was not operational and needs to be repaired.

Typical Test Tag on Express Cars

Hoistway Equipment - Rating 3

All unit car tops are clean and free of debris. It is suggested that all car top equipment be painted soon to help prevent rust and prolong equipment life. All door operator belts appeared to be in good condition and operating smoothly. ThyssenKrupp 08- LD Linear door operators are in use. All elevator equipment in the overhead needs to be painted with rust inhibiting paint.

Typical Rusted Counterweights on Express Cars

Fixtures – Rating 4

All push button fixtures were standard ThyssenKrupp metal style buttons. Although these are metal cap buttons, they are considered lighter duty fixtures. It is recommended that they be replaced in the next five to seven (5-7) years with vandal resistant fixtures. Buttons with “Titan” logo and team colors embedded into the buttons are available. Currently there are no TV monitors in these elevators.

Pits - Rating 4

The pits are in good condition and water was not present in the pit. Sump pumps and sprinklers were present.

Passenger Elevators (Express) #15, #16 & #17 – Overall Rating 3

Elevators 18, 19 and 20 Passenger (Express)

4,000 lbs. capacity operating at 500 fpm with two (2) stops on all units. The controller is a ThyssenKrupp/Nashville Machine TAC-50 with Synergy Performance Series MRL Overhead permanent magnet gearless machines and variable volt variable frequency A/C drives. Doors are one speed center opening operated by ThyssenKrupp 08- LD Linear door operators.

Machine Room - Rating 4

The machine room was clean and did have a spare parts cabinet available. Elevators are up to date with required state Inspection, and the required 5-year full load Category 5 tests were performed in 2012, although exact month is unknown. We recommend that the elevator contractor properly tag all units. Annual Category 1 Test requirement will go into effect in 2017. The equipment is newer than the other elevators in the main building and is operating as designed. The ride is considered rough, but the arrival to the destination is swift. The machine room temperature was acceptable upon our evaluation, but we were advised by the route mechanic that it gets very warm in the machine room during game day. It is recommended that the machine room HVAC be designed to keep the room between 60 and 85 degrees to help prolong the life of the equipment and improve reliability. All machines and overhead equipment need to be cleaned down and painted, as they are beginning to rust. The automatic louver ventilation at the top of the shaft is open on several of the units and causing the equipment in the overhead to rust. There are very expensive components including the hoist machine in these areas, and damage caused by rust and water intrusion is not typically covered by the maintenance agreement. There is a toggle switch at the top of the hoistway that can activate the power louver. It is recommended that the louver be returned to power open, making the louver typically closed at all times, on all three (3) units. Installation of hoist rope lubricators should be considered. The overall condition of the units was fair. Elevator #20 has a much rougher ride than any of the other units and should be adjusted for smooth and quiet operation. Also, car and hall door linkage on #20 needs to be adjusted.

Sun Damaged Signage

Hoistway Equipment - Rating 3

All unit car tops are clean and free of debris. It is suggested that all car top equipment be painted soon to help prevent rust and prolong equipment life. All door operator belts appeared to be in

good condition and operating smoothly. ThyssenKrupp 08- LD Linear door operators were in use. All elevator equipment in the overhead needs to be painted with rust inhibiting paint.

Weather Damaged Hall Door Entrances on Express Units

Fixtures – Rating 4

All push button fixtures were standard ThyssenKrupp metal style buttons. Although these are metal cap buttons, they are considered lighter duty fixtures. It is recommended that they be replaced in the next five to seven (5-7) years with vandal resistant fixtures. Buttons with "Titan" logo and team colors embedded into the buttons are available. Currently there are no TV monitors in these elevators.

Pits - Rating 4

The pits are in good condition and water was not present in the pit. Sump pumps and sprinklers were present.

Passenger Elevators (Express) #18, #19 & #20 – Overall Rating 3

Escalators #1 West - Short Unit

Overall Rating 3

The escalator is a Montgomery/KONE E-5,000 – 236 F model with a Smart Controller. This is a 100-fpm unit and was running at the designed speed. This unit was originally installed in 1998 when the stadium was built. Handrails and steps were tracking at the same speed, and no damaged steps were visible on the date of our evaluation. The mechanic is applying lubricant manually and the chain is well lubricated, but the units have not had an annual clean down in several years. When this clean down is performed, the equipment will be out of service for about one (1) week, but it will prolong the life of the equipment and improve reliability due to the extensive maintenance that can be performed at that time. Broken skirt brushes at the lower and upper ends need to be replaced, and a missing skirt brush at the upper end needs to be installed. All skirt decking needs to be adjusted for flush finish.

Escalators #2 West Long Unit

Overall Rating 3

The escalator is a Montgomery/KONE E-5,000 – 236 F model with a Smart Controller. This is a 100-fpm unit and was running at the designed speed. This unit was originally installed in 1998 when the stadium was built. Handrails and steps were tracking at the same speed and no damaged steps were visible on the date of our evaluation. The mechanic is applying lubricant manually and the chain is well lubricated, but the units have not had an annual clean down in several years. When this clean down is performed, the equipment will be out of service for about one (1) week, but it will prolong the life of the equipment and improve reliability due to the extensive maintenance that can be performed at that time. Deck barricades must be installed at 40". Pit lighting and the handrail inlet brush on the lower left side need to be repaired.

Escalators #3 East Short Unit

Overall Rating 4

The escalator is a Montgomery/KONE E-5,000 – 236 F model with a Smart Controller. This is a 100-fpm unit and was running at the designed speed. This unit was originally installed in 1998 when the stadium was built. Handrails and steps were tracking at the same speed. No damaged steps were visible on the date of our evaluation. The mechanic is applying lubricant manually and the chain is well lubricated, but the units have not had an annual clean down in several years. When this clean down is performed, the equipment will be out of service for about one (1) week, but it will prolong the life of the equipment and improve reliability due to the extensive maintenance that can be performed at that time.

Escalators #4 East Long Unit

Overall Rating 3

The escalator is a Montgomery/KONE E-5,000 – 236 F model with a Smart Controller. This is a 100-fpm unit and was running at the designed speed. This unit was originally installed in 1998 when the stadium was built. Handrails and steps were tracking at the same speed and no damaged steps were visible on the date of our evaluation. The mechanic is applying lubricant manually and the chain is well lubricated, but the units have not had an annual clean down in several years. When this clean down is performed, the equipment will be out of service for about one (1) week, but it will prolong the life of the equipment and improve reliability due to the extensive maintenance that can be performed at that time. The handrail inlet brush on the lower left side and the handrail inlet brush on the upper right side need to be repaired. The missing controller cover in the pit needs to be installed.

Conclusion

Overall, the equipment is being maintained, but more emphasis needs to be provided on the freight elevators and the escalators. These are high maintenance devices that require considerable uninterrupted scheduled maintenance. The freight elevators are obviously critical to the day to day operations, year around, so it would be in the facility's best interest to schedule a dedicated time slot each month, of three to four (3-4) hours per unit, so that detailed maintenance can be performed on each freight elevator. We have been advised that these freight elevators will be modernized in the near future. It is our recommendation that the hall bi-parting freight door equipment be included in this modernization. While most of the actual door panels can be reused to reduce cost, all tracks, guides, chains, motors and locks should be replaced at the time of modernization to provide the most reliable performing product. The freight door equipment is the most worn equipment at the facility.

Estimated life expectancy for the original passenger elevators is twenty to twenty-five (20-25) years under normal conditions. With proper maintenance, your current elevators should operate reliably for another five to seven (5-7) years, but parts availability may become an issue before the units wear out completely. Parts availability or obsolescence for the Magnetec DSB-312 drives will typically be what becomes the biggest issue. While the current drives are operational, replacement parts or repairs will become an issue down the road, leading to extended shutdown times required for lengthy repairs and resulting in mandatory upgrades or replacement. It is our recommendation that you plan for modernization within the next 3-4 years.

Estimated life expectancy for escalators is also twenty to twenty-five (20-25) years. The current systems appear to be operating reliably and as designed. If proactive annual clean downs are performed on each of these units regularly, then they should operate reliably for another six to eight (6-8) years. At the time of modernization, it would be more cost effective to do a complete unit replacement, truss included, rather than a modernization reusing the existing truss in place. Due to easy access and the extensive area around the units, this should be accomplished relatively quickly within 2-3 weeks per unit, compared to the several months per unit it would take to perform a rebuild in place within the existing truss.

There are elevator fixture manufacturers that can provide custom designed pushbutton assemblies that will incorporate the home team's logo into the fixture design and will provide a higher level of durability than you are currently experiencing with your existing fixtures. They can also incorporate video screens within the fixture panel. Another car interior push button alternative is to provide a touch screen car station that is manufactured to replace the current button panel assembly including the stainless-steel plate and can be also utilized for advertisement and video feed within the elevators.

The relatively new express elevators are MRL units and tend to be of a lighter duty construction. Their actual life expectancy is not clearly defined yet in the industry. We do see that this product seems to be prematurely ageing since it has entered the market. These "Express" units seem to support this conclusion based on their current condition. The condition of the cabs, fixtures, entrances and hoistway equipment indicates that the actual life expectancy of this equipment will be closer to ten to fifteen (10-15) years rather than the typical twenty to twenty-five (20-25) years experienced in the past. Maintenance and protection of the existing stainless steel entrances should be considered immediately to help prolong life expectancy. Because of the environment that these units are installed in and their application, diligent maintenance and frequent cleaning and painting will be necessary to maximize the life cycle.

Recommendations – Maintenance of Units

Passenger Elevator #1 and #2

1. Blow out hoist motors on #1 and #2.
2. Wipe down all machines.
3. Repair lights in the elevator machine room.
4. Replace the manual toggle stop switch in the car station with a key switch on #1.
5. Replace bad hall door rollers on floors 1 and 2 on elevator #2.
6. Repair pit light on #1.
7. Increase hall door dwell time to 5 seconds, as required by ADA.
8. Adjust door torque on #1 to <30 lbs., per code requirements.
9. Replace all damaged/cracked buttons throughout on #1 and #2.
10. Clean and paint the car top.

Passenger Elevator #3

1. Blow out hoist motors.
2. Wipe down the machine.
3. Repair lights in the elevator machine room.
4. Install governor cover.
5. Adjust car door gibs for smooth and quiet operation.

6. Properly secure rope data tag at shackles on #3.
7. Clean and paint the car top.
8. Replace all damaged/cracked buttons throughout on #3.

Freight Elevator #4

1. Adjust car gate for smooth operation.
2. Repair damaged cab interior canopy.
3. Turn and undercut commutator on the hoist motor.
4. Lubricate car and hall door operator chains as directed by the manufacturer.
5. Clean and paint down all hoistway equipment.
6. Install car top handrails.
7. Install detector edge in lieu of rubber boot. (Optional)

Freight Elevator #5

1. Adjust car gate for smooth operation.
2. Seal all hoist machine leaks.
3. Lubricate hoist ropes.
4. Install duct cover on the car top.
5. Turn and undercut commutator on the hoist motor.
6. Lubricate car and hall door operator chains, as directed by the manufacturer.
7. Clean and paint down all hoistway equipment.
8. Install car top handrails.
9. Install detector edge in lieu of rubber boot. (Optional)
10. Repair hoistway door gate switch at 4th floor.
11. Repair car top emergency stop switch.
12. Repair broken junction box connector on the car top.
13. Install two (2) clips on all hoistway dead ends.
14. Install proper gate weight on rear car gate.
15. Repair directional arrow at lowest landing.
16. The hall doors closed automatically at ground floor while we evaluated pit when elevator was at the floor above and should be repaired immediately.
17. Adjust doors to close 100% when under fire recall phase 2.
18. Provide fire service operation signage in car and hall.

Passenger Elevator #6

1. Blow out hoist motors.
2. Wipe down the machine.
3. Clean and paint the car top.
4. Replace all damaged/cracked buttons throughout.
5. Repair pit lighting.
6. Investigate water in the elevator pit.
7. Adjust door torque to <30 lbs., per code requirements.
8. Replace bad spirator door closer at floor 3.

Passenger Elevators #7 and #8

1. Blow out hoist motors.
2. Wipe down both machines.
3. Repair lights in the elevator machine room.
4. Repair pit lights.
5. Replace all damaged/cracked buttons throughout on #7 and #8.
6. Clean and paint car top.

Passenger Elevators #9, 10 and 11 (Express)

1. Clean and paint all overhead equipment. (Rusting)
2. Close fire damper in the overhead.
3. Elevator #11 was shut down during our evaluation. Repair.
4. Repair hoistway access on #10.
5. Adjust car door gib on #10.
6. Provide smooth and quiet operation in ride quality on all units.
7. Replace all damaged cab interior lights.
8. Provide adequate HVAC in elevator controller machine room, per the manufacturer's requirements.

Passenger Elevators #12, 13 and 14 (Express)

1. Clean and paint all overhead equipment. (Rusting)
2. Close fire damper in the overhead.
3. Adjust car door restrictor on #12 and #14.
4. Provide smooth and quiet operation in ride quality on all units.
5. Replace all damaged cab interior lights.
6. Provide adequate HVAC in elevator controller machine room, per the manufacturer's requirements.

Passenger Elevator #15, 16 and 17 (Express)

1. Clean and paint all overhead equipment. (Rusting)
2. Close fire damper in the overhead.
3. Repair hoistway access on #16.
4. Elevator #17 will not operate on Fire Service. Repair.
5. Provide smooth and quiet operation in ride quality on all units.
6. Replace all damaged cab interior lights.
7. Provide adequate HVAC in elevator controller machine room, per the manufacturer's requirements.
8. Repair the broken hall call button at the 7th floor.
9. Clean and maintain uncovered hoistway entrance frames and doors. They are beginning to show signs of rust.
10. Provide legible "In Case of Fire Use Exit Stairs" signage.

Passenger Elevators #18, 19 and 20 (Express)

1. Clean and paint all overhead equipment. (Rusting)
2. Close fire damper in the overhead.
3. Adjust hoistway door linkage on #20.
4. Provide smooth and quiet operation in ride quality on all units. #20 is very rough.
5. Replace all damaged cab interior lights.
6. Provide adequate HVAC in elevator controller machine room, per the manufacturer's requirements.
7. Clean and maintain uncovered hoistway entrance frames and doors. They are beginning to show signs of rust.
8. Provide legible "In Case of Fire Use Exit Stairs" signage.

Escalator West - Short Unit

1. Provide annual clean down.
2. Replace broken skirt brushes on lower end.
3. Replace broken skirt brushes on upper end.
4. Replace missing skirt brushes at upper end.
5. Adjust skirt deck upper so that it is flush.
6. Confirm that all Montgomery/KONE E-5000 service bulletins have been implemented.
7. Install contrasting comb plates at top and bottom.

Escalator East - Short Unit

1. Perform annual clean down.
2. Install contrasting comb plates at top and bottom.
3. Confirm that all Montgomery/KONE E-5000 service bulletins have been implemented.

Escalator West – Long Unit

1. Provide annual clean down.
2. Install deck barricades at 40".
3. Repair pit light.
4. Repair handrail entry brush at lower end left side.
5. Confirm that all Montgomery/KONE E-5000 service bulletins have been implemented.
6. Install contrasting comb plates at top and bottom.

Escalators East - Long Unit

1. Perform annual clean down.
2. Install contrasting comb plates at top and bottom.
3. Install deck barricade at 40".
4. Repair handrail entry brush at lower end left side.
5. Repair handrail entry brush at upper end right side.
6. Install controller cover plate in the pit.

FOOD SERVICE & RETAIL

VENUE Solutions group

FOOD SERVICE

The scope of the food service and retail review included;

- General wear and tear on equipment and facilities including concession stands, bars, kitchens, pantries, restaurants and retail team stores, satellite stands and kiosks and warehouses;
  - Cooking and preparation equipment
  - Ice machines
  - Point of sale equipment
  - Counters and casework
  - Menu boards
  - Portable carts and kiosks
  - Wall and floor finishes
- Cleaning and pest control results, and
- Preventative maintenance results

Kitchen equipment is considered to have a useful life of 7 to 10 years; however, unlike a traditional public restaurant or institutional (hospital or factory cafeteria) kitchen that may be open five to seven days a week (260 to 365 days), the stadium's equipment has typically only been used for 30 days or less per year. So even with major crowds approaching 70,000, while equipment is strained more than the daily routine of a restaurant, the industry standard of a seven to ten-year life can be stretched to ten to fifteen years for this food service equipment. However, as equipment ages, it will require more frequent maintenance expense.

Ten to fifteen years is just an industry average. Equipment with compressors such as ice machines, refrigeration and beer systems, typically require the most repairs and earliest replacements, while non-mechanical items such as shelving and stainless steel tables will have a longer life, regularly exceeding 20 years under normal maintenance and sanitation conditions. Nissan Stadium opened in August of 1999, so any original equipment has just served its 18th NFL season.

It is given that background, that we are proposing a systematic replacement of the mechanical, electrical and food production equipment over the next twenty years.

Main Kitchen

All the stadium's foodservice is supported by one main kitchen on the ground level. The space is sufficient in size for preparation and staging.

The main cooking line ventilator and roof fan have been problematic but are currently pulling vapor and smoke out of the kitchen. $16,000 was spent in 2016 to correct the situation, and while it improved the ventilation, Aramark still believes there is an engineering problem with the ventilator hood.

An independent technician is likely needed to test the hood's smoke and air evacuation against the manufacturer's specification.

Aramark just added a new smoker to the kitchen with the equipment fund, reflecting the popularity of the smoked meats throughout the stadium.

Coolers and freezers are on the topping slab and do not have interior raised insulated floors; therefore, they do not have a problem with warped flooring issues. However, several need the threshold replaced and door hardware repaired to replace missing handles and locks.

Door Handle on Walk In Cooler is Damaged

Missing Door hardware on Cooler

In addition, the kitchen floor covering has various patches and should be fully resurfaced.

Damaged floor surface

Ceiling tiles surrounding the cooking line need replacement, but others are in good condition.

The dishwasher has increasingly more maintenance issues and needs to be replaced. The tilt skillet is inoperable and needs to be replaced.

Office space is sufficient with 6 private offices and five cubicles. The cash room complex is the largest we have ever seen in a stadium, with 11 cash windows. It was originally designed to handle food and beverage as well as merchandise. But now with two separate vendors, it only serves foodservice.

The ceiling tiles in the cash room need replacement, and the entire cash room space could be subdivided should a future development plan be needed to access more space on the service level.

Two freight elevators are adequate, placed at opposite corners of the stadium. The stadium also has ramp access to move product up from the service levels to the various concourses. However, the elevators are located at the far end of the concourses, and moving food to suites which may be in the center or at the opposite end of the suite concourse can take a longer time than customers would like for service. That is why you will see our recommendation for suite cooking/finishing kitchens on each suite level, so your customers spending the most for their tickets are not waiting the longest for their food.

Ice Machines

Aramark indicated that all the Manitowoc black ice makers were new in 2014; however, we observed numerous instances where along with the old machines, these new machines were already corroding from mineral build-up along the seal between the ice maker and the ice bin below.

Mineral Build Up on Ice Machine

All the ice makers need to be thoroughly cleaned and inspected along with the water filters to determine the cause of the corrosion.

We also noted the number of Redi Ice merchandisers throughout the stadium, which signals a need for more ice maker production. At a minimum, the merchandisers should be screened to eliminate the public from seeing them on the concourse.

Suites

There is a total of 177 suites in the stadium spread out over five levels; three levels on the east side and two levels plus the press box and media dining on the west side.

The suites are all serviced from the one main kitchen located on the service level, which was the standard 20 years ago. Newer stadiums now place finishing kitchens directly on the suite level to offer a wider variety of menu items that can be served directly from the kitchen to the suite without holding the product for hours from preparation, through transportation to the proper suite level to the ultimate customer.

Aramark has suggested a total of ten finishing kitchens to service the five levels, since all the current pantries which might be used are located at the far end of each suite level. Realistically, one finishing kitchen per level if sized correctly may be more cost efficient from a labor standpoint. It appears that in addition to the two pantries on each of the five suite levels, there is also a storage room on each of those levels that could be better utilized as well.

Consideration should be given to converting the largest pantry or storeroom on each suite level to a cooking kitchen, even if ventless hoods are required versus full ventilation.

In the pantries, suites and kitchen, Aramark uses its own proprietary software for suite ordering and billing, which they indicated is working well.

Thirty of the suites have recently been remodeled, including adding three or four induction warmers built into a credenza table in each of those suites. Some suites we saw only had three induction warmers. For future renovations, we recommend four induction warmers in all typical sized (20 seat) suites.

Existing original suites have 3 Sterno open flame chafing dishes and brightly colored vendor supplied plastic ice bins and recycling bins which provide a very amateurish look.

These $8,000 Spring credenzas are professional looking and eliminate open flames in the suites, which can be a fire hazard.

The team is planning on converting another 30 to 50 suites each year until complete.

The newly renovated 20 person suites are more attractive and more functional for foodservice, eliminating multiple deliveries and makeshift holding areas for products, including packaged beverages. In addition to the induction credenza, the new suites have;

- Hand sink
- GE Monogram full height refrigerator with;
  - ✓ Glass Front
  - ✓ Ice Drawer
  - ✓ Freezer

Owners Suite

The owner's suite has a convection oven in its pantry area; however, there is no ventilator hood over the oven to allow for full cooking. Aramark indicated it is not used.

Should the owner desire to have food prepared in the oven, either permission is needed from the fire code officials, or a ventless hood may be needed over this convection oven.

Level 3 East

Room 3.05.07 SE Pantry; cracks are appearing on the interior floor of the cooler.
Room 3.06.04 is the SW Pantry.

Level 3 West

3.27.02 Press Dining; The room is a mixture of different types of portable equipment and just pipe and drape separating the front servery from the back prep station.

Temporary food staging area

The front service area (25'x25') is tiled, but all the flooring could be redesigned.

Press dining is an expense of the team, and some teams elect to do more for the media than others. Most teams have upgraded to permanent equipment, rather than mobile cabinetry and even have a hot cooking line in the servery (exhibition cooking) serving the meals, which we would recommend.

Level 5 East

<u>East Storeroom</u>

As with most venues, there are underutilized rooms which become a dumping ground for underused or broken equipment. We recommend inventorying these underutilized rooms to determine which if any could be repurposed for a suite finishing kitchen. Discard and/or repair all broken equipment, and sell any working used equipment that doesn't have a function with the current menus.

5.56.10 Pantry

This pantry is centrally located on the concourse. Its new Manitowoc ice maker is not working.

Level 5 West Suites

5.25.03 Pantry

This room is adjacent to 5.24.03, which is currently a housekeeping room. The two rooms combined should be sufficient for a suite kitchen in this level.

5.32.10 Pantry in NW corner of concourse

Fifth level storeroom

Level 6 East

East Storage Room

- Non-working steamer

6.55.03 Pantry

- A new Manitowoc ice maker was set in place but not turned on.

A Lear ice merchandiser was in the pantry, which appeared to indicate Aramark was still buying packaged ice to make up for a lack of ice production from their own equipment.

Aramark needs to hire a refrigeration specialist to ensure that all ice equipment is functioning properly as well as filtering the water to protect the equipment from corrosion.

The water heater was sitting on 2" x 4" planks of wood over a broken plastic tray.

Non-code compliant stand for hot water heater

Water heaters are normally part of the base building rather than foodservice, which means they may be a maintenance item for the Titans, rather than Aramark. All units should be inspected for code compliance and to insure functionality.

6.05.03 Pantry serving 6 E South

Old ice maker is working at less than capacity, and needs repair or replacement.

Level 6 West Suites

Storage room adjacent to the elevator is large enough to be converted to a suite kitchen, whether using ventless cooking or redesigning the rooms with full utilities and ventilation for cooking.

6.32.03 Pantry
6.25.03 Pantry SW

Concessions

Aramark has branded their concessions based on menu types. They use signage above each stand and menu maps on the concourse to inform customers of their choices around the stadium, which is a much better system than just generic stands labeled "Concessions". This allows customers to look down a concourse and find the menu items quickly without having to stand in line and read the entire menu board.

Logan's is a national restaurant chain known for grilled and fried food that licenses their name to Aramark. Aramark then staffs and manages the stand with their own employees.

Provisions is Aramark's internal brand for traditional concession favorites such as hot dogs, popcorn and nachos.

Nashgrille is Aramark's internal brand, selling traditional concession fare plus burgers and fries.

Petro's is another well-known regional brand from Knoxville that licenses their name to Aramark, who then manages the stand. Unfortunately, not all the signage is created with professional graphics. Instead, a laminated sheet was taped to the stand to explain the product. Professional graphics are needed at the Petro Stand to enhance its professional appearance.

Aramark reports than none of the single faucet beer towers work anywhere in the stadium's permanent concession stands. Like many sports venues, as these draft systems fall into disrepair, the concessionaire prefers to replace them with canned beer which is either iced down in insulated bins or placed in glass front coolers. Draft beer costs have increased to the point that canned beer is as profitable from a product cost standpoint. In addition, from a service time standpoint, being able to hand the customer the can is a much quicker transaction than pouring a draft beer, so the concessionaire has no incentive to return to draft beer in the permanent concession stands.

Aramark uses a TCT ID Reader to check valid age for all alcoholic beverage purchasers. They have 1 for every 3 points of sale. This is a very good practice.

Aramark explained to us that the Titans purchased all the Coca Cola dispensing equipment initially, which is very unusual. We are not showing any replacement cost for that equipment, as it is traditionally provided by the purveyor without charge as long as they maintain the pouring rights.

Menu Boards

Aramark installed new digital menu boards in all the permanent stands.

Point of Sale Equipment

Many of the portable carts are cash only and will not accept credit cards. Credit cards and other electronic payment options are considered a basic service in venues today and are the fastest method of payment. Customers spend more with these forms of payment over cash (15% to 25% per transaction), so sales will increase for the Titans.

The current POS system does not have electronic chip readers (EMV) as required by the banking industry. Many concessionaires are waiting to add this equipment until the transaction speed of reading the chip is reduced to a reasonable time. In the meantime, Aramark and other concessionaires are willing to assume the financial risk of accepting bad credit cards. All portables should have POS capable of accepting credit cards and electronic payments. Any chip readers should be a part of the next generation of POS upgrades at the stadium.

Electric service has been added around concourses along exterior walls to power the portables. However, Aramark still reports a need for more power for more equipment.

Data cabling should be run to allow the portables to accept credit cards or POS terminals that work on cellular, or Wi-Fi service should be purchased if the stadium can support the additional bandwidth needed.

Condiments are served on a variety of stainless steel shelves mounted to the walls. While the shelves work in some locations, most the condiment shelves are mounted too high (42”) to be Americans with Disability Act (ADA) compliant at 34”. The shelves and walls are plain without any merchandising around them.

Shelving either needs to be relocated to meet ADA guidelines or new condiment carts for each concession stand should be purchased. We would also recommend the use of vinyl wrap on condiment carts or behind condiment shelves to provide appetizing color and allow sponsorship opportunities for the food purveyors at the stadium.

We also found concession stand (#105) counters at 36” height. Again, normal ADA height is 34”, but these may have been approved at 36”.

Main Concourse with Concession Brand Names

North Endzone

- Miscellaneous Portables waiting for placement;
  - 2 Hebrew National Hot Dog Carts
  - 9 Iowa Rotocast Plastic (IRP) Beer Portables
- 101 Portable Grill Cart
- 102 Jack Daniels BBQ
  - no hood over convection oven
- 103 Beverage Window
- 102 Goose Island Portable
- 103 Coors Light Beer Portable
- 104 Bud Light Beer Portable
- 143 Miller Lite Beer Portables (2)
- 143 Food Cart
- 144 Miller Lite Beer Portables (2)
- 145 Locker Room Portable Merchandise Kiosk
- 146 Jack Daniel Old #7 Cocktail Bar

Main Concourse East Side Line

- 105 Vending Room
- 105 Bud Light Beer Portable
  - Security cage
- 105 Provisions
- 105 Ice Merchandiser on Concourse
- 106 Miller Lite Beer Portables (2)
  - Security Cage
- 106 Rita Cabana Stand
  - (managed by subcontractor Jet Services)
- 107 Locker Room Merchandise Stand
- 108 Nashgrille
  - The stand had very attractive brick façade under the front counter.
- 111 Petro's Portable
- 111 Jack Daniel's BBQ
- 112 Chicken Coop
  - (a new concept in 2016)
- 113 Provisions
- 113 Titan's Team Store
- 114 Hot Chocolate/Lemonade/Dippin Dots Portable
  - Subcontracted
- 114 Bud Light Beer Portables (2)
- 115 Subcontractor Portables; Corn Dog, Funnel Cake, Ice Cream Cart (3)
  - with Fire Suppression Ventilator Hood
- 115 Miller Lite Portables (2)
- 115 Blue Moon Draft Beer Portable Cart
- 115 Roasted Almond Portable
  - Subcontracted
- 116 Nashgrille
- 117 Papa Johns
- 117 Portable Craft Beer/Spirits
- 117 Catering Storeroom and Vending Room
- 118 Provisions

Main Concourse South End Zone East/West Fan Zones

- Group Party Patio
- 2 Ice Merchandisers
- 4 Bud Light IRP Portables
- 120 Miller Lite IRP Portables (2)
  - Security Cage
- 120 10' Carts of Colorado Sandwich/Nacho Portable

- 121 Coors Light IRP portables (2)
  - Suncast Plastic storage closet
  - Security Cage
- 122 Test Kitchen Container Portable
- 123 Jack Daniels Portable
  - Security cage
- 124 10' Grill Portable
- 121 120 Moonshine Frozen Drink Bar
- 121 Logan's
- 125 Goose Island Portable
- 125 Jack Daniels BBQ
- 126 Jack Daniels Spirits and Draft Window
- 127 Miller Lite Portables (2)
- 127 Bud Light Portables (2)

Main Concourse West Side Line

- 127 Vending Room
- 127 Reddi-Ice Ice Merchandiser
- 128 Provisions
- 130 Craft Beer and Spirits Portable
- 130 Papa Johns
- 131 Miller Lite/Lime Rita Portable
- 130 Subcontractor Portable

  - Ice Cream
  - Corn Dog
  - Lemonade
  - Hot Chocolate
  - Dippin Dots
- 131 Nashgrill
  - No walk-in cooler
  - Prep table not cooling
- 132 Walk-in Team Merchandise Stand
- 134 Jack Daniel's BBQ
- 135 Chicken Coop
- 136 Provisions
- 137 Petro's 10' Portable Cart
- 138 Bud Light Beer Portables (2)
- 138 Coors Light Beer Portables (2)
- 139 Nashgrille
- 140 Locker Room Merchandise Stand
- 141 Rita Cabana
- 141 Artisan Pretzel and Popcorn Portable
  - 1 Micros Pad POS
- 142 Provisions
- 143 Vending Room

Clubs

There are two clubs in the stadium, mirrored on the East and West sidelines. In addition to the concession outlets detailed below, new bars have been added with a strong emphasis on popular craft beers and action stations in the center of the clubs that also serve the numerous catering functions during non-football events.

View from front counter to back of stand

Level 4 East Club Level with Concession Brand Names

- 205 Tennessee Twist
- 205 Bar Window

Customers can see to the back of the stand so a partition wall is needed to block that view.

- 206 Locker Room Merchandise Stand
- 4.52.07 Vending Room
- Section 217 Locker Room Merchandise Stand
- 207 Provisions
- 209 Burger & Fries
- 211 4.57.02 Hot Chicken
- 212 4.58.02 BBQ
- 213 Provisions
- 214 Pizza
- 214 B

This stand gets extremely hot, so maintenance leaves the covers off compressors and roof tiles are removed to allow for more air circulation. Unfortunately, both remedies also lead to more dirt getting into the unit.

Operator needs to check on air current and add a fan and/or ventilator in the roof or louvered door as necessary.

- 215 Bar
- 217-S 4.05.02 Provisions
- 218V Pantry with a cooking hood
- 219/220 Concession
  - Back room has 2 convection ovens without hoods that may be in violation of the fire code, depending

on the local rules and the food cooked in these ovens.

Level 4 West Club with Concession Brand Names

- 227 Nashgrille
- 228 Bar Window
- 230 Locker Room Merchandise Stand
- 230 Provisions
- 232 Bar
- 233 4.26.02 Pantry
- 233 Papa John's
- 234 Provisions
- 235 Tennessee BBQ
- 236 Hot Chicken
- 237 Jack Daniels Bar
- 238 Burgers
- 240 Provisions
- 241 Locker Room Merchandise Stand
- 241 Bar
- 242 Tennessee Twist

Upper Level East Side with Concession Brand Names

- 303 Jet Vending and Pizza Stand
  - (Managed by a Subcontractor and Left Dirty)
- 304 Provisions
  - No draft beer system remaining, packaged only)
- 305 Vending Commissary Stand
  - Needs upgraded maintenance to replace ceiling tiles and broken door hinges.
- 306/305 Locker Room Merchandise Stand
- 308 Logan's
  - This branded stand is managed by Aramark personnel. It was left in dirty condition when we inspected it. It also is poorly laid out from an efficiency viewpoint with fryers in the backroom, grills in the front and only half of the ventilator hood being used.

Logan's is in bankruptcy now so once it is determined if this brand will return for next season, the stand should be redesigned for improved service.

- 309 Bud Light Beer Portable
- 308 Food Portable
- 310 Liquor Portable
- 311 Petro's
  - Has a Blodget Convection Oven without a hood, which may not be code compliant, depending on the menu served.
- 311 Bud Light Beer Portable
- 312 Food Portable
- 314 Bud Light Portable
- 313 Provisions
- 312 Miller Portable
- 313 Food Portable
- 314 Titan Tavern (4 POS full bar)
- 315 Bud Light Beer Portable
- 316 Papa John's Pizza
- 316 Beer Portable
- 317 Miller Lite Beer Portable
- 318 Locker Room Merchandise Stand
- 318 Food Portable
- 319 Nashgrille
- 320 Provisions
- 321 Vending room converted to a Beverage Express Stand

Redi-Ice Merchandisers are placed around the stadium concourses to supplement the concessions and portables ice requirements; however they do not provide a professional look to the concourses.

We recommend either purchasing larger ice makers to eliminate the need for merchandisers or building attractive enclosures to prevent the public from seeing these around the stadium.

Upper Level West Side with Concession Brand Names

- 326 Beverage Express (formerly vending room)
- 327 Provisions
- 328 Nashgrille
- 328 Food Portable
- 329 Locker Room Merchandise Stand
- 329 Ice Cream Portable Soft Serve Cart
- 330 Coors Light IRP Portable
- 331 Papa John's Pizza
- 331 Hot Chocolate/Lemonade Portable
- 332 Bud Light Portable
- 333 Titan's Tavern
- 334 Food Portable
- 334 Provisions
- 335 Coors Light
- 334 Bud Light Portable
- 335 Beer Portable
- 336 Bud Light Portable
- 336 Petro's
- 337 Liquor Portable
- 338 Food Portable

Ice dispensers "clutter" the presentation of the concourses

- 339 Bud Light Portable
- 339 Logan's
- 342 Vending Room
- 343 Provisions
- 344 Beverage Express

Many of the concession stands on the upper concourses are lower than the exterior concourse and had standing water on the floor. It appears that the concrete floors do not slope to the floor drains, and there are no thresholds at the doorways holding back water. Floors should be repaved to provide sloping to the floor drains.

Floor slopes away from floor drain in concession stand

POS Counts

One of the common metrics used by venues is the number of points of sale (POS) in the food and beverage outlets to try to maximize service efficiency and minimize serving times for the customers. If you were building a new NFL stadium today, industry standards for general concourses would be 1 permanent POS per 125 seats, and adding in portables brings that ratio down to 1 per 100. However, typically the upper concourse does not have that strong of coverage, because it is typically narrower and has greater fluctuation in attendance; therefore, 1 POS per 150 would be ideal. On club concourses, the ratio could be as low as 1 per 75, depending of the other services offered such as buffets, in-seat service and all-inclusive options.

On the main concourse, the POS ratio is 1 POS per 115 seats including portables, which exceeds current industry standard. On the club level, the ratio is 1 POS per 83 seats, so again a very good ratio for efficient service.

And on the upper concourse, the ratio is 1 POS per 168, which is good.

We have also noted the cooking and non-cooking stands. Again, in new construction we are seeing stadiums aiming for 75% vented stands for cooking on the main and club concourses and down to 50% of the stands on the upper concourse.

Nissan Stadium's cooking percentages are;

- Main Concourse 65%
- Club Concourse 53% excluding the action stations
- Upper Concourse 33%, which is below industry norms

Sanitation and Maintenance

In general, the kitchen, concessions and pantries were clean, although on the Thursday and Friday after a Sunday game, there were still stands needing to be sanitized. We did see a small crew of cleaners working in a few stands.

We also observed food still in serving trays and plates being held in walk-in coolers waiting for the dish crew to come in and start cleaning the products. This was three days or longer from the last game. We were told by the chef that she was not allowed to bring in a cleaning crew earlier because that would put them on overtime pay.

All food scraps and trash should be removed as close to the event as possible to prevent any sanitation issues, pest issues and/or foodborne illnesses. This may require hiring additional kitchen personnel to eliminate the overtime issue.

We did see Hoodz Kitchen Exhaust Cleaning stickers on ventilators; however, most showed a last inspection in 2014, so not current. Aramark indicated they now used Koorsen Fire and Security for hood cleaning and checking the Ansul fire suppression system.

All ventilator hoods, ducting and roof fans should be cleaned regularly, at a minimum of once per year for an NFL Stadium.

Aramark contracts with a full array of service providers to maintain their equipment. These service companies include;

- General Facilities Cleaning - SMS (Service Management Systems)
- General Maintenance - Midsouth Maintenance
- Plumbing - Lee Plumbing scheduled through the Titans
- Hood Cleaning - Hoodz
- Fire Suppression - Korsen
- Warewashing - Eco Labs
- Recycling - Aramark places their recycling in SMS bins for SMS to sort and recycle.
- Fryer Oil Filtration - Filta Fry
- Grease Disposal - Qwest
- Pest Control - Orkin

Aramark has procedures in place for their continual cleaning. Those procedures are;

Event
- Trash set outside sales locations for SMS pickup
- Aramark employees sweep and mop sales location
- Each stand and kitchen is inspected by Aramark supervisor

Weekly
- Cleaning by a combination of Aramark and SMS personnel

Seasonally

- Deep clean at the end of each Titans season by Aramark and SMS staff.

Merchandise

MainGate assumed the responsibility for managing the Titan's merchandise in April of 2014. MainGate, based in Indianapolis, serves the Titans and two other NFL teams; the Minnesota Vikings and Washington Redskins.
They have fifteen sales locations at the stadium, including the Team Store and the Trailer that is used in the parking lot.

- 107
- 113 Pro Shop
- 125 Kiosk
- 132
- 140
- 145 Kiosk
- 206
- 217
- 230
- 240
- 306
- 318
- 329
- 341
- Trailer

They are considering 1 or 2 additional kiosks for 2018.

The stadium has good overall coverage in merchandise locations, and when the stands are remodeled to a more open design, sales can expect to increase.

Each Locker Room Store is similar with a 22' front glass counter and merchandise hung on slat boards behind on the back wall of the 9' deep stand and two points of sale.

The kiosks are 8' deep by 11' wide with the front glass counter and back slat wall. Each kiosk has 2 POS.

Only one stand to date, #132, has been converted to the more appealing walk-in store from this older traditional front counter model. The space is twice that of the standard merchandise stand. It is 43' wide and 21' deep and has 4 POS. The back room also has a 12'x12' lockable cage for back up product.

We recommend removing the front counters of the traditional stands, providing a colorful floor covering to add excitement to the space and placing display racks out into the concourse to encourage more browsing and purchasing.

The trailer is approximately 10' wide x 30' long. There are 4 POS in the interior, and if they open the exterior awning, they add exterior fixtures to create more of a walk-in store feel.
MainGate owns two additional trailers (45' x 9' with 6 POS and 35' x 9' with 4 POS) and they are working with the Titans to possibly employ them in the two end zones.

The team store is approximately 3,600 square feet, which is small in comparison with the newer NFL stadiums that can have upwards of 7,000 to 10,000 square feet. While we were told the stands and team store were updated in 2014 with new slat walls and lighting, they still appear very dated in appearance. The blue and white team colors are the only colors in the store against white slat walls and do not have a vibrant feel.

The store does not make use of their higher ceilings space for displays. The 17 racks of merchandise are very basic, with little merchandising above eye level.

There are also no interactive attractions in the store that we are seeing in other team stores. Those interactive displays are normally geared to attract smaller children and women into the store to make purchases.

There are 10 POS in the store plus one additional one at the custom jersey counter. The store has a limited back room for storage and back room desks. A separate 300 sq. ft. storeroom supplements their storage needs.

As many teams have done, we would recommend a retail consultant be hired to give all of the stands, and particularly the team store, a bolder and more vibrant look. They can use team colors but also accent them with other shades to create a more professional and inviting retail look. Also, use of interactive football related displays will enliven the team store space.

The design of the traditional stands should also be updated to provide a larger proportion of walk-in stores versus this older belly up design.

In addition, MainGate staffs 8 program booths around the stadium.

The merchandise warehouse is located directly behind the freight elevator and has 9 pallet rack shelving units, 6 Metro Shelves and four desks.
Since Aramark controls the original large cash room, the Titans have provided MainGate with use of the Event Center for the cash room. Equipment includes

- 2 currency counters
- 1 small safe for nightly receipts
- 7 lockers
- 1 metro shelf
- 1 small shelf
- 4 banquet tables

While the space is minimal, MainGate is making it work.

Recommendations

1. Hire an independent technician to test the kitchen hoods' smoke and air evacuation against the manufacturer's specification.
2. Continue the renovations to the suites to upgrade service with four induction warmers and full height refrigerators.
3. Continue deleting single faucet draft beer dispensers and adding supplier provided glass front merchandise coolers.
4. Develop a finishing kitchen on each of the six suite levels.
5. Add POS to all portable stands so they can accept credit and electronic payment.
6. Add cooking portable carts on the upper concourse.
7. Add new condiment carts/shelving at each concession stand.
8. Redesign club level corner bars to hide back room from customers.
9. Resurface concession floors to ensure water is flowing to floor drains rather than forming puddles. Several the floors have been addressed as a part of the waterproofing improvements.
10. Clean, repair and replace corroded ice makers and bins.
11. Replace dishwasher and tilt skillet in main kitchen.
12. Upgrade graphics in Petro's stands.
13. Add attractive fencing around ice merchandisers on concourse.
14. Redesign Logan's Roadhouse stands to ensure efficient flow of product from fryers and grills to serving the public.
15. Convert 10 merchandise stands to walk-in concepts.
16. Remodel the team store.
17. Discard and/or repair all broken equipment and sell any working used equipment that doesn't have a function.
18. Check on air current and add a fan and/or ventilator in the roof or louvered door as necessary to aid in cooling compressors.
19. Clean all ventilator hoods, ducting and roof fans regularly, at a minimum once per year.
20. Clean all foodservice spaces as close to the event as possible.
21. Replace ceiling tiles in Aramark cash room.
22. Water heaters should be inspected for code compliance and to ensure functionality.

PLAYING SURFACE

VENUE Solutions group

PLAYING SURFACE

Sod

The playing field surface as originally designed consisted of sodded TifSport Bermuda grass, grown in a sand-based growing medium similar to the specified playing field rootzone growing medium. The sod was harvested with a minimum amount (approx. ¾" depth) of imported soil from the sod farm. A minimum 45-60 days of grow-in time was likely required from the time of initial sod installation to the first athletic event, to insure an adequately rooted and stable sod playing surface. It was not uncommon at the time that Nissan Stadium was opened for a typical NFL stadium to require as few as one re-sodding per year.

As event schedules have intensified, multiple re-soddings per season have become more the norm for most NFL stadiums having natural grass playing surfaces. Nissan Stadium currently experiences, in addition to the Titans current 10-game schedule, multiple college football games, soccer games and concerts. The additional wear to the natural grass playing surface brought on by these additional events has resulted in the need currently for a minimum of 2 re-soddings per year. Since one of the re-soddings often occurs at the midpoint of the NFL season, the sod is not afforded the luxury of the previously mentioned 45-60 day grow-in period. Consequently, the Titans grounds crew currently re-sods with a Bermuda 419 sod, purchased from a North Carolina sod grower (Carolina Green) and grown over a plastic membrane. This growing technique is designed to provide the playing surface with a tough, fibrous root system that enables play immediately, thus eliminating the need for the 45-60 day grow-in period. The existing sod is stripped and the rootzone re-graded by a local contractor. The local contractor also installs the sod provided by Carolina Green.

Current Conditions

The sod playing surface appeared to be generally in very good condition at the time of the walkthrough (November 16, 2016). There was some apparent damage, which is to be expected at this point in an NFL season. The sodded areas between the sidelines and the field wall have also begun to wear noticeably, which is common on NFL playing fields having no warning track. According to Titan's staff, the field was re-sodded directly after the Beyonce concert on October 2, and before the Titans/Browns game on October 16. Even though it's common for Bermuda grass to begin dormancy (typically brought on by seasonal decrease in soil temperature) in Nashville by mid-November, the sod color was still vibrant and stable from the standpoint of playability per Titans staff.

Recommendations

The Titans currently utilize a Macleod Inflatable Field Heating System as well as an Evergreen Tarp Field System to maximize soil temperatures to extend the growing season for the warm-season Bermuda grass playing surface.

While these technologies can have a minor effect on soil temperature, the inclusion of a glycol-based field heating system would offer a much more impactful solution for extending the Bermuda grass growing season. Additionally, this would insure that the NFL mandate prohibiting play on a "frozen" field would be easily adhered to. To implement a glycol-based heating system, the existing top 12" of rootzone would need to be removed and replaced to allow for the placement of the required glycol tubing within the rootzone profile. Additionally, an area would need to be found within the service area of Nissan Stadium (preferably adjacent to the playing field) to house the required heat exchanger, boiler, and other associated mechanical equipment inherent with a glycol-based field heating system.

In addition, the inclusion of a perimeter warning track would greatly reduce the wear currently experienced by the sod in the areas between the sideline and the field wall. Sod health is typically compromised in these areas due to intense foot and vehicle traffic, as well as excessive shade, especially in the southern end zone late in the season.

Sod Wear/Damage at Mid-Field – Mid November

Sod Density/Color – Typical throughout Field – Mid November

Mid-Morning Shade Pattern – South Endzone – Mid November

Sod Wear/Damage at Sideline – Mid November

Rootzone Material

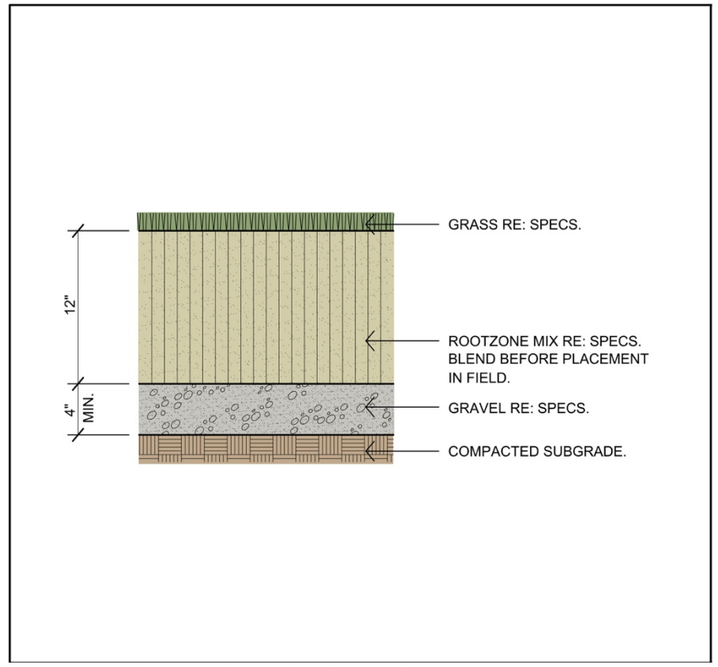
The sand rootzone material provides the basic growing medium for the sod's root system. The three primary criteria for a successful rootzone profile involve free vertical drainage, stable footing for the athlete, and optimal agronomic characteristics to promote healthy root growth for the natural grass. The original rootzone was installed at a depth of 12". Per Titan's staff, the rootzone continues to perform well with regard to the three previously mentioned criteria. However, the top 6" of rootzone was removed and replaced after the flood of '10, and Titan's staff believes that the rootzone may not offer the same agronomic quality as did the rootzone in place prior to the flood. Titan's staff have commissioned independent laboratory testing of the rootzone to determine whether it's agronomic quality has been compromised. The testing results found no indication that the rootzone material had been compromised.

Current Conditions

Except for the before-mentioned questions regarding the agronomic quality of the rootzone, it appears to be functioning adequately. Continued performance of the rootzone will be largely dependent on maintenance practices as administered by Titans staff.

Recommendations

None currently. Although agronomic quality of the rootzone should continue to be monitored.



Schematic Playing Field Profile as Constructed

Drainage System

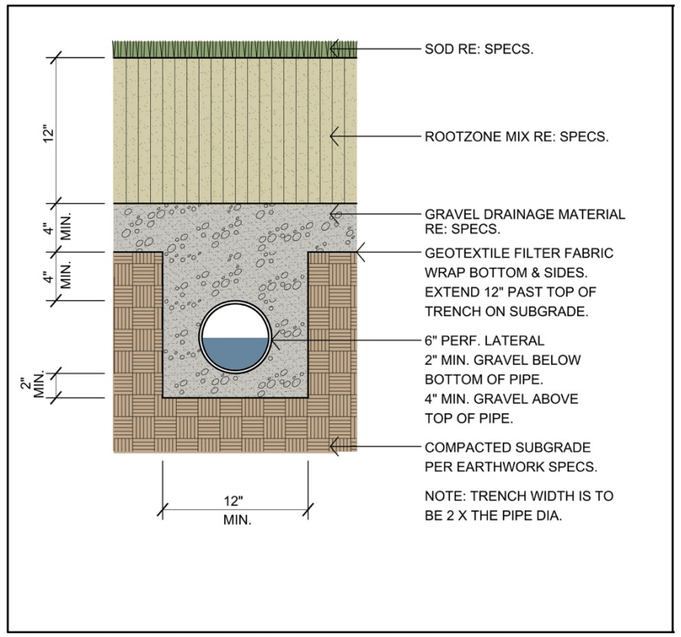
The playing field's drainage system consists of a series of perforated drainage laterals located in gravel filled trenches. The 6" laterals are arranged in a herring bone pattern 15' off center throughout the field, and tied to a perimeter perforated drainage collector located at the base of the field wall. The perimeter perforated collector connects to an outfall manhole at the northeast corner of the playing field, adjacent to the stadium access tunnel. The playing field drainage system is supplemented by a perimeter trench drain at the base of the field wall. The perimeter trench drain provides an outlet for storm water when the field is covered with an impermeable surface (i.e. tarp/field protection system), thus temporarily reducing/eliminating the effectiveness of the subsurface drainage system.

Current Conditions

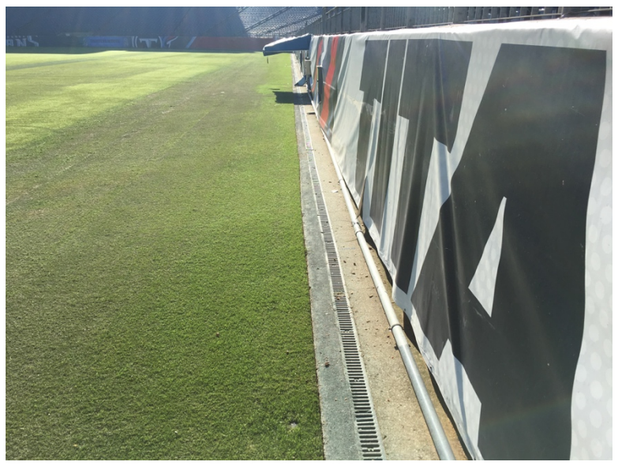
Based on conversation with Titan's staff, the drainage system seems to be performing adequately. Although, a portion of the perimeter perforated collector in the northwest corner of the field and a handful of laterals were replaced recently as it had been determined they had likely been damaged by concert trucks utilizing the adjacent field access tunnel repeatedly. The drainage system should continue to be monitored to insure no additional damage has been incurred by heavy concert trucks. Truck access to the field should be minimized when possible, and adequate field protection should always be incorporated when trucks must access the field to insure no further damage is incurred to the drainage system.

Recommendations

None currently. Although drainage performance should continue to be monitored.



Schematic Playing Field Drainage Profile as Constructed



Perimeter Trench Drain Condition

Irrigation System

The playing field irrigation system is comprised of a series of sports-rated broadcast heads located approx. 50' on center throughout the extent of the field. The heads are connected with a series of PVC laterals and zoned in groups of 2-7 heads per zone, depending on each zone's location within the field. Each zone is supplied with domestic water from a perimeter 3" PVC main line, and is controlled by an electronic remote control valve which connects back to a central controller located in the northeast corner of the service area.

The irrigation system is supplied by the City's domestic water system. The city-supplied domestic water system provides adequate pressure to operate the system. A booster pump is not required.

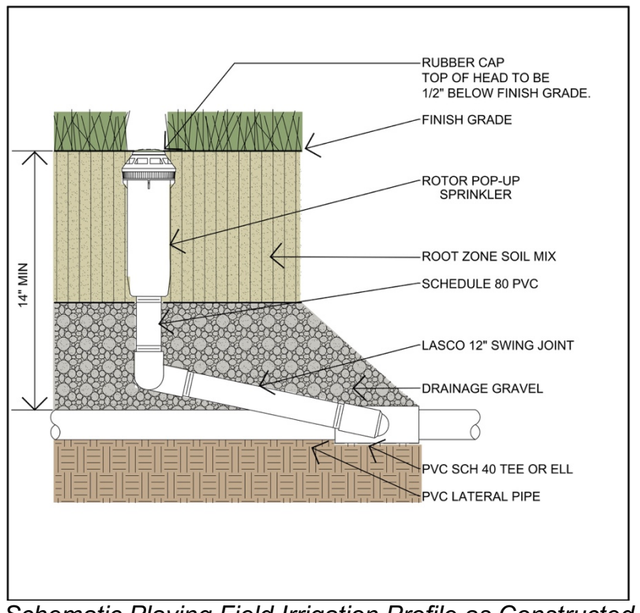
Current Conditions

Based on conversation with Titan's staff, the irrigation system is operating in a relatively maintenance-free fashion, which is uncommon for an irrigation system of this type and age. It is typical for an automatic irrigation system of this type to experience leaks and other malfunctions after 17 years of operation to the point that total replacement is appropriate. Even with the good condition of the system, total replacement should be anticipated within the next 5-10 years.

Recommendations

Water bibs should be placed at 50' on center along each field wall adjacent to the sideline would be very beneficial as it would allow game day operations staff easy access for sideline equipment requiring a domestic water supply.

Perimeter Irrigation Remote Control Valve



Schematic Playing Field Irrigation Profile as Constructed

PREVENTIVE MAINTENANCE PROGRAM

VENUE Solutions group

PREVENTIVE MAINTENANCE PROGRAM

Public assembly facilities that are well maintained and upgraded when appropriate remain contemporary and competitive with their local and regional rivals. On the other hand, poorly maintained facilities have a negative impact on the operator and owner's ability to attract regional and national events that have large economic impacts.

Well-maintained facilities do not happen by accident and require an actionable plan, resources to implement the plan, and staff with proper skill sets to execute the work, which includes tracking and capturing data, transferring knowledge, and implementing training and professional development.

The plan should have a set of objectives on how the operator wants to execute preventive maintenance for the facilities, and the following items should be part of the overall plan:

1. Develop policies for preventive maintenance (which would start with a list of equipment by facility)
2. Utilization of a computerized maintenance management software (CMMS)
3. Develop a set of checklists for equipment maintenance
4. Establish who does the work
5. Establish process for employee feedback
6. Establish quality assurance process to ensure work is being done
7. Establish performance metrics for department employees and contractors

Preventive maintenance (PM) is not an attractive or high profile function, and decisions to defer preventive maintenance are made every day by well-intentioned people when prioritizing resources. More resources are typically allocated toward revenue generation. Poorly maintained systems and equipment typically results in more rapid, untimely breakdowns, expensive emergency service calls, and higher utility costs. Proper preventive maintenance procedures require investments in staff and materials; however, an effective program will save the operator money over the life of the facility by limiting repairs and replacements, therefore avoiding costly breakdowns and accelerated equipment replacement and facilitating lower utility costs.

Employees tasked with executing preventive maintenance require training and updating on the systems they are to maintain. Mechanical, electrical, plumbing, roofing, telecommunication and other facility systems require specific training that is ongoing, and this takes a commitment from the employer and employee in the investment of time and financial resources. Well trained employees and a continued commitment to maintaining certification in their respective disciplines will lay the foundation for adherence to the preventive maintenance program. As technology advances, the commitment to training will ensure that employee skills do not become dated and obsolete.

One of the most critical aspects for effective asset preservation is the utilization of a computerized maintenance management software (CMMS) that allows for the implementation of preventive maintenance along with the necessary tracking and budgeting for preventive maintenance. Daily work orders can be produced through the system, employee hours tracked, and materials required to perform preventive maintenance can be identified and managed. The software can assist the operator administratively as it can be used for contract and insurance tracking, purchase orders, inventory ordering and scheduling.

Nissan Stadium has utilized a work order system that was developed in-house by the Titans IT department in 2003. The current process for generating work orders starts with an email or phone call to stadium operations, who then fills out a sheet of paper documenting the work to be performed. Once the work order has been completed, operations staff then manually inputs into the system that the work order has been "closed". Work orders to be completed by stadium contractors who currently are utilized for mechanical systems and vertical transportation submit closed work orders to stadium operations.

Currently, there is no CMMS utilized by stadium operations as most of the equipment requiring preventive maintenance is performed by contractors. Contractors are tasked with documenting the preventive maintenance through their own CMMS platforms and can provide the operations staff reports when requested. VSG was provided a demonstration of the major systems contractor's CMMS which showed that labor and materials expended is being tracked. The functionality of their program is limited compared to systems VSG has observed in other NFL stadiums. Several we reviewed have apps for tablets and PDAs which can be deployed in the "field" and eliminate the need for paper and manual entry of completed work orders and PMs. More modern work order systems are deployed through a web portal that can be accessed by anyone in the organization and provides a level of accountability for everyone in the organization to participate in maintaining the venue, not just operations staff.

Based on our observations and interviews of stadium operations staff, the planning and execution of equipment and systems preventive maintenance is one of the highest priorities. Currently, the staff person responsible for administering the work order system is expending too much of his time "managing the paper", which is a poor use of his time when he could be out in the stadium performing maintenance and repair work. Additional administrative resources will likely be required to fully optimize a more comprehensive computerized work order and preventive maintenance system.

Recommendations

1. Migrate to a single preventive maintenance and work order system to be utilized by stadium management and contractors.

2. Functionality should include web based work order system that can be accessed by everyone in the organization.

3. Consideration should be given to a system that deploys an app for use in the field via tablets and PDAs.

4. Consideration should be given to a system that provides for advanced reporting and analytics.

5. Sports Authority should request from the operator reports on number of PMs completed quarterly and annually.

6. If request by operator to repair or replace a piece of equipment that requires reimbursement from the Sport Authority, then a reporting on the preventive maintenance of said equipment over its life cycle should be provided by operator.

CAPITAL EXPENSE MATRIX

VENUE Solutions group

Nissan Stadium Capital Expenditures

Grouping		Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	*Total Cost*
					Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
Architectural & Interiors																									
Site	Add pedestrian ramps to cross over Russell Street and Victory Avenue	30	New	510,000	-	-	-	574,009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***574,009***
Site	Replace 35% of paving between the stadium exterior and the curb with upgraded material	30	Fair	595,000	-	-	-	-	689,768	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***689,768***
Site	Create permanent security screening stations at each gate	20	Poor	500,000	515,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***515,000***
Site	Upgrade landscaping, sidewalks and ped crossing at Russell Ave. and 1st St, Align drives at Lots E and F	20	Poor	600,000	-	-	655,636	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***655,636***
Site	Replace planting areas adjoining Lots J and K with ground cover or a walkable landscape material	15	Poor	20,000	20,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32,094	-	-	-	-	***52,694***
Site	Upgrade landscaping in and around Lots N, P and R by adding shade trees	20	Fair	340,000	-	119,033	122,604	126,282	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***367,919***
Exterior	Reclad existing exterior opaque building walls with a contemporary building cladding system	30	Fair	2,250,000	-	-	-	-	-	-	2,767,216	-	-	-	-	-	-	-	-	-	-	-	-	-	***2,767,216***
Field Level	Replace Event Level lighting with up-to-date, efficient LED or high-efficiency fluorescent lighting	15	Fair	150,000	-	79,568	81,955	-	-	-	-	-	-	-	-	-	-	-	-	-	123,964	127,682	-	-	***413,168***
Field Level	Upgrade finishes and lighting in crew catering area	15	Fair	100,800	-	-	110,147	-	-	-	-	-	-	-	-	-	-	-	-	-	-	171,605	-	-	***281,752***
Field Level	Create a permanent family lounge at the event level near the Titans locker room	10	Fair	100,000	-	-	-	112,551	-	-	-	-	-	-	-	-	-	151,259	-	-	-	-	-	-	***263,810***
Field Level	Upgrade team meeting facilities with permanent seating, tiered if possible, dimmable lighting	15	Fair	336,000	-	-	-	-	389,516	-	-	-	-	-	-	-	-	-	-	-	-	-	-	606,853	***996,369***
Field Level	Renovate Titans home & coaches' locker rooms to a level of finish comparable to other NFL stadiums	10	Good	1,030,000	-	-	1,125,509	-	-	-	-	-	-	-	-	-	1,512,590	-	-	-	-	-	-	-	***2,638,099***
Field Level	Add permanent holding rooms for persons detained by police	20	Poor	80,000	-	84,872	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***84,872***
Main Concourse	Add carefully selected finishes in main concourse areas to improve overall appearance of the facility	20	Fair	594,000	-	-	324,540	334,276	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***658,816***
Main Concourse	Replace printed signage at any retail area with dimensional signage similar to concessions	10	Fair	50,000	51,500	-	-	-	-	-	-	-	-	-	69,212	-	-	-	-	-	-	-	-	-	***120,712***
Main Concourse	Replace themed buildings in end zone with guest amenities consistent with the stadium	20	Fair	1,690,000	-	-	923,354	951,055	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***1,874,409***
Press/Suite Level	Replace acoustical ceiling tile at this level on a schedule with tile having extreme humidity resistance	15	Fair	130,000	-	-	71,027	73,158	-	-	-	-	-	-	-	-	-	-	-	-	-	110,658	113,978	-	***368,821***
Press/Suite Level	Repaint suite lobby (all levels) with colors pertaining to sponsor, team, or architectural theme	5	Good	24,000	-	25,462	-	-	-	-	29,517	-	-	-	-	34,218	-	-	-	-	39,668	-	-	-	***128,865***
Press/Suite Level	Replace ceiling tile in the fan zones with a more decorative acoustical ceiling, and more flexible lighting	15	Good	40,000	-	-	-	-	46,371	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72,244	***118,615***
Press/Suite Level	Replace orange wall tile in public restrooms with newer tile finish; replace laminate counters	20	Good	140,000	-	-	-	-	162,298	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***162,298***
Club Level	Replace acoustical ceiling tile at this level on a schedule with tile having extreme humidity resistance	15	Good	195,000	-	-	106,541	109,737	-	-	-	-	-	-	-	-	-	-	-	-	-	165,987	170,967	-	***553,232***
Club Level	Replace orange wall tile in public restrooms (all levels) with newer tile finish; replace laminate counters	20	Good	1,240,000	-	-	-	-	1,437,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***1,437,500***
Club Level	Refurbish Midfield Club Lounges, with updated and more lively colors and finishes	10	Good	2,380,000	-	-	-	2,678,711	-	-	-	-	-	-	-	-	-	3,599,964	-	-	-	-	-	-	***6,278,675***
Club Level	Add escalators at each midfield club lounge to access Mezzanine Suite and Promenade Suite levels	30	New	1,260,000	-	1,336,734	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***1,336,734***
Club Level	Replace printed signs & wayfinding with dimensional signs & add dimensional signs at concessions	10	Fair	50,000	-	53,045	-	-	-	-	-	-	-	-	-	71,288	-	-	-	-	-	-	-	-	***124,333***
Club Level	Redevelop up to four smaller end zone club level lounges as sponsored lounges	10	Fair	1,080,000	-	1,145,772	-	-	-	-	-	-	-	-	-	1,539,822	-	-	-	-	-	-	-	-	***2,685,594***
Mezzanine Suite Level	Redevelop up to four smaller end zone suite-level lounges as sponsored lounges; replace stadium seats	10	Poor	1,270,000	-	1,347,343	-	-	-	-	-	-	-	-	-	1,810,716	-	-	-	-	-	-	-	-	***3,158,059***
Mezzanine Suite Level	Replace acoustical ceiling tile at this level on a schedule with tile having extreme humidity resistance	15	Fair	220,000	-	-	-	123,806	127,520	-	-	-	-	-	-	-	-	-	-	-	-	-	192,886	198,672	***642,884***
Mezzanine Suite Level	Replace orange wall tile in public restroom with newer tile finish; replace laminate counters	20	Good	300,000	-	-	-	-	347,782	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***347,782***
Mezzanine Suite Level	Install permanent reception counter at elevator lobby	10	Fair	30,000	30,900	-	-	-	-	-	-	-	-	-	41,527	-	-	-	-	-	-	-	-	-	***72,427***
Mezzanine Suite Level	Add framed artwork at suite corridor	10	Fair	50,000	-	-	54,636	-	-	-	-	-	-	-	-	-	73,427	-	-	-	-	-	-	-	***128,063***
Mezzanine Suite Level	Replace suite corridor carpet with carpet tiles having a more distinctive pattern and colors	10	Good	80,000	-	-	-	-	92,742	-	-	-	-	-	-	-	-	-	124,637	-	-	-	-	-	***217,379***
Mezzanine Suite Level	Replace wall covering accent at suite door recess with wood, tile, or other durable material	10	Good	30,000	-	-	-	-	34,778	-	-	-	-	-	-	-	-	-	46,739	-	-	-	-	-	***81,517***
Mezzanine Suite Level	Redevelop large open floor areas as suite lounges, with bar service, upgraded finishes	10	Fair	990,000	-	-	1,081,800	-	-	-	-	-	-	-	-	-	1,453,848	-	-	-	-	-	-	-	***2,535,648***
Promenade Suite Level	Install permanent reception counter at elevator lobby	10	Fair	30,000	30,900	-	-	-	-	-	-	-	-	-	41,527	-	-	-	-	-	-	-	-	-	***72,427***
Promenade Suite Level	Replace acoustical ceiling tile at this level on a schedule with tile having extreme humidity resistance	15	Good	220,000	-	-	-	123,806	127,520	-	-	-	-	-	-	-	-	-	-	-	-	-	192,886	198,672	***642,884***
Promenade Suite Level	Replace orange wall tile in public restrooms with newer tile finish; replace laminate counters	20	Good	300,000	-	-	327,818	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***327,818***
Promenade Suite Level	Replace Suite Corridor carpet with carpet tiles having a more distinctive pattern and colors	10	Good	80,000	-	-	-	-	92,742	-	-	-	-	-	-	-	-	-	124,637	-	-	-	-	-	***217,379***
Promenade Suite Level	Replace wall covering accent at suite door recess with wood, tile, or other durable material	10	Good	30,000	-	-	-	-	34,778	-	-	-	-	-	-	-	-	-	46,739	-	-	-	-	-	***81,517***
Promenade Suite Level	Redevelop 4 smaller end zone suite-level lounges as sponsored lounges, w/ distinct personalities	10	Fair	1,270,000	-	1,347,343	-	-	-	-	-	-	-	-	-	1,810,716	-	-	-	-	-	-	-	-	***3,158,059***
Promenade Suite Level	Redevelop large open floor areas as suite lounges, with upgraded finishes	10	Fair	860,000	-	912,374	-	-	-	-	-	-	-	-	-	1,226,154	-	-	-	-	-	-	-	-	***2,138,528***
Upper Concourse	Consider adding escalator access to upper concourse levels	30	New	4,000,000	-	-	-	-	4,637,096	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***4,637,096***
Upper Concourse	Reclad existing restrooms and concession stands with durable, weather resistant materials	20	Fair	250,000	-	265,225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***265,225***
Upper Concourse	Add large scale wayfinding graphics to upper concourse	10	Poor	70,000	72,100	-	-	-	-	-	-	-	-	-	96,896	-	-	-	-	-	-	-	-	-	***168,996***
Upper Concourse	Add angled trim to flat guardrail tops to discourage resting food or drinks on guardrail	15	New	20,000	20,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32,094	-	-	-	-	***52,694***
Upper Concourse	Replace printed signage at retail area with dimensional signage similar to concessions	10	Fair	50,000	51,500	-	-	-	-	-	-	-	-	-	69,212	-	-	-	-	-	-	-	-	-	***120,712***
Upper Concourse	Paint UC Restroom ceiling and add permanent ceiling at sloped fireproofing	10	Fair	100,000	-	106,090	-	-	-	-	-	-	-	-	-	142,576	-	-	-	-	-	-	-	-	***248,666***
	Magnetometers - Security screening at entry gates	10	Good	500,000	-	-	-	-	-	-	-	-	652,387	-	-	-	-	-	-	-	-	-	-	903,056	***1,555,442***
Replacement completed in 2016	Seat Replacement	15-20	Good	6,500,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,743,510	-	-	-	***10,743,510***

Nissan Stadium Condition Assessment

Nissan Stadium Capital Expenditures

Grouping		Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	*Total Cost*
					Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
Original to stadium opening in 1999	Trash Cans - Public Concourses	12	Poor	625,000	643,750	-	-	-	-	-	-	-	-	-	-	-	917,834	-	-	-	-	-	-	-	*1,561,584*
					1,436,850	**6,822,860**	**4,985,567**	**5,207,392**	**8,220,412**	**-**	**2,796,733**	**-**	**652,387**	**-**	**318,374**	**6,635,491**	**3,957,698**	**3,751,223**	**342,753**	**64,188**	**10,907,142**	**575,933**	**670,716**	**1,979,498**	59,325,216
Major Systems																									
Mechanical	Chilled Water Pumps	21	Fair	150,000	-	-	-	168,826	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*168,826*
	CHW Pump VFDs	20	Good	45,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70,109	-	-	-	-	-	*70,109*
	Piping Treatment/Replacement	30	Poor	1,500,000	509,850	525,146	540,900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*1,575,895*
	Electric Resistance Heaters	25	Good	200,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	311,593	-	-	-	-	-	*311,593*
	Club Air Handling Units	15-20	Good	1,350,000	-	-	-	-	313,004	322,394	332,066	342,028	352,289	-	-	-	-	-	-	-	-	-	-	-	*1,661,781*
	Support Air Handling Units	20 - 25	Fair	400,000	-	-	-	-	92,742	95,524	98,390	101,342	104,382	-	-	-	-	-	-	-	-	-	-	-	*492,379*
	BAS System Overhaul	25	Fair	300,000	-	-	-	337,653	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*337,653*
	VAV Boxes	20	Fair	150,000	-	-	40,977	42,207	43,473	44,777	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*171,434*
	Fan Coils	25	Fair	480,000	-	-	-	-	-	-	147,585	152,012	156,573	161,270	-	-	-	-	-	-	-	-	-	-	*617,440*
170 fans	Fans	20	Fair	475,000	-	-	171,285	176,424	181,716	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*529,425*
	Truck & Bus Exhaust System - Loading Dock	15	Poor	40,000	41,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64,188	-	-	-	-	*105,388*
HVAC Upgrades	BAS Upgrades and Ventilation Measurement	20 - 25	New	250,000	257,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*257,500*
	Demand-Control Ventilation	20 - 25	New	65,000	66,950	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*66,950*
	Bi-Polar Filters on Club AHUs	15-20	New	500,000	515,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	851,217	-	-	*1,366,217*
	Add Energy Wheels to Locker AHUs	15-20	New	140,000	144,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	238,341	-	-	*382,541*
	Commissioning + Continuing Commissioning		New	300,000	207,030	53,151	54,746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*314,927*
	Chilled water filtration system	21	New	50,000	51,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*51,500*
Electrical	Electrical Dist. Central Monitoring for Power Trending	15	New	150,000	154,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	240,706	-	-	-	-	*395,206*
	Thermal Scans on Dist. Equipment	Annually	Good	25,000	25,750	28,982	29,851	30,747	31,669	32,619	33,598	34,606	35,644	36,713	37,815	38,949	40,118	41,321	42,561	43,838	45,153	42,561	43,838	45,153	*741,485*
	Replace Central Lighting Control System	15	Poor	1,400,000	-	742,630	764,909	-	-	-	-	-	-	-	-	-	-	-	-	-	1,156,993	1,191,703	-	-	*3,856,235*
	Integrate All Lighting Controls	20	Poor	50,000	51,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*51,500*
	Upgrade all Lighting to LED Fixtures	20 - 25	New	1,250,000	-	663,063	682,954	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*1,346,017*
	Replace Sports Lighting System for LED	20	New	2,000,000	-	-	2,185,454	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*2,185,454*
	Relamp Existing Metal Halide Sports Lighting	10	Fair	120,000	123,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*123,600*
	Replace Fire Alarm Headend Panel	15	Poor	1,000,000	-	1,060,900	-	-	-	-	-	-	-	-	-	-	-	-	1,604,706	-	-	-	-	-	*2,665,606*
	New Suite Aisle Lighting and Controls	15	New	400,000	206,000	212,180	-	-	-	-	-	-	-	-	-	-	-	-	320,941	330,570	-	-	-	-	*1,069,691*
	Replace Existing Main and Tie Breakers in Unit-Substations	30	Good	1,800,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*-*
Plumbing & Water Systems	Replace Galvanized Cold Water Mains in Stadium with S/S	30	Poor	2,300,000	592,250	610,018	628,318	647,168	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*2,477,753*
	Reline Existing Galvanized Cold Water Within Chases of Stadium	30	Poor	400,000	135,960	140,039	144,240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*420,239*
	Replace Galvanized Cold Water at South End Zone Buildings with Copper	30	Poor	60,000	15,450	15,914	16,391	16,883	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*64,637*
	New PRV valves, fittings and gauges	15	Good	30,000	-	-	32,782	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51,073	-	-	*83,855*
	Replacement of (3) Bolt Mounted Water Closets With (4) Bolt Type	30	Good	2,650,000	-	-	-	-	-	-	-	-	432,206	445,172	458,527	472,283	486,452	501,045	516,077	531,559	-	-	-	-	*3,843,322*
	Replacement of 1.0 GPF Urinals with 0.125 GPF Urinals	30	Good	500,000	-	-	-	-	-	-	-	-	81,548	83,995	86,515	89,110	91,783	94,537	97,373	100,294	-	-	-	-	*725,155*
	Replacement of Lavatory Faucets with 0.5 GPM Faucets	20	Good	200,000	-	-	-	-	-	-	-	-	32,619	33,598	34,606	35,644	36,713	37,815	38,949	40,118	-	-	-	-	*290,062*
	Replacement of Concourse Drinking Fountain Refrigeration Units	15	Fair	50,000	25,750	26,523	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41,321	42,561	-	-	*136,155*
	Replacement of Shower Valves (NO TILE WORK INCLUDED)	10	Fair	50,000	10,300	10,609	10,927	11,255	11,593	-	-	-	-	-	13,842	14,258	14,685	15,126	15,580	-	-	-	-	-	*128,175*
	Replace Existing Water Heaters with Gas Fire 96% Efficient Heaters	15	Poor	100,000	51,500	53,045	-	-	-	-	-	-	-	-	-	-	-	-	-	80,235	82,642	-	-	-	*267,423*
Event Level	Replace Existing Hot Water Storage Tanks	15	Poor	60,000	30,900	31,827	-	-	-	-	-	-	-	-	-	-	-	-	-	48,141	49,585	-	-	-	*160,454*
Event Level	Replace with Digital Control Mixing Valve Station	15	Fair	20,000	-	21,218	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33,057	-	-	-	*54,275*
Main Concourse	Provide Heat Trace Cable and Insulation on Each Trap	10	New	20,000	10,300	10,609	-	-	-	-	-	-	-	-	13,842	14,258	-	-	-	-	-	-	-	-	*49,009*
	Replace Sewage Pumps, Controls and Re-line Pit at (2) locations	15-20	Fair	50,000	25,750	26,523	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41,321	42,561	-	-	*136,155*
					3,252,740	**4,232,374**	**5,303,734**	**1,431,161**	**674,197**	**495,315**	**611,639**	**629,988**	**1,195,261**	**760,748**	**645,147**	**664,502**	**669,751**	**689,844**	**1,092,241**	**3,074,727**	**1,780,643**	**2,460,016**	**43,838**	**45,153**	29,753,019
Roofs																									
Replacement	Main Concourse - East & West	20	Fair to Poor	400,000	-	-	437,091	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*437,091*
Replacement	Main Concourse - End Zones	20	Poor	200,000	206,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*206,000*
Replacement	Entry Gates - Canopies	20	Poor	50,000	-	-	50,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*50,000*
Prep & Coat	Scoreboards - Prep & Coat	10	Poor	30,000	-	-	32,782	-	-	-	-	-	-	-	-	-	44,056	-	-	-	-	-	-	-	*76,838*
Prep & Coat	Free Stand Buildings - Concrete	10	Fair	12,500	-	-	-	-	14,491	-	-	-	-	-	-	-	-	-	19,475	-	-	-	-	-	*33,966*
Replacement	Elevator Towers	20	Good	65,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101,268	-	-	-	-	-	*101,268*
Replacement	Club & Press Level	20	Fair to Poor	130,000	-	-	142,055	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*142,055*
Replacement	Upper Concourse - East & West	20	Fair to Poor	675,000	-	-	737,591	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*737,591*
					206,000	**-**	**1,399,518**	**-**	**14,491**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**44,056**	**-**	**120,742**	**-**	**-**	**-**	**-**	**-**	1,784,807
Structure																									
33% of joints on East & West sides replaced in 2016	Expansion Joint Replacement - Upper Concourse	15	Fair/Good	6,000,000	-	-	4,392,763	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,214,598	-	-	*14,607,361*
	Expansion Joint Replacement - Main Concourse	15	Fair	2,500,000	-	-	2,731,818	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,256,083	-	-	*6,987,900*
85% of Club on East Side replaced in 2016/2017	Expansion Joint Replacement - Premium Levels	15	Fair/Good	2,500,000	-	-	1,775,681	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,256,083	-	-	*6,031,764*
$7.00 sq. ft.	Caulk Joint Replacement - Exterior	5	Fair	15,000	-	15,914	-	-	-	-	18,448	-	-	-	-	21,386	-	-	-	-	24,793	-	-	-	*80,541*
Completed in 2016	Water Proofing - Upper Concourse	15-20	Good	700,000	-	-	-	-	-	-	-	-	-	-	-	-	1,027,974	-	-	-	-	-	-	-	*1,027,974*
	Water Proofing - Main Concourse	15-20	Fair	1,500,000	-		-	-	1,738,911	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*1,738,911*

Nissan Stadium Capital Expenditures

Grouping		Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	*Total Cost*
					Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
Re-painted in 2016	Light Rakers - Painting	10	Good	600,000	-	-	-	-	-	-	-	760,062	-	-	-	-	-	-	-	-	-	1,021,460	-	-	*1,781,522*
	Parking Lots - Re-Seal & Striping	5	Good	125,000	-	-	-	-	144,909	-	-	-	-	167,990	-	-	-	-	194,746	-	-	-	-	225,764	*733,409*
					-	**15,914**	**8,900,261**	**-**	**1,883,820**	**-**	**18,448**	**760,062**	**-**	**167,990**	**-**	**21,386**	**1,027,974**	**-**	**194,746**	**-**	**24,793**	**19,748,224**	**-**	**225,764**	32,989,381
Technology																									
	Radio Repeater System	15	Poor	250,000	257,500	-	-	-	-	-		-	-	-	-	-	-	-	-	401,177	-	-	-	-	*658,677*
	Broadcast Systems	15	Poor	1,750,000	1,802,500	-	-	-	-	-		-	-	-	-	-	-	-	-	2,808,236	-	-	-	-	*4,610,736*
	Information Technologies	5	Good	1,700,000	-	-	1,857,636	-	-	-		2,153,509	-	-	-	-	2,496,507	-	-	-	-	2,894,136	-	-	*9,401,789*
	Information Technologies - 10G Fiber Optic Backbone	20	Fair	200,000	206,000	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	*206,000*
	Phone System	20	Poor	400,000	-	424,360	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	*424,360*
	WLAN Upgrade - Seating Bowl	10	Fair	600,000	-	-	655,636	-	-	-		-	-	-	-	-	881,120	-	-	-	-	-	-	-	*1,536,756*
	WLAN Upgrade - Concourses	10	Fair	400,000	-	-	437,091	-	-	-		-	-	-	-	-	587,413	-	-	-	-	-	-	-	*1,024,504*
	Distributed Television System	5	Fair	1,200,000	-	1,273,080	-	-	-	-	1,475,849	-	-	-	-	1,710,913	-	-	-	-	1,983,417	-	-	-	*6,443,259*
	Security Systems - Video Surveillance	10	Poor	1,600,000	1,648,000	-	-	-	-	-		-	-	-	2,214,774	-	-	-	-	-	-	-	-	-	*3,862,774*
	Security Systems - Access Control	10	Good	400,000	-	-	-	-	-	-	491,950	-	-	-	-	-	-	-	-	-	661,139	-	-	-	*1,153,089*
	Security Systems - Access Control (Maintenance and Licensing)	1	Good	45,000	46,350	47,741	49,173	50,648	52,167	53,732	55,344	57,005	58,715	60,476	62,291	64,159	66,084	68,067	70,109	72,212	74,378	76,609	78,908	81,275	*1,245,442*
	Security Systems - Mechanical Barriers	30	Good	20,000	-	-	-	-	-	-		-	-	26,878	-	-	-	-	-	-	-	-	-	-	*26,878*
	Sound Systems	15	Good	4,400,000	-	-	-	-	-	-		-	-	5,913,232	-	-	-	-	-	-	-	-	-	-	*5,913,232*
	Video Production Control Room	8	Good	3,000,000	-	-	-	3,376,526	-	-		-	-	-	-	4,277,283	-	-	-	-	-	-	-	5,418,334	*13,072,143*
	Audio-Video Systems (Club)	8	Poor	600,000	-	636,540	-	-	-	-		-	-	-	-	855,457	-	-	-	-	-	-	-	1,083,667	*2,575,663*
	Large Format Video Displays (2 Endzones)	8	Good	9,000,000	-	-	-	10,129,579	-	-		-	-	-	-	12,831,848	-	-	-	-	-	-	-	16,255,001	*39,216,428*
	Large Format Video Displays (2 Ribbon Boards)	8	Good	3,000,000	-	-	-	3,376,526	-	-		-	-	-	-	4,277,283	-	-	-	-	-	-	-	5,418,334	*13,072,143*
	Large Format Video Displays (Clubs)	8	Good	750,000	-	-	-	-	-	-		950,078	-	-	-	-	-	-	-	1,203,530	-	-	-	-	*2,153,607*
					3,960,350	**2,381,721**	**2,999,536**	**16,933,280**	**52,167**	**53,732**	**2,023,143**	**3,160,591**	**58,715**	**6,000,587**	**2,277,065**	**24,016,942**	**4,031,125**	**68,067**	**70,109**	**4,485,154**	**2,718,934**	**2,970,746**	**78,908**	**28,256,610**	106,597,481
Turf Systems																									
	Subsurface Glycol Heating System	20	New	1,500,000	-	-	1,639,091	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*1,639,091*
	Perimeter Warning Track	20	New	200,000	-	-	218,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*218,545*
	Irrigation System	20	Good	100,000	-	-	109,273	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*109,273*
	Water Bibs (8) - Field Wall	25	New	25,000	25,750	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*25,750*
					25,750	**-**	**1,966,909**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	1,992,659
Vertical Transportation																									
1998	Passenger Elevator #1	20-25	Fair	200,000	-	-	218,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*218,545*
1998	Passenger Elevator #2	20-25	Fair	200,000	-	-	218,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*218,545*
1998	Passenger Elevator #3	20-25	Fair	200,000	-	-	218,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*218,545*
1998	Freight Elevator #4	20-25	Poor	400,000	-	-	437,091	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*437,091*
1998	Freight Elevator #5	20-25	Poor	400,000	-	-	437,091	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*437,091*
1998	Passenger Elevator #6	20-25	Fair	200,000	-	-	218,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*218,545*
1998	Passenger Elevator #7	20-25	Fair	200,000	-	-	218,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*218,545*
1998	Passenger Elevator #8	20-25	Fair	200,000	-	-	218,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*218,545*
2012	Passenger Elevator #9	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #10	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #11	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #12	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #13	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #14	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #15	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #16	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #17	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #18	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #19	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
2012	Passenger Elevator #20	10-15	Good	200,000	-	-	-	-	-	-	-	253,354	-	-	-	-	-	-	-	-	-	-	-	361,222	*614,576*
1998	Escalator 1 East Long	20-25	Good	700,000	-	-	-	-	811,492	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*811,492*
1998	Escalator 2 West Long	20-25	Good	700,000	-	-	-	-	811,492	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*811,492*
1998	Escalator 3 East Short	20-25	Good	500,000	-	-	-	-	579,637	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*579,637*
1998	Escalator 3 West Short	20-25	Good	500,000	-	-	-	-	579,637	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*579,637*
					-	**-**	**2,185,454**	**-**	**2,782,258**	**-**	**-**	**3,040,248**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4,334,667**	12,342,627
	(Note - a 3% escalation in cost starting in 2018)																								
	Total				**8,881,690**	**13,452,868**	**27,740,979**	**23,571,833**	**13,627,346**	**549,047**	**5,449,962**	**7,590,889**	**1,906,363**	**6,929,324**	**3,240,586**	**31,338,321**	**9,730,605**	**4,509,133**	**1,820,591**	**7,624,070**	**15,431,511**	**25,754,918**	**793,461**	**34,841,692**	244,785,189

Nissan Stadium Food Service & Retail Capital Expenditures

Grouping		Total Equipment Counts	Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2027	***Total Cost***
						Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
Food Service																										
	Underbar Ice Bin - 36"	34	15	Fair/Good	1,938	-	-	-	-	-	-	-	-	45,516	41,672	-	-	-	-	-	-	-	-	-	-	***87,188***
	Underbar Speed Rail - 36"	18	15	Fair/Good	261	-	-	-	-	-	-	-	-	6,130	-	-	-	-	-	-	-	-	-	-	-	***6,130***
	Underbar Double Speed Rails - 36"	16	15	Fair/Good	224	-	-	-	-	-	-	-	-	-	4,817	-	-	-	-	-	-	-	-	-	-	***4,817***
	Soda Gun Mounting System	34	By Purveyor	Fair/Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Soda Gun	34	By Purveyor	Fair/Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Beer Keg Tapper 1 Keg / 2 Tap (1 of 3 is currently Not in Use)	3	10	Fair/Good	2,031	-	-	-	-	7,063	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,005	***18,068***
	P.O.S. Cabinet - Corner Unit, Undercounter	6	15	Fair/Good	1,191	-	-	-	-	-	-	8,789	-	-	-	-	-	-	-	-	-	-	-	-	-	***8,789***
	Underbar Hand Sink - 18"	16	20	Fair/Good	1,046	-	-	-	-	-	-	-	-	-	-	-	13,585	13,992	-	-	-	-	-	-	-	***27,577***
	Drain Board, Undercounter, 12" Wide	12	15	Fair/Good	315	-	-	-	-	-	-	-	-	-	-	-	6,737	-	-	-	-	-	-	-	-	***6,737***
	Bag-In-The-Box Rack	68	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Remote Refrigerated Beer Sys. (Included in Faucet Pricing)	4	10	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Beer Tower - (1) Tap; (7) Papa John's 117-P; (7) Papa John's 130; (8) Jack D's BBQ 102/103; (8) Jack D's BBQ 125/126; (8) Logan's/Moon 120/121; (8) Logan's/Moon 143/144; (4) Goose Island 218; (4) Goose Island 228; (6) Provisions 213; (6) Provisions 234; (6) Provisions 207; (6) Provisions 240; (6) Papa John's 303; (6) Papa John's 344; (6) Petro's Chili & Chips 311; (6) Petro's Chili & Chips 336, Note: To Be Replaced with Purveyor Provided Bottle Coolers	102	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Beer Tower - (2) Tap; (3) Nashgrille 209; (3) Nashgrille 238	6	10	Good	2,800	-	-	-	-	-	-	-	21,282	-	-	-	-	-	-	-	-	-	28,601	-	-	***49,883***
	Beer Tower - (4) Tap; (1) Jack D's BBQ 102/103; (1) Jack D's BBQ 125/126; (1) Logan's/Moon 120/121; (1) Logan's/Moon 143/144; (4) Nashgrille 219; (4) Nashgrille 229 (4) TN Twist 206; (4) TN Twist 241	20	10	Good	5,760	-	-	-	-	-	-	35,420	36,483	37,577	38,705	-	-	-	-	-	-	47,602	49,030	50,501	52,016	***347,335***
	Beer Dispenser Tower - 16 Dispenser Tap	8	10	Good	3,860	-	-	-	-	-	-	-	19,559	20,146	-	-	-	-	-	-	-	-	26,286	27,074	-	***93,064***
	Kierig Coffee Machine (Small)	2	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Coffee Brewer, Satellite System (Single)	38	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Coffee Brewer, Bulk, Cafitesse/Douwe Egberts	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dispenser, Hot Powered Drink	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Iced Tea Brewer, Counter-Top	46	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dispenser, Soda	168	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hot Water Dispenser, Bulk, Countertop	4	10	Good	1,434	-	-	-	-	-	6,849	-	-	-	-	-	-	-	-	-	9,205	-	-	-	-	***16,054***
	Hot Water Dispenser, Countertop	2	10	Good	1,543	-	-	-	-	-	-	3,795	-	-	-	-	-	-	-	-	-	5,101	-	-	-	***8,896***
	Cambro Beverage Container, 10 gallon, Insulated	57	10	Good	420	-	-	-	13,709	13,633	-	-	-	-	-	-	-	-	18,423	18,322	-	-	-	-	-	***64,087***
	Counter-Top Soda & Ice Dispenser	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wire Cup Rack	168	12	Good	150	-	-	-	-	-	-	-	15,961	16,440	-	-	-	-	-	-	-	-	-	-	22,757	***55,158***
	POS System - Touchscreen/Tablet Year 1: (20) POS units to be ADDED at Portable Carts that are currently operated as Cash-Only transactions. Year 1: (22) POS units that are currently Micros Units that will be updated to Touchscreen/Tablet.	538	7	Fair	4,000	173,040	-	2,264,130	-	-	-	-	-	-	2,784,595	-	-	-	-	-	-	3,424,700	-	-	-	***8,646,465***
	Nacho Cheese Dispenser (Counter-Top)	22	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Digital Menu Board - 40" LCD TV	267	7	Good	3,500	-	-	1,021,153	-	-	-	-	-	-	1,255,890	-	-	-	-	-	-	1,544,586	-	-	-	***3,821,629***
	Oven, Microwave; (1) Media/Press Dining Service Level 100	1	7	Good	1,600	-	-	-	-	1,855	-	-	-	-	-	-	2,281	-	-	-	-	-	-	2,806	-	***6,942***
	Toaster, Slot-Type	8	10	Good	349	-	-	-	-	3,237	-	-	-	-	-	-	-	-	-	4,350	-	-	-	-	-	***7,587***
	Toaster, Conveyor	10	10	Good	2,244	-	-	-	-	-	13,397	13,799	-	-	-	-	-	-	-	-	18,005	18,545	-	-	-	***63,746***
	Tilt Skillet, Gas (40 Gal. Braising Pan)	2	15	Poor/Fair	25,426	26,189	-	-	-	-	30,360	-	-	-	-	-	-	-	-	-	40,801	-	-	-	-	***97,350***
	Steamer, Convection, Electric - Counter-Top; Single Units	38	15	Fair/Good	9,600	49,440	-	-	-	-	-	129,875	133,771	137,784	-	-	-	-	-	-	77,026	-	-	-	-	***527,896***
	Steamer, Convection, Gas - Double Stacked Units	3	7	Good	20,844	-	-	-	-	24,164	24,889	25,635	-	-	-	-	29,719	30,610	31,528	-	-	-	-	36,550	37,647	***240,742***
	Oven, Convection, Electric, Half-Size	20	15	Good	6,048	-	-	-	-	-	-	-	-	-	40,640	41,859	43,115	44,408	-	-	-	-	-	-	-	***170,023***
	Oven, Convection, Gas, Full Size, Single, w/ Stand	2	15	Good	9,795	-	-	-	-	-	-	-	-	-	26,327	-	-	-	-	-	-	-	-	-	-	***26,327***
	Oven, Convection, Gas (Double Stacked)	4	15	Good	19,239	-	-	-	-	-	-	-	-	51,711	53,263	-	-	-	-	-	-	-	-	-	-	***104,974***
	Convection, Electric Counter-Top	5	15	Good	6,711	-	-	-	-	-	-	-	-	-	27,057	18,579	-	-	-	-	-	-	-	-	-	***45,636***
	Oven, Conveyor (Pizza) (Single Conveyor - 34")	2	10	Fair	3,650	-	-	-	8,216	-	-	-	-	-	-	-	-	-	11,042	-	-	-	-	-	-	***19,258***
	Oven, Conveyor (Pizza) (Double Stack Unit) w/ Base	12	10	Fair	10,621	10,940	-	-	-	-	-	52,250	53,817	41,574	-	14,702	-	-	-	-	-	70,220	72,326	55,872	-	***371,701***
	Oven, Conveyor; Countertop	1	10	Good	2,754	-	-	-	-	-	-	3,387	-	-	-	-	-	-	-	-	-	4,552	-	-	-	***7,939***
	Cook & Hold, Mobile	4	12	Good	8,314	-	-	-	-	-	-	-	-	-	22,347	23,017	-	-	-	-	-	-	-	-	-	***45,364***
	Fryer (1) Battery, Deep Fat, Gas w/ Filter	14	12	Fair/Good	12,158	-	-	-	-	-	-	-	-	79,317	65,357	84,148	-	-	-	-	-	-	-	-	-	***228,822***
	Fryer (2) Battery, Deep Fat, Gas w/ Filter	7	12	Fair/Good	23,004	-	-	-	-	-	-	113,168	87,422	-	-	-	-	-	-	-	-	-	-	161,351	124,643	***486,584***
	Fryer (3) Battery, Deep Fat, Gas w/ Filter	10	12	Fair/Good	31,157	-	-	-	-	144,478	111,609	114,958	-	-	-	-	-	-	-	-	-	205,991	159,128	163,902	-	***900,066***
	Fryer (4) Battery, Deep Fat, Gas w/ Filter	8	12	Fair/Good	39,310	-	-	-	-	-	-	-	99,593	102,581	105,659	108,828	-	-	-	-	-	-	-	-	141,996	***558,658***
	Fryer, Counter-Top	2	12	Good	2,020	-	-	-	-	-	-	-	-	-	5,429	-	-	-	-	-	-	-	-	-	-	***5,429***
	Fry Dump Station - 34" Wide	4	12	Fair/Good	5,680	-	-	-	-	-	-	27,943	-	-	-	-	-	-	-	-	-	-	-	39,840	-	***67,782***
	Fry Dump Station - 14" Wide	9	15	Good	4,378	-	-	-	-	-	-	-	-	-	29,418	24,241	-	-	-	-	-	-	-	-	-	***53,659***
	Restaurant Range, Gas, 10-Burner; Standard Oven Base	1	12	Good	7,544	-	-	-	-	-	-	-	-	-	10,139	-	-	-	-	-	-	-	-	-	-	***10,139***
	Griddle, Gas, w/ Stand - 36"	11	12	Fair/Good	3,470	-	-	-	-	-	-	-	-	27,165	23,317	-	-	-	-	-	-	-	-	-	-	***50,482***
	Griddle, Gas, No Stand - 48"	9	12	Fair/Good	3,422	-	-	-	-	-	-	-	-	22,325	18,396	-	-	-	-	-	-	-	-	-	-	***40,720***
	Charbroiler, Gas, w/ Stand, 48"	2	12	Fair/Good	6,209	-	-	-	-	-	-	-	-	16,203	-	-	-	-	-	-	-	-	-	-	-	***16,203***
	Charbroiler, Gas, No Stand - 48"	2	12	Poor/Fair	5,761	-	-	-	12,968	-	-	-	-	-	-	-	-	-	-	-	18,489	-	-	-	-	***31,458***

Nissan Stadium Food Service & Retail Capital Expenditures

Grouping		Total Equipment Counts	Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2027	***Total Cost***
						Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
	Smoker, Gas	2	10	Good	18,752	-	-	-	-	-	-	23,063	23,754	-	-	-	-	-	-	-	-	30,994	31,924	-	-	***109,735***
	Hot Dog Roller Grill - 24"	45	7	Fair/Good	896	-	-	-	15,127	15,581	16,048	-	-	-	-	18,604	19,162	19,737	-	-	-	-	22,881	23,567	24,274	***174,981***
	Hot Dog Roller Grill - 36"	24	7	Fair/Good	1,513	-	-	-	20,435	21,048	-	-	-	-	-	25,132	25,886	-	-	-	-	-	30,909	31,837	-	***155,247***
	Add Cooking Portables Carts on the Upper Concourse	4 Locations	10	New	75,000	-	318,270	-	-	-	-	-	-	-	-	-	427,728	-	-	-	-	-	-	-	-	***745,998***
	Rack, Universal (Speed Rack)	40	10	Fair/Good	636	-	-	-	-	-	7,594	7,822	8,057	8,298	-	-	-	-	-	-	10,206	10,512	10,827	11,152	-	***74,469***
	Can Opener, Manual	21	15	Poor	334	-	5,315	-	-	-	-	-	-	-	1,347	1,387	-	-	-	-	-	8,281	-	-	-	***16,329***
	Slicer, Food	8	10	Good	7,259	-	-	-	-	-	-	17,855	18,391	18,943	19,511	-	-	-	-	-	-	23,996	24,716	25,457	26,221	***175,090***
	Mixer, Counter, 24 QT	1	12	Good	3,074	-	-	-	-	-	-	-	3,894	-	-	-	-	-	-	-	-	-	-	-	5,552	***9,446***
	Mixer, Floor, 80 QT	1	12	Good	12,880	-	-	-	-	-	-	-	-	-	17,310	-	-	-	-	-	-	-	-	-	-	***17,310***
	Dough Sheeter, Counter-Top	8	7	Fair	2,227	-	-	9,734	10,026	-	-	-	-	-	-	-	-	13,082	13,474	-	-	-	-	-	16,089	***62,405***
	Dispenser, Soft Serv	3	6	Good	15,981	-	-	-	17,987	18,526	19,082	-	-	-	21,477	22,121	22,785	-	-	-	25,645	26,414	27,207	-	-	***201,244***
	Bud Light Frozen Rita Dispenser, Counter-Top	5	6	Good	1,229	-	-	-	6,916	-	-	-	-	-	8,258	-	-	-	-	-	9,861	-	-	-	-	***25,036***
	Slush Machine, 2-Flavor, Full Height	4	6	Good	12,606	-	-	-	28,376	29,228	-	-	-	-	33,883	34,899	-	-	-	-	40,458	41,672	-	-	-	***208,516***
	Ice Maker w/ out Bin - 1,300lbs (Air Cooled):(22) Recorded as Original Ice Maker Units &/or Currently Not Working Units & are slated to be replaced in Year 1.	73	10	Poor/Fair	6,120	138,679	-	-	-	141,895	146,152	82,795	-	-	-	186,373	-	-	-	190,695	196,416	111,270	-	-	-	***1,194,276***
	Ice Bin - 1,300lbs	73	20	Poor/Fair	3,688	83,570	-	-	-	85,508	88,073	49,894	-	-	-	-	-	-	-	-	-	-	-	-	-	***307,045***
	Water Filter, Ice Maker	73	10	Good	371	8,407	-	-	-	8,602	8,860	5,019	-	-	-	11,298	-	-	-	11,560	11,907	6,745	-	-	-	***72,398***
	Ice Maker, Undercounter (at Suites), Note: This item is not in Foodservice Budget, as Suites are currently being upgraded by Titans.	175	10	Fair	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Cart, Bussing (2-Shelves Total)	54	15	Fair/Good	822	-	-	-	-	-	17,667	18,197	18,743	-	-	-	-	-	-	-	-	-	-	-	-	***54,608***
	Cart, Bussing (4-Shelves Total)	12	15	Fair/Good	1,235	-	-	-	-	-	-	-	-	19,337	-	-	-	-	-	-	-	-	-	-	-	***19,337***
	Cart, Cambro Transport	15	15	Good	1,462	-	-	-	-	-	-	-	-	-	29,472	-	-	-	-	-	-	-	-	-	-	***29,472***
	Carlisle Utility Cart	33	15	Good	210	-	-	-	-	-	-	-	-	-	9,313	-	-	-	-	-	-	-	-	-	-	***9,313***
	Weighing Scale, Floor Type (used as Countertop unit)	1	20	Good	650	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,013	-	-	-	-	-	***1,013***
	Cart, Uniform (on Casters)	1	15	Good	450	-	-	-	-	-	-	-	-	-	701	-	-	-	-	-	-	-	-	-	-	***701***
	Laundry Rack/Utility Rack - 4' Wide; w/ Folding Middle Shelf.	1	15	Good	350	-	-	-	-	-	-	-	-	-	545	-	-	-	-	-	-	-	-	-	-	***545***
	Pallet Jack, Electric	2	10	Good	3,500	-	-	-	-	-	-	8,609	-	-	-	-	-	-	-	-	-	11,570	-	-	-	***20,179***
	Pallet Jack, Manual	7	15	Good	1,000	-	-	-	-	-	-	-	-	-	32,926	-	-	-	-	-	-	-	-	-	-	***32,926***
	Hand-Dolly Cart, 4-Wheels	11	12	Good	150	-	-	-	-	-	-	-	2,090	-	-	-	-	-	-	-	-	-	-	-	2,980	***5,070***
	Fork Lift, (Make/Model: Hyster-30 /Fortis)	1	15	Good	28,800	-	-	-	-	-	-	-	-	-	38,705	-	-	-	-	-	-	-	-	-	-	***38,705***
	Floor Trough - 5' x 18"	1	20	Good	2,468	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,845	-	-	-	-	-	***3,845***
	Floor Trough - 8' x 24"	1	20	Good	3,342	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,207	-	-	-	-	-	***5,207***
	Air Curtain, Unheated	4	12	Good	757	-	-	-	-	-	-	-	3,836	-	-	-	-	-	-	-	-	-	-	-	5,469	***9,305***
	Hebrew National Hot Dog Carts (Not in Use)	2	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Iowa Rotocast Plastic (IRP) Beer Portables (Not in Use)	9	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	5' IRP Cart; Awning; Insulated Ice Bins; at Portable Stands	16	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	8' IRP Cart; Awning; Insulated Ice Bins; at Portable Stands	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	10' IRP Cart; Insulated Ice Bins; at Portable Stands	2	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Coors Light Portable: (1) 5'-2" IRP Cart; (2) Insulated Ice Bin	8	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Miller Lite Portable: (1) 5'-2" IRP Cart; (2) Insulated Ice Bin	12	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Miller Lite/Lime Rita Portable	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Bud Light Portable: (1) 5'-2" IRP Cart; (2) Insulated Ice Bin	16	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Budweiser Portable: (1) 5'-2" IRP Cart; (2) Insulated Ice Bin	2	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Blue Moon Portable: (1) 5'-2" IRP Cart; (2) Insulated Ice Bin	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Goose Island Portable: (1) 5'-2" IRP Cart; (2) Insulated Ice Bin	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	7' Cart; Awning; Built-In Freezer Slide Top; Dippn Dots (Subcontracted)	2	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Hot Chocolate/Lemonade/Dippn Dots; Cart (Subcontracted)	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Corn Dog, Funnel Cake, Ice Cream; 6' Cart; with Fire Suppression Ventilator Hood (Subcontracted)	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Ice Cream, Corn Dog, Lemonade, Hot Chocolate, Dippn Dots Cart; (Subcontracted)	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Roasted Almonds Cart (Subcontracted)	1	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	6' Carts of Colorado Portable	1	7	Good	15,000	-	-	-	-	17,389	-	-	-	-	-	-	21,386	-	-	-	-	-	-	26,303	-	***65,078***
	8' Carts of Colorado Portable; (3) Built-In Cold Wells	2	7	Good	23,033	-	-	-	-	26,702	27,503	-	-	-	-	-	32,840	33,825	-	-	-	-	-	40,389	41,600	***202,857***
	10' Carts of Colorado Portable; Sandwich/Nacho Cart	1	7	Good	29,422	-	-	-	-	34,108	-	-	-	-	-	-	41,949	-	-	-	-	-	-	51,592	-	***127,649***
	10' Cart; Portable; Petro's	1	7	Good	25,000	-	-	-	-	28,982	-	-	-	-	-	-	35,644	-	-	-	-	-	-	43,838	-	***108,464***
	10' Cart; Front Counter Portable w/ Built-In Hand sink	1	7	Good	25,000	-	-	-	-	28,982	-	-	-	-	-	-	35,644	-	-	-	-	-	-	43,838	-	***108,464***
	Suncast Plastic Storage Closet/Cart	1	7	Good	514	-	-	-	-	596	-	-	-	-	-	-	733	-	-	-	-	-	-	901	-	***2,230***
	3'-0" x 3'-6" Cart; Back Counter Work Top;	1	7	Good	2,100	-	-	-	-	2,434	-	-	-	-	-	-	2,994	-	-	-	-	-	-	3,682	-	***9,111***
	3' IRP Cart / Insulated Ice Tub	8	7	Good	780	-	-	-	-	7,234	-	-	-	-	-	-	8,897	-	-	-	-	-	-	10,942	-	***27,072***
	Shelving, Portable	1	10	Good	400	-	-	-	-	-	-	492	-	-	-	-	-	-	-	-	-	661	-	-	-	***1,153***
	7' Cart; Awning; Front Counter	2	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	7'-6" Cart; Awning; Built-In Hand sink;	2	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	6' Cart; Rear Counter; w/ Storage Undercounter	3	7	Good	15,000	-	-	-	-	17,389	17,911	18,448	-	-	-	-	21,386	22,028	22,689	-	-	-	-	26,303	27,092	***173,246***

Nissan Stadium Food Service & Retail Capital Expenditures

Grouping		Total Equipment Counts	Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2027	*Total Cost*
						Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
	7'-6" Cart; Rear Counter; Portable	3	7	Good	5,000	-	-	-	-	5,796	5,970	6,149	-	-	-	-	7,129	7,343	7,563	-	-	-	-	8,768	9,031	***57,749***
	8' Custom Counter Cart; (3) Launch Cart - South End zone Sect 122	3	7	Good	20,000	-	-	-	-	23,185	23,881	24,597	-	-	-	-	28,515	29,371	30,252	-	-	-	-	35,070	36,122	***230,994***
	8' Custom Counter Cart; Awning; (2) Launch Cart - South End zone Sect 122	2	7	Good	25,000	-	-	-	-	28,982	29,851	-	-	-	-	-	35,644	36,713	-	-	-	-	-	43,838	45,153	***220,181***
	10' Cart; Awning; (3) Built-In Ice Bins;	3	7	Good	27,000	-	-	-	-	31,300	32,239	33,207	-	-	-	-	38,496	39,650	40,840	-	-	-	-	47,345	48,765	***311,842***
	10' Cart; Awning; Built-In (3) Hot Wells; (1) Cold Well; (1) Undercounter Hand Sink	3	7	Good	29,500	-	-	-	-	34,199	35,225	36,281	-	-	-	-	42,060	43,322	44,621	-	-	-	-	51,728	53,280	***340,716***
	10' Cart; Awning; 8' Long Sneeze Guard; Built-In (1) Ice Bin / (3) Hot Wells / Hand Sink; Undercounter Storage (No Doors); (1) Petro's Chili & Chips Cart Portable - Section 111	1	7	Good	25,000	-	-	-	-	28,982	-	-	-	-	-	-	35,644	-	-	-	-	-	-	43,838	-	***108,464***
	48" x 36" Storage Bin, Mobile, Full Ht. (1) Petro's Chili & Chips Cart Portable - Section 111	1	10	Good	10,000	-	-	-	-	-	-	12,299	-	-	-	-	-	-	-	-	-	16,528	-	-	-	***28,827***
	11'-6 Cart; Awning; Built-In (2) Hot Wells	3	7	Good	27,000	-	-	-	-	31,300	32,239	33,207	-	-	-	-	38,496	39,650	40,840	-	-	-	-	47,345	48,765	***311,842***
	Box-Car Exterior Shell at Launch Cart - South End zone 122	1	15	Good	100,000	-	-	-	-	-	-	-	-	-	134,392	-	-	-	-	-	-	-	-	-	-	***134,392***
	58" x 26" Condiment Cart; (1) at every (Permanent) Concession Stand on all Levels	58	7	Fair	15,000	-	-	950,672	-	-	-	-	-	-	1,169,207	-	-	-	-	-	-	1,437,977	-	-	-	***3,557,857***
	Popcorn Warming Cabinet	3	10	Good	626	-	-	-	-	-	-	5,254	-	-	-	-	-	-	-	-	-	7,061	-	-	-	***12,315***
	Popcorn Popper (16 oz), Cabinet, Small	2	10	Good	1,424	-	-	-	-	-	-	3,503	-	-	-	-	-	-	-	-	-	4,707	-	-	-	***8,210***
	Popcorn Popper (24 oz), Cabinet, Medium	14	10	Good	3,906	-	-	-	-	-	-	33,627	34,636	-	-	-	-	-	-	-	-	45,192	46,548	-	-	***160,003***
	Popcorn Popper (32 oz), Floor, Large	6	10	Good	5,266	-	-	-	-	-	-	19,430	20,012	-	-	-	-	-	-	-	-	26,112	26,895	-	-	***92,449***
	Popcorn Popper (48 oz), Floor, Large	3	10	Good	6,822	-	-	-	-	-	-	25,171	-	-	-	-	-	-	-	-	-	33,827	-	-	-	***58,998***
	Griddle Stand, Refrigerator - 32"	1	10	Good	5,604	-	-	-	-	-	-	6,892	-	-	-	-	-	-	-	-	-	9,263	-	-	-	***16,155***
	Griddle Stand, Refrigerator - 48"	8	10	Good	6,300	-	-	-	-	-	-	30,993	31,923	-	-	-	-	-	-	-	-	41,652	42,901	-	-	***147,469***
	Griddle Stand, Refrigerator - 72"	2	10	Good	7,636	-	-	-	-	-	-	18,783	-	-	-	-	-	-	-	-	-	25,242	-	-	-	***44,025***
	Work Table w/ Refrigerated Base - 43"	4	10	Good	5,561	-	-	-	-	-	-	13,679	14,089	-	-	-	-	-	-	-	-	18,383	18,934	-	-	***65,085***
	Refrigerated Pizza Prep Table - 36"	3	10	Poor/Fair	4,716	4,857	-	-	10,616	-	-	-	-	-	-	6,528	-	-	14,267	-	-	-	-	-	-	***36,268***
	Refrigerated Pizza Prep Table - 43"	4	10	Poor/Fair	4,407	11,581	-	-	9,920	-	-	-	-	-	-	12,201	-	-	13,332	-	-	-	-	-	-	***47,034***
	Refrigerated Pizza Prep Table - 60"	3	10	Poor/Fair	5,622	5,791	-	-	12,655	-	-	-	-	-	-	15,564	-	-	8,504	-	-	-	-	-	-	***42,514***
	Refrigerated Pizza Prep Table - 7'-6"	1	10	Fair	8,921	-	-	-	-	10,342	-	-	-	-	-	-	-	-	-	13,899	-	-	-	-	-	***24,241***
	Refrigerated Sandwich Prep Table - 24"	4	10	Poor/Fair	4,445	4,578	-	-	15,009	-	-	-	-	-	-	6,153	-	-	20,170	-	-	-	-	-	-	***45,910***
	Refrigerated Sandwich Prep Table - 48"	1	10	Fair	6,396	-	-	-	-	7,415	-	-	-	-	-	-	-	-	-	9,965	-	-	-	-	-	***17,379***
	Bottle Cooler - Counter-Top - Coke/Visa Cooler	26	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Bottle Cooler - Full Ht - 2 Door (Sliding) - Coke	2	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Bottle Cooler, 1 Door (Full Ht w/ Glass Front)	99	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Bottle Cooler, 2 Door (Full Ht w/ Glass Front)	54	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Bottle Cooler, 3 Door (Full Ht w/ Glass Front)	3	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Undercounter Refrigerator - 1 Door - 27" Wide (at Suites) Note: This item is not in Foodservice Budget, as Suites are currently being upgraded by Titans.	175	10	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Undercounter Refrigerator - 1 Door - 32" Wide	8	10	Good	3,746	-	-	-	-	-	-	18,428	18,981	-	-	-	-	-	-	-	-	24,766	25,509	-	-	***87,685***
	Undercounter Refrigerator - 2 Door - 48" Wide	2	10	Good	4,563	-	-	-	-	-	-	11,224	-	-	-	-	-	-	-	-	-	15,084	-	-	-	***26,308***
	Undercounter Refrigerator - 2 Door - 60" Wide	3	10	Good	4,924	-	-	-	-	-	-	18,168	-	-	-	-	-	-	-	-	-	24,416	-	-	-	***42,584***
	Reach-In Freezer (1-Door)	8	10	Fair/Good	6,003	-	-	-	-	27,836	28,672	-	-	-	-	-	-	-	-	37,410	38,532	-	-	-	-	***132,450***
	Reach-In Refrigerator (1-Door)	11	10	Fair/Good	5,541	-	-	-	-	38,541	33,081	-	-	-	-	-	-	-	-	51,796	44,458	-	-	-	-	***167,877***
	Reach-In Freezer (2-Door)	37	10	Fair/Good	9,008	-	-	-	-	114,870	118,316	121,866	45,644	-	-	-	-	-	-	154,376	159,007	163,777	61,342	-	-	***939,199***
	Reach-In Freezer, Slim (2-Door)	3	10	Fair/Good	4,856	-	-	-	-	16,888	-	-	-	-	-	-	-	21,394	-	-	-	-	-	-	-	***38,282***
	Reach-In Refrigerator (2-Door)	29	10	Fair/Good	7,299	-	-	-	-	-	-	89,768	92,462	85,712	-	-	-	-	-	-	-	120,641	124,261	115,190	-	***628,033***
	Reach-In Freezer (3-Door)	2	10	Fair/Good	7,299	-	-	-	-	-	-	17,954	-	-	-	-	-	-	-	-	-	24,128	-	-	-	***42,082***
	Reach-In Freezer (1-Door); Countertop	2	10	Fair/Good	2,220	-	-	-	-	-	-	5,461	-	-	-	-	-	-	-	-	-	7,339	-	-	-	***12,799***
	Reach-In Refrigerator, Roll-In (1-Door)	1	10	Fair	7,079	-	-	-	-	8,207	-	-	-	-	-	-	-	-	-	11,029	-	-	-	-	-	***19,235***
	Reach-In Refrigerator, Roll-In (2-Door)	1	10	Fair	10,641	-	-	-	-	12,336	-	-	-	-	-	-	-	-	-	16,578	-	-	-	-	-	***28,914***
	Ice Bin, Stainless Steel, Insulated, Floor, 2' Long	26	12	Good	830	-	-	-	-	-	-	-	-	14,079	14,501	-	-	-	-	-	-	-	-	-	-	***28,579***
	Ice Bin, Stainless Steel, Insulated, Floor, 3' Long	8	12	Good	1,004	-	-	-	-	-	-	-	-	5,240	5,397	-	-	-	-	-	-	-	-	-	-	***10,637***
	Ice Bin, Stainless Steel, Insulated, Floor, 4' Long	10	12	Good	1,178	-	-	-	-	-	-	-	-	7,685	7,916	-	-	-	-	-	-	-	-	-	-	***15,601***
	Ice Bin, Stainless Steel, Insulated, Floor, 8' Long	2	12	Good	1,951	-	-	-	-	-	-	-	-	5,091	-	-	-	-	-	-	-	-	-	-	-	***5,091***
	Floor Freezer Chest - 6' Wide	1	10	Good	650	-	-	-	-	-	-	799	-	-	-	-	-	-	-	-	-	1,074	-	-	-	***1,874***
	Deli Case, Glass Front, Full Ht - 2' Wide (currently Not in Use)	1	10	Fair	10,870	-	-	-	-	12,601	-	-	-	-	-	-	-	-	-	16,935	-	-	-	-	-	***29,536***
	Ambient Cafeteria Line - 3' Wide (currently Not in Use)	1	10	Fair	1,105	-	-	-	-	1,281	-	-	-	-	-	-	-	-	-	1,722	-	-	-	-	-	***3,003***
	Cold Cafeteria Line, Full Ht - 4' Wide (currently Not in Use)	1	10	Fair	2,150	-	-	-	-	2,492	-	-	-	-	-	-	-	-	-	3,350	-	-	-	-	-	***5,842***
	Redi-Ice, 2-Door, 6.5' Wide, Ice Merchandiser	23	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,213	28,139	19,322	-	-	-	***65,673***
	Security Cage Unit - Mobile - 36"	35	20	Good	1,169	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Rack, Dunnage	165	20	Fair/Good	231	-	-	-	-	-	-	-	-	-	15,522	15,988	21,408	-	-	-	-	-	-	-	-	***52,918***
	Queen Mary	7	20	Fair/Good	1,281	-	-	-	-	-	-	-	-	-	12,051	-	-	-	-	-	-	-	-	-	-	***12,051***
	Shelf, Wall Mount - Stainless Steel - 24"	9	20	Good	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,528	-	-	-	-	-	***1,528***
	Shelf, Wall Mount - Stainless Steel - 36"	2	20	Good	164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	511	-	-	-	-	-	***511***
	Shelf, Wall Mount - Stainless Steel - 48"	7	20	Good	178	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,941	-	-	-	-	-	***1,941***
	Shelf, Wall Mount - Stainless Steel - 60"	4	20	Good	205	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,278	-	-	-	-	-	***1,278***
	Shelf, Wall Mount - Stainless Steel - 72"	59	20	Good	235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,984	10,936	-	-	-	-	***21,920***
	Shelf, Wall Mount - Stainless Steel - 84"	10	20	Good	248	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,864	-	-	-	-	-	***3,864***
	Shelf, Wall Mount - Stainless Steel - 96"	25	20	Good	310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,074	-	-	-	-	-	***12,074***
	Shelf, Wall Mount - Stainless Steel - 144"	3	20	Good	487	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,276	-	-	-	-	-	***2,276***

Nissan Stadium Food Service & Retail Capital Expenditures

Grouping		Total Equipment Counts	Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2027	***Total Cost***
						Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
	Shelving Unit, Wire 5-Tier, 48" X 24" (Metro)	312	20	Good	481	-	-	-	-	-	-	-	-	-	-	-	-	52,977	54,567	56,204	67,152	-	-	-	-	***230,900***
	Shelving Unit, Wire 3-Tier, 36" X 18" Counter-Top	16	20	Good	291	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,254	-	-	-	-	-	***7,254***
	Pallet Rack, 3 Tier, Single	12	20	Good	199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,720	-	-	-	-	-	***3,720***
	Sink, Hand, Drop-In	9	20	Good	273	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,828	-	-	-	-	-	***3,828***
	Sink, Hand, Wall Mount	166	20	Good	606	-	-	-	-	-	-	-	-	-	-	-	-	-	-	76,474	82,658	-	-	-	-	***159,133***
	Sink, Mop	66	20	Good	1,020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	104,882	-	-	-	-	-	***104,882***
	Mobile Hand Sink Cart (Launch Cart - South End zone/122)	1	7	Good	3,540	-	-	-	-	4,104	-	-	-	-	-	-	5,047	-	-	-	-	-	-	6,207	-	***15,358***
	Dispenser, Soap (Lotion or Gel)	166	10	Good	20	-	-	-	-	-	-	-	-	-	4,332	-	-	-	-	-	-	-	-	-	5,822	***10,153***
	Dispenser, Paper Towel	166	10	Good	133	-	-	-	-	-	-	-	-	-	14,403	14,835	-	-	-	-	-	-	-	-	19,357	***48,596***
	Sink, Scullery, 3 Compartments - 93" Long	75	20	Good	3,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	124,637	128,377	132,228	-	-	-	***385,242***
	Sink, Scullery, 3 Compt Sink - 144" Long	2	20	Good	3,028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,435	-	-	-	-	-	***9,435***
	Sink, Scullery, 2 Compt Prep Sink - 144" Long	2	20	Good	3,973	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,380	-	-	-	-	-	***12,380***
	Chef's Table - 4' Long; (2) Built-In Induction Plates (1) TN Twist 205; (1) TN Twist 242.	2	20	Good	3,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,906	-	-	-	-	-	***10,906***
	Chef's Table - 8'-6" Long - w/ Built-In (1) 4' Long Sandwich Prep; (1) 55" Long Hot Well; (2) 3' S.S. Overshelves; (1) 3' Long Heat Strip; (2) TN Twist 205; (2) TN Twist 242.	4	20	Good	12,474	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38,868	40,034	-	-	-	-	***78,902***
	Custom Stainless Steel Work Table - 8' Long x 4' Wide; w/ (2) Built-In Hand Sinks; (1) Main Kitchen Service Level 100.	1	20	Good	3,536	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,509	-	-	-	-	-	***5,509***
	Chef's Table - 8' Long; (1) Built-In Prep Sink (1) Press Dining & Pantry (SW); (1) Owner's Pantry (SE)	2	20	Good	5,275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,218	8,465	-	-	-	-	***16,683***
	Chef's Table - 8' Long; (1) Built-In Prep Sink & (2) Hot Wells; (2) Vending 305-V & 342-V; (6) Provisions 304, 343, 313-S, 334, 320, 327.	8	20	Good	7,446	-	-	-	-	-	-	-	-	-	-	-	-	43,739	45,051	-	-	-	-	-	-	***88,790***
	Chef's Table - 8' Long; (1) Built-In Prep Sink & (3) Hot Wells; (2) Logan/Moon 125/126 & 143/144; (1) Provisions 213.	3	20	Good	8,151	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38,097	-	-	-	-	-	***38,097***
	Chef's Table - 10' Long; Built-In (3) Hot Wells; (1) Prep Sink; (1) Papa John's 303-S; (1) Papa John's 344.	2	20	Good	9,151	-	-	-	-	-	-	-	-	-	-	-	-	-	13,842	14,257	-	-	-	-	-	***28,099***
	Chef's Table - 12' Long; Built-In (3) Hot Wells; (2) Overhead S.S. Shelves - 8' Long ea; (1) Heat Strip - 6' Long; Storage Shelves Undercounter; (2) Club BBQ 212; (2) Club BBQ 235	4	20	Good	9,753	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30,390	31,301	-	-	-	-	***61,691***
	Chef's Table - 14' Long; Built-In (1) Prep Sink & (2)Hot Wells (3) Pressing Dining & Pantries; (4) 500 & 600 Lvl Pantries.	7	20	Good	10,446	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48,824	67,051	-	-	-	-	***115,875***
	Chef's Table - 15'-6" Long; Built-In (1) Hot Well & (1) Cold Well; (2) Overhead S.S. Shelves 12' Long ea; (1) Heat Strip - 10' Long; (1) Launch Cart - South End zone/122.	1	20	Good	12,356	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19,250	-	-	-	-	-	***19,250***
	Chef's Table - 18' Long; Built-In (3) Hot Wells; (1) Prep Sink; (1) 500 Lvl Pantry SW; (1) 500 Lvl Pantry SE; (1) 600 Lvl Pantry SW; (1) 600 Lvl Pantry SE	4	20	Good	13,151	-	-	-	-	-	-	-	-	-	-	-	-	-	79,568	-	-	-	-	-	-	***79,568***
	Chef's Table - 18' Long; Built-In (4) Hot Wells; (2) Overhead S.S. Shelves 10' Long ea; (2) Heat Strips - 10' Long	6	20	Good	14,404	-	-	-	-	-	-	-	-	-	-	-	-	-	43,575	44,882	46,228	-	-	-	-	***134,685***
	Chef's Table/Counter - 25' Long; Built-In (3) Hot Wells; (2) S.S. Overshelves - 12' Long ea; Shelving Underneath at30"	2	20	Good	16,588	-	-	-	-	-	-	-	-	-	-	-	-	-	25,091	25,844	-	-	-	-	-	***50,934***
	Chef's Table/Counter - 140" Long; Built-In (3) Hot Wells; (2) S.S. Overshelves 5' Long ea; (1) Heat Strip 4' Long; Shelving Underneath; (1) Sandwich Slide Undercounter	4	20	Good	13,228	-	-	-	-	-	-	-	-	-	-	-	37,720	38,852	-	-	-	-	-	-	-	***76,571***
	Chef's Table w/ Built-In Sink -12' Long; (Heated) Bain Marie; Overhead Pot/Utensil Rack;	1	20	Good	10,403	-	-	-	-	-	-	-	-	-	-	-	14,832	-	-	-	-	-	-	-	-	***14,832***
	Beverage Serving Counter - 9' Long; Stainless Steel; w/ 12" Stainless Steel Cafeteria Tray Slide along entire front.	1	20	Fair/Good	5,000	-	-	-	-	-	-	-	-	-	-	-	7,129	-	-	-	-	-	-	-	-	***7,129***
	Stainless Steel Work Table - 15"	10	20	Fair/Good	250	-	-	-	-	-	-	-	-	-	-	-	3,564	-	-	-	-	-	-	-	-	***3,564***
	Stainless Steel Work Table - 24" (x 30")	15	20	Fair/Good	588	-	-	-	-	-	-	-	-	-	-	-	12,575	-	-	-	-	-	-	-	-	***12,575***
	Stainless Steel Work Table - 30" (x 30")	7	20	Fair/Good	681	-	-	-	-	-	-	-	-	-	-	-	6,797	-	-	-	-	-	-	-	-	***6,797***
	Stainless Steel Work Table - 36"	34	20	Fair/Good	623	-	-	-	-	-	-	-	-	-	-	-	-	31,106	-	-	-	-	-	-	-	***31,106***
	Stainless Steel Work Table - 48"	25	20	Fair/Good	842	-	-	-	-	-	-	-	-	-	-	-	-	-	31,840	-	-	-	-	-	-	-	***31,840***
	Stainless Steel Work Table - 60"	34	20	Fair/Good	900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47,674	-	-	-	-	-	***47,674***
	Stainless Steel Work Table - 60"; w/ Overshelf	5	20	Fair/Good	1,263	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,839	-	-	-	-	-	***9,839***
	Stainless Steel Work Table - 72"	47	20	Fair/Good	1,067	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80,474	-	-	-	-	***80,474***
	Stainless Steel Work Table - 72"; w/ Built-In Sink	11	20	Fair/Good	3,500	-	-	-	-	-	-	-	-	-	-	-	-	-	58,235	-	-	-	-	-	-	***58,235***
	Stainless Steel Work Table - 72"; w/ Overshelf	2	20	Fair/Good	1,359	-	-	-	-	-	-	-	-	-	-	-	3,875	-	-	-	-	-	-	-	-	***3,875***
	Stainless Steel Work Table - 72"; w/ Built-In Sink & Overshelf	1	20	Fair/Good	2,166	-	-	-	-	-	-	-	-	-	-	-	3,088	-	-	-	-	-	-	-	-	***3,088***
	Stainless Steel Work Table - 84"	8	20	Fair/Good	1,212	-	-	-	-	-	-	-	-	-	-	-	13,824	-	-	-	-	-	-	-	-	***13,824***
	Stainless Steel Work Table - 84"; w/ Built-In Sink	1	20	Fair/Good	2,488	-	-	-	-	-	-	-	-	-	-	-	-	29,230	-	-	-	-	-	-	-	***29,230***
	Stainless Steel Work Table - 96"	43	20	Fair/Good	1,262	-	-	-	-	-	-	-	-	-	-	-	-	27,799	28,633	25,560	-	-	-	-	-	***81,993***
	Stainless Steel Work Table - 96"; w/ (2) Built-In Hot Wells	4	20	Fair/Good	3,433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22,036	-	-	-	-	***22,036***
	Stainless Steel Work Table - 96"; w/ Overshelf	1	20	Fair/Good	1,760	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,742	-	-	-	-	-	***2,742***
	Stainless Steel Work Table - 108"; w/ Built-In Sink	4	20	Fair/Good	2,016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,563	-	-	-	-	-	***12,563***
	S.S. Work Table - 108"; w/ Built-In Sink & (3) Hot Wells	2	20	Fair/Good	4,892	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15,243	-	-	-	-	-	***15,243***
	Stainless Steel Work Table - 120"; with Built-In Prep Sink & (1) Hot Well	2	20	Fair/Good	2,586	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,058	-	-	-	-	-	***8,058***
	Stainless Steel Work Table - 120"	6	20	Fair/Good	2,100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,219	-	-	-	-	***20,219***
	Cashier Table (for Vending) - 36"	3	20	Poor	1,265	3,909	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***3,909***
	Heated Glass Display, Small w/ Motor	8	10	Good	1,966	-	-	-	-	-	-	9,672	9,962	-	-	-	-	-	-	-	-	12,998	13,388	-	-	***46,020***

Nissan Stadium Condition Assessment

Nissan Stadium Food Service & Retail Capital Expenditures

Grouping		Total Equipment Counts	Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2027	***Total Cost***
						Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
	Heated Glass Display, Large, w/o Motor	9	10	Good	2,210	-	-	-	-	-	-	10,872	13,998	-	-	-	-	-	-	-	-	14,611	18,812	-	-	***58,293***
	Heated Glass Display, 2-Door, Countertop (for Pizza)	3	10	Good	1,774	-	-	-	-	-	-	6,545	-	-	-	-	-	-	-	-	-	8,796	-	-	-	***15,342***
	Heated Glass Display, w/o Motor for Pretzels	66	By Purveyor	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Heated (2) Shelf European Display - 36" (currently Not in use)	1	7	Good	2,285	-	-	-	-	2,649	-	-	-	-	-	-	3,258	-	-	-	-	-	-	4,007	-	***9,914***
	Heat Lamp - Individual Pendant Lamp	20	7	Good	210	-	-	-	-	2,434	-	-	-	-	-	-	2,994	-	-	-	-	-	-	3,682	-	***9,111***
	Heated Shelf, Horizontal, 24D	2	7	Good	3,021	-	-	-	-	7,004	-	-	-	-	-	-	8,614	-	-	-	-	-	-	10,595	-	***26,213***
	Heated Shelf, Horizontal, 30D	13	7	Good	3,184	-	-	-	-	22,147	26,613	-	-	-	-	-	27,238	32,731	-	-	-	-	-	33,499	40,255	***182,482***
	Heated Shelf, Horizontal, 42D	5	7	Good	3,441	-	-	-	-	3,989	-	-	-	-	-	-	4,906	-	-	-	-	-	-	6,034	-	***14,929***
	Heated Shelf, Slanted, 36D	2	7	Good	3,275	-	-	-	-	7,593	-	-	-	-	-	-	9,339	-	-	-	-	-	-	11,485	-	***28,417***
	Drawer Warmer, Wide	2	7	Good	2,392	-	-	-	-	5,546	-	-	-	-	-	-	6,821	-	-	-	-	-	-	8,389	-	***20,756***
	Induction Unit, Countertop, Single (Vollrath)	5	10	Good	463	-	-	-	-	-	-	2,847	-	-	-	-	-	-	-	-	-	3,826	-	-	-	***6,674***
	Induction Unit, Countertop, Double (CookTek)	2	10	Good	919	-	-	-	-	-	-	2,261	-	-	-	-	-	-	-	-	-	3,038	-	-	-	***5,298***
	Induction Table, 4-Warmers (Spring)	1	10	Good	1,114	-	-	-	-	-	-	1,370	-	-	-	-	-	-	-	-	-	1,841	-	-	-	***3,211***
	Fry Holding Station, Counter-Top - 20"	1	10	Good	1,610	-	-	-	-	-	-	1,980	-	-	-	-	-	-	-	-	-	2,661	-	-	-	***4,641***
	Fry Holding Station, Counter-Top - 36"	4	10	Fair/Good	2,185	-	-	-	-	-	10,436	-	-	-	-	-	-	-	-	-	14,025	-	-	-	-	***24,461***
	Hot Food Table, 2 Wells	4	10	Good	3,061	-	-	-	-	-	-	7,529	7,755	-	-	-	-	-	-	-	-	10,119	10,422	-	-	***35,825***
	Hot Food Table, 3 Wells (1 of 3 is currently Not in Use)	3	10	Fair/Good	3,869	-	-	-	-	-	13,859	-	-	-	-	-	-	-	-	-	18,626	-	-	-	-	***32,485***
	Hot Food Table, 5 Wells (currently Not in Use)	1	10	Fair	5,686	-	-	-	-	6,592	-	-	-	-	-	-	-	-	-	8,859	-	-	-	-	-	***15,450***
	Heated Mobile Cabinet - Full Ht	146	7	Fair	4,011	103,283	106,382	109,573	112,860	116,246	100,576	-	127,025	130,836	134,761	138,804	142,968	123,696	-	156,225	160,912	165,739	170,711	175,833	152,131	***2,428,563***
	Heated Mobile Cabinet - Half Size	1	7	Fair/Good	2,561	-	-	-	-	2,969	-	-	-	-	-	-	3,651	-	-	-	-	-	-	4,491	-	***11,111***
	Banquet Cart, Warming, 2-Door	2	7	Fair/Good	3,696	-	-	-	-	8,569	-	-	-	-	-	-	10,539	-	-	-	-	-	-	12,962	-	***32,070***
	Counter Top Kettle, Rethermalizer - 11 Quart	4	7	Good	588	-	-	-	-	2,727	-	-	-	-	-	-	3,353	-	-	-	-	-	-	4,124	-	***10,204***
	Drop-In Hot Well, 1 Well	1	7	Good	420	-	-	-	-	487	-	-	-	-	-	-	599	-	-	-	-	-	-	736	-	***1,822***
	Drop-In Hot Well, 4 Well	1	7	Good	3,526	-	-	-	-	4,088	-	-	-	-	-	-	5,027	-	-	-	-	-	-	6,183	-	***15,298***
	Chaffing Dish, Stainless Steel, Countertop; w/ Sterno Heat; No Replacement shown -- as this item to be replaced w/ Induction Warmers in Suites - see next line item.	522	20	Good	1,070	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Drop-In Induction Warming Unit - in each of the 175 Suites Note: This item is not in Foodservice Budget, as Suites are currently being upgraded by Titans.	175	7	Does Not Exist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Carving Station, Single Lamp, Standing, Countertop	184	7	Good	1,704	-	-	-	-	120,500	124,115	127,838	-	-	-	-	148,199	152,645	157,225	-	-	-	-	182,266	187,734	***1,200,522***
	Carving Station, Double Lamp, Standing, Countertop	13	7	Good	2,464	-	-	-	-	37,134	-	-	-	-	-	-	45,670	-	-	-	-	-	-	56,168	-	***138,972***
	Counter-Top, Hot Well, 1 Well	25	7	Fair/Good	588	-	-	-	-	17,041	-	-	-	-	-	-	20,959	-	-	-	-	-	-	25,777	-	***63,777***
	Undercounter Heated Cabinet	6	7	Good	3,115	-	-	-	-	10,833	11,158	-	-	-	-	-	13,324	13,723	-	-	-	-	-	16,387	16,878	***82,304***
	Cook N Hold, Undercounter	10	7	Good	4,664	-	-	-	-	27,034	27,845	-	-	-	-	-	33,249	34,246	-	-	-	-	-	40,892	42,119	***205,385***
	Food Holder, 8 Holding Drawers; (2) Nashgrille 209 & 238	2	7	Good	4,532	-	-	-	-	10,508	-	-	-	-	-	-	12,923	-	-	-	-	-	-	15,894	-	***39,325***
	Crisp N Hold, Undercounter; (4) Nashgrille 209, 238, 319 & 328	4	7	Good	2,246	-	-	-	-	5,207	5,364	-	-	-	-	-	6,405	6,597	-	-	-	-	-	7,877	8,113	***39,562***
	Warmer, 2-Shelves, Countertop	4	7	Poor/Fair	4,005	8,250	8,498	-	-	-	-	-	10,147	10,451	-	-	-	-	-	12,479	12,854	-	-	-	-	***62,679***
	Warmer, 4-Shelves, Countertop	2	7	Good	8,115	-	-	-	-	18,815	-	-	-	-	-	-	23,140	-	-	-	-	-	-	28,459	-	***70,415***
	Warewasher, Flight-Type; (1) Main Kitchen, Service Lvl 100	1	10	Poor	78,201	80,547	-	-	-	-	-	-	-	-	-	108,248	-	-	-	-	-	-	-	-	-	***188,796***
	Custom Dirty Dish Table - 18' Long x 42" W; w/ Hose Reel; 9' S.S. Overshelf; Built-In Hand Sink & 10' Long Trough; (1) Main Kitchen Service Level 100	1	20	Good	6,488	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,108	-	-	-	-	-	***10,108***
	Grease Trap	50	By Bldg. Ops	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Wash Station, Wall-Mounted, Hose/Reel w/ Spray	1	10	Fair/Good	4,056	-	-	-	-	-	4,843	-	-	-	-	-	-	-	-	-	6,509	-	-	-	-	***11,352***
	Disposer, Sink Mounted	3	5	Fair/Good	4,650	-	-	5,081	5,234	5,391	-	-	5,890	6,067	6,249	-	-	6,829	7,034	7,245	-	-	7,916	8,154	8,398	***79,488***
	Water Heater, Gas - 47 gal.	50	By Bldg. Ops	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Ventless Hood - 54" Long	4	12	Good	24,729	-	-	-	-	-	-	-	-	-	66,443	68,437	-	-	-	-	-	-	-	-	-	***134,880***
	Ventless Hood - 72" Long	2	12	Good	12,172	-	-	-	-	-	-	-	-	-	16,358	16,849	-	-	-	-	-	-	-	-	-	***33,207***
	Exhauster Ventilator (7'-0" x 8'-0") (in middle room, therefore NO S.S. Panels at Wall)	1	18	Fair/Good	4,600	-	-	-	-	-	-	-	-	6,002	-	-	-	-	-	-	-	-	-	-	-	***6,002***
	Exhaust Ventilator - 4'-0" x 60" (Incls. S.S. Panels at Wall)	2	18	Fair/Good	2,300	-	-	-	-	-	-	-	5,827	-	-	-	-	-	-	-	-	-	-	-	-	***5,827***
	Exhaust Ventilator - 5'-0" x 60" (Incls. S.S. Panels at Wall)	12	18	Fair/Good	2,875	-	-	-	-	-	-	-	14,568	15,005	15,455	-	-	-	-	-	-	-	-	-	-	***45,028***
	Exhaust Ventilator - 6'-6" x 60" (Incls. S.S. Panels at Wall)	4	18	Fair/Good	3,740	-	-	-	-	-	-	-	-	4,880	-	-	-	-	-	-	-	-	-	-	-	***4,880***
	Exhaust Ventilator - 8'-0" x 60" (Incls. S.S. Panels at Wall)	4	18	Fair/Good	4,600	-	-	-	-	-	-	-	-	6,002	-	-	-	-	-	-	-	-	-	-	-	***6,002***
	Exhaust Ventilator - 9'-0" x 60" (Incls. S.S. Panels at Wall)	3	18	Fair/Good	5,175	-	-	-	-	-	-	-	19,667	-	-	-	-	-	-	-	-	-	-	-	-	***19,667***
	Exhaust Ventilator - 10'-0" x 60" (Incls. S.S. Panels at Wall)	2	18	Fair/Good	5,750	-	-	-	-	-	-	-	7,284	7,502	-	-	-	-	-	-	-	-	-	-	-	***14,786***
	Exhaust Ventilator - 13'-0" x 60" (Incls. S.S. Panels at Wall)	4	18	Fair/Good	7,475	-	-	-	-	-	-	-	-	9,753	-	-	-	-	-	-	-	-	-	-	-	***9,753***
	Exhaust Ventilator - 52'-0" x 60" (S.S. Wall Panels?)	1	18	Fair/Good	29,900	-	-	-	-	-	-	-	-	-	40,183	-	-	-	-	-	-	-	-	-	-	***40,183***
	Fire Protection System	30	25	Fair/Good	11,000	-	-	-	-	-	-	-	139,345	143,525	147,831	-	-	-	-	-	-	-	-	-	-	***430,701***
	Washer Exhaust; (2) Pant-Leg Ducts	1	20	Poor	3,250	3,348	-	-	-	3,768	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***7,115***
	Walk-In Cooler Unit - 12'-0" x 14'-0" (1) Press Dining & Pantry (NE); (1) Press Dining & Pantry (SE)	2	20	Fair	35,280	-	-	-	-	81,798	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***81,798***
	Walk-In Cooler Unit - 12'-0" x 20'-0"; (1) Service Lvl Main Kitchen/Commissary	1	20	Fair	50,400	-	-	-	-	58,427	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***58,427***

Nissan Stadium Food Service & Retail Capital Expenditures

Grouping		Total Equipment Counts	Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2027	***Total Cost***
						Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
	Walk-In Cooler Unit - 8'-0" x 14'-0"; (1) 200 Lvl Pizza Kitchen NW; (1) 200 Lvl Provisions 113-S; (1) 200 Lvl Provisions 136-S; (1) 200 Lvl Liquor Bar 111-S; (1) 200 Lvl Liquor 134-S	5	20	Fair	23,520	-	-	-	-	27,266	56,168	57,853	-	-	-	-	-	-	-	-	-	-	-	-	***141,288***
	Walk-In Cooler Unit - 8'-0" x 9'-0"; (1) Provisions 320; (1) Provisions 327	2	20	Fair	15,120	-	-	-	-	-	36,108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***36,108***
	Walk-In Cooler Unit - 8'-0" x 8'-0"; (1) SE Vending Rm 119; (1) SW Vending Rm 127V; (1) Liquor Bar 215; (1) Liquor Bar 232; (1) Papa John's 214; (1) Papa John's 233 (1) Hot Chicken 211; (1) Hot Chicken 236; (1) Nashgrille 209; (1) Nashgrille 238; (1) Provisions 207; (1) Provisions 240; (1) Pantry 206-V; (1) Pantry 242-V; (1) Titan Tavern 314; (1) Titan Tavern 333; (1) Provisions 321; (1) Provisions 326	18	20	Fair	13,440	-	-	-	-	93,484	96,288	99,177	-	-	-	-	-	-	-	-	-	-	-	-	-	***288,949***
	Walk-In Cooler Unit - 8'-0" x 10'-0"; (1) NE Vending Rm 105V; (1) Chicken Coup 112-G; (1) Chicken Coup 135-G; (1) Goose Island 218; (1) Goose Island 228; (1) Provisions 217; (1) Provisions 213; (1) Provisions 230; (1) Provisions 234; (1) Logan's RdHouse 308; (1) Logan's RdHouse 339; (1) Papa John's 316; (1) Papa John's 331; (1) Nashgrille 319; (1) Nashgrille 328	15	20	Fair	16,800	-	-	-	-	58,427	60,180	61,986	63,845	65,761	-	-	-	-	-	-	-	-	-	-	-	***310,199***
	Walk-In Cooler Unit - 8'-0" x 12'-0"; (1) Logan's/Moon 120/121; (1) Logan's/Moon 143/144; (1) Liquor Bar 206; (1) Liquor Bar 241; (1) Provisions 304; (1) Provisions 313; (1) Provisions 334; (1) Provisions 343; (1) Petro's Chili & Chips 311; (1) Petro's Chili & Chips 336	10	20	Fair	20,160	-	-	-	45,381	46,742	48,144	49,589	51,076	-	-	-	-	-	-	-	-	-	-	-	***240,931***
	Walk-In Cooler Unit - 8'-0" x 15'-0"; (1) Papa John's 117-P; (1) Papa John's 117; (1) Jack D's BBQ 102/103; (1) Jack D's BBQ 125/126;	4	20	Fair	25,200	-	-	-	-	-	60,180	61,986	-	-	-	-	-	-	-	-	-	-	-	-	-	***122,166***
	Walk-In Cooler Unit - 9'-0" x 16'-0"; (1) Nashgrille 219; (1) Nashgrille 229; (1) Pantry 214-B; (1) Pantry 233-B	4	20	Fair	30,240	-	-	-	-	70,113	72,216	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***142,329***
	Walk-In Cooler Unit - 8'-0" x 18'-0"; (1) Pantry 500 Lvl NW; (1) Pantry 600 Lvl NW; (1) Pantry 500 Lvl NE; (1) Pantry 600 Lvl NE;	4	20	Fair	30,240	-	-	-	-	70,113	72,216	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***142,329***
	Walk-In Cooler Unit - 10'-0" x 12'-0"; (1) Pantry 500 Lvl SW; (1) Pantry 600 Lvl SW; (1) Pantry 500 Lvl SE; (1) Pantry 600 Lvl SE;	4	20	Fair	25,200	-	-	-	-	-	-	61,986	63,845	-	-	-	-	-	-	-	-	-	-	-	-	***125,831***
	Walk-In Cooler Unit - 9'-0" x 12'-0"; (1) Papa John's 303; (1) Papa John's 344	2	20	Fair	22,680	-	-	-	-	-	-	-	57,461	-	-	-	-	-	-	-	-	-	-	-	-	***57,461***
	Walk-In Cooler - 10'-0" x 10'-0" (w/ one notched corner); (1) Vending Room 305; (1) Vending Room 342V	2	20	Fair	21,000	-	-	-	-	-	-	-	53,204	-	-	-	-	-	-	-	-	-	-	-	-	***53,204***
	Walk-In Freezer/Cooler Unit - 26'-0" x 44'-0"; (1) Service Lvl Main Kitchen/Commissary	1	20	Fair	240,240	-	-	-	-	-	-	-	-	313,459	-	-	-	-	-	-	-	-	-	-	-	***313,459***
	Front Counter - Typical Front Counter at each Concession	72	Base Bldg.	Fair/Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Front Counter/Bar Die; 67' Long (Total); at Liquor Bar 215 & Liquor Bar 232	2	Base Bldg.	Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Front Counter - Millwork; 12' Long; at Media/Press Dining Room - Service Level 100	1	Base Bldg.	Poor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Rear Counter - Millwork w/ Formica Top - 6' Long	2	10	Poor	6,600	-	14,004	-	-	-	-	-	-	-	-	-	18,820	-	-	-	-	-	-	-	-	***32,824***
	Rear Counter - Millwork w/ Formica Top - 8' Long	9	10	Poor	8,800	-	84,023	-	-	-	-	-	-	-	-	-	112,920	-	-	-	-	-	-	-	-	***196,944***
	Rear Counter - Millwork w/ Formica Top - 10' Long	4	10	Poor	11,000	-	46,680	-	-	-	-	-	-	-	-	-	62,733	-	-	-	-	-	-	-	-	***109,413***
	Rear Counter - Stainless Steel - 6' Long; w/ Undercounter Storage Shelves	6	20	Good	960	-	-	-	-	-	-	-	-	-	-	-	-	-	8,713	-	-	-	-	-	-	***8,713***
	Rear Counter - Stainless Steel - 8' Long; w/ Undercounter Storage Shelves	16	20	Good	1,193	-	-	-	-	-	-	-	-	-	-	-	-	-	25,263	-	-	-	-	-	-	***25,263***
	Rear Counter - Stainless Steel - 11' Long; Built-In Under-Cabinets	6	15	Fair	4,181	-	-	-	-	29,082	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45,308	***74,390***
	Rear Counter - Stainless Steel - 14' Long; Built-In Under-Cabinets	6	15	Fair	5,575	-	-	-	-	38,778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60,414	***99,192***
	Rear Counter - Stainless Steel - 21' Long; (4) Built-In Hot Wells; Built-In Under-Cabinets	2	15	Fair	9,947	-	-	-	-	23,063	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35,931	***58,993***
	Mobile Buffet Counter (Corsair) - 4' Long; Granite-like Top; Wooden Sides	4	7	Good	3,200	-	-	-	14,407	-	-	-	-	-	-	17,718	-	-	-	-	-	-	21,791	-	-	***53,916***
	Mobile Buffet Counter (Corsair) - 8' Long; Granite-like Top; Wooden Sides	4	7	Good	6,400	-	-	-	28,813	-	-	-	-	-	-	35,436	-	-	-	-	-	-	43,582	-	-	***107,832***
	Mobile Buffet/Serving Counter - 4' Long	1	7	Good	2,297	-	-	-	2,585	-	-	-	-	-	-	3,180	-	-	-	-	-	-	3,910	-	-	***9,675***
	Mobile Buffet/Serving Counter - 4' Long; with (2) Built-In Induction Warmer Plates	1	7	Good	4,064	-	-	-	4,574	-	-	-	-	-	-	5,626	-	-	-	-	-	-	6,919	-	-	***17,118***
	Mobile Buffet/Serving Counter - 8' Long; (1) Built-In Ice Bin	1	7	Good	8,700	-	-	-	9,792	-	-	-	-	-	-	12,043	-	-	-	-	-	-	14,811	-	-	***36,646***
	Buffet Counter - 10'-6" Long; w/ Undercounter Cabinets	3	7	Good	8,400	-	-	-	28,363	-	-	-	-	-	-	34,883	-	-	-	-	-	-	42,901	-	-	***106,147***
	Currency Counter Units - at Cash Room	10	7	Fair	2,500	-	-	27,318	-	-	-	-	-	-	33,598	-	-	-	-	-	-	41,321	-	-	-	***102,237***
	28' Long Airstream Trailer - Cocktail Bar at North End zone	1	By Purveyor	Fair/Good	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
Merchandise	Remodel Team Store: Hire a retail consultant to give all of the stands & particularly the team store a bolder and more vibrant look. Team colors can be used, but also accent them with other shades to create a more professional and inviting retail look. Use of interactive football related displays will enliven the Team Store space.	1	15	Poor/Fair	500,000	-	-	546,364	-	-	-	-	-	-	-	-	-	-	-	-	-	-	851,217	-	-	***1,397,580***
	Convert 10 Merchandise Stands into "Walk-In" Concepts: Remove front counters at the traditional Merchandise Stands, & provide a colorful floor covering to add excitement to the space & place display racks out into the concourse to encourage more browsing and purchasing.	10	15	Poor/Fair	75,000	-	238,703	245,864	337,653	-	-	-	-	-	-	-	-	-	-	-	-	371,891	383,047	526,052	-	***2,103,209***
	Portable Merchandise Kiosk "Locker Room" (1) Main Concourse End zone	1	7	Good	20,000	-	-	-	-	23,185	-	-	-	-	-	-	28,515	-	-	-	-	-	-	35,070	-	***86,771***
Leaseholder Improvements	Replace ceiling tiles in Aramark Cash Room.	1,200 SF	By Base Bldg.	Poor	1	1,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***1,545***
	Increase Power & Data to Portable Locations	Multiple	By Base Bldg.	Does Not Exist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***

Nissan Stadium Food Service & Retail Capital Expenditures

Grouping		Total Equipment Counts	Frequency of repairs & replacement in years	Condition of Equipment (good, fair, poor)	Estimated Cost per occurrence in FY 2017 Dollars	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2027	***Total Cost***
						Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
	Upgrade graphics at Petro's Permanent Stands.	2	10	Poor	5,000	10,300	-	-	-	-	-	-	-	-	-	13,842	-	-	-	-	-	-	-	-	-	***24,142***
	Add attractive fencing around Redi-Ice Merchandisers on Main & Upper Concourses	12	By Base Bldg.	Does Not Exist	1,000	12,360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***12,360***
	Resurface/Refinish Concession Floors to ensure water flows to floor drains rather than puddling.	42,680 SF	By Base Bldg.	Poor/Fair	12	527,525	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***527,525***
	Redesign the Upper Concourse Logan's Roadhouse Stands to ensure efficient flow of product from fryers & grills to serving the public.	2 Stands	By Base Bldg.	Poor	15,000	-	30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***30,000***
	Hire an independent technician to TEST the Kitchen Hoods, Smoke & Air Evacuation against Manufacturer's specification.	Main Kitchen	By Base Bldg.	N/A	15,000	15,450	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***15,450***
	Continue the renovations to the suites to upgrade service with Refrigerators, Ice Makers & Induction Warmers.	175	By Titans	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Convert the largest pantry or storeroom on each Suite Level to a Cooking Kitchen, even if ventless hoods are required versus full ventilation. Construction of Plumbing, Power & Ventilation to be paid for by Base Building.	5 Potential Locations	By Base Bldg.	Does Not Exist	400,000	-	-	2,185,454	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***2,185,454***
	Inventory all underutilized rooms to determine which, if any, could be repurposed such as for a suite finishing kitchen. Discard &/or repair all broken equipment & sell any working used equipment that doesn't have a function with the current menus.	Various Locations	By Base Bldg.	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Redesign Club Level corner bars to hide back room from customers view.	4 Locations	By Base Bldg.	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	Water Heaters should be inspected for code compliance & to ensure functionality.	Multiple		N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	***-***
	(Note - a 3% escalation in cost starting in 2018)																									
	Total					**1,283,589**	**851,874**	**7,365,344**	**771,621**	**2,189,041**	**1,701,781**	**1,911,442**	**1,455,301**	**1,488,097**	**6,605,074**	**1,141,524**	**1,904,479**	**989,295**	**896,181**	**1,605,172**	**1,546,013**	**8,428,974**	**2,419,654**	**2,502,037**	**1,402,916**	***48,459,410***

Nissan Stadium Capital Expenditures

Grouping	Total Cost
Architectural & Interiors	59,325,216
Major Systems	29,753,019
Roofs	1,784,807
Structure	32,989,381
Technology	106,597,481
Turf Systems	1,992,659
Vertical Transportation	12,342,627
Food Service	48,459,410
TOTAL COST - 20 YEARS	293,244,600

PROJECT TEAM