

Facility Condition Assessment

April 3, 2017

Nissan Stadium



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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.

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.