

October 31, 2022

Master Plan Design Review

Comparable Stadium Review

Facility Condition Assessment



# PROJECT TEAM



# Project Team

## **Venue Solutions Group**

Venue Solutions Group was formed in 2011 by three former senior facility operators who saw a need by public assembly venues that did not have the support of large, contract management firms. Managing with best practices, planning for the future, and honestly assessing one's environment and operating success can be challenging in the least, and especially so with today's limited resources. In 2011, as the in-house operational consultants for the world's largest sports architectural firm, the future partners of VSG uncovered a market beyond those needing only architectural services. We discovered that many of our clients desired help in opening new buildings, understanding renovation potential, properly training front of house staff, and being able to see the forest for the trees when it came to their own management. VSG is dedicated to continually improving facility performance through direct experience, benchmarking, and the use of industry best practices. We take pride in being recognized as industry leaders in the programming, planning, preparation, and performance of public assembly facilities worldwide. Additionally, we understand that not every option is meant for every building. While we take on board the best that is out there, we recognize that a procedure, solution, or amenity for one venue isn't necessarily right for another. Finally, the information VSG provides is more than a collection of numbers and other data; as operators, we understand what is behind the numbers and can advise clients to a great depth. VSG recently performed comprehensive assessments of NRG Stadium (home of the Houston Texans NFL team), Bankers Life Fieldhouse (home of the Indiana Pacers NBA team), Spectrum Center (home of the Charlotte Hornets NBA team), American Airlines Arena (home of the Miami Heat NBA team), Amway Center (home of the Orlando Magic NBA team), M&T Bank Stadium (home of the Baltimore Ravens NFL team), and Oriole Park at Camden Yards (home of the Baltimore Orioles MLB team). VSG was also the operational consultant to the owner of the Hollywood Park and Entertainment District, a 300-acre mixed use site located in Inglewood, California (which includes So Fi Stadium, home of the NFL's Los Angeles Rams and Los Angeles Chargers). Most recently, VSG assisted the Golden State Warriors as operational advisors on the recently opened Chase Center in San Francisco, California.

## **Legends Project Development**

Founded in 2008 as a joint venture between the iconic Dallas Cowboys and New York Yankees, Legends is a data-intelligence fueled global premium experiences company with six divisions operating worldwide - Global Planning, Global Sales, Hospitality, Global Partnerships, Global Merchandise, and Global Technology Solutions - offering clients and partners a 360-degree service solution platform to elevate their brand and execute their vision. Legends is headquartered

in New York City, NY, has over two dozen offices across the United States and Europe, employs more than 1,700 full time staff and upwards of 20,000 seasonal staff in their projects across the country. Legends Project Development (LPD) provides comprehensive owner's representative and project management services to the attractions, sports, entertainment, and public assembly industries. LPD provides a collaborative approach to the owner's representative role that results in a venue that maximizes enhancement of the customer experience, generates optimal revenue, reduces time and costs associated with design and construction, and delivers industry leading venues with reduced operating and maintenance costs. The LPD team actively manages the daily work of all project participants and closely coordinates and communicates with the client so that the project remains on time and under budget while maximizing revenue. In addition to what we would call "core" or "essential" project management services, our team provides added value by creating unique solutions to complex problems integrating lessons learned on the development of dozens of the most complex and unique venues in the world. Legends has provided consulting and project management services to AT&T Stadium (Home to the Dallas Cowboys), SoFi Stadium (Home to the Los Angeles Rams and Chargers), Caesars Superdome renovations (Home to the New Orleans Saints) and the New Buffalo Bills Stadium.

## **Henderson Engineers**

Henderson Engineers is a national building systems design firm with 12 offices and over 1,000 staff members spread across the country. The systems they design help bring buildings to life by providing air and water flow, lighting, power, and technology integration. Henderson knows their work is about more than buildings. It's about the people, experiences, and potential inside. At the core of every project, you'll find Henderson working with integrity, intelligence, and care. Henderson is as passionate about people as they are about their work, and that unique focus ensures they can meet clients' needs. Even better, it helps them enhance the experience for the people who use the spaces that Henderson helps create. Because good design on paper requires great building partners to bring it to life, you'll find construction management and commissioning services from Henderson Building Solutions under the same roof. Together, they are changing the engineering and construction industries and redefining how buildings come to life. Henderson Engineers has provided consulting and design services for SoFi Stadium (Home to the Los Angeles Rams and Chargers), and for renovation and improvement projects at Arrowhead Stadium (Home to the Kansas City Chiefs), Caesars Superdome (Home to the New Orleans Saints), Gillette Stadium (Home to the New England Patriots), and Lucas Oil Stadium (Home to the Indianapolis Colts).



# Project Team

## **Idibri**

Idibri, A Salas O'Brien Company, assist design teams and venue owners to create spaces that connect and engage through acoustics, theatre planning & technology design. Their experience bridges entertainment and sports at professional levels and brings the experience of working in a wide variety of contexts and budgets to develop creative solutions to technology, performance, and fan experience. Idibri has provided consulting services for Highmark Stadium (Home to the Buffalo Bills), Ford Field (Home to the Detroit Lions), U.S. Bank Stadium (Home to the Minnesota Vikings) and Tom Benson Hall of Fame Stadium in Canton, Ohio.

## **Manhattan Construction Company**

Founded in 1896, Manhattan Construction Company is a fifth-generation family-owned company that provides pre-construction, construction management, program management, general building, and design-build services throughout the United States, Mexico, Central America, and the Caribbean. Manhattan's portfolio of work includes mission-critical, sports, healthcare, government, education, laboratory, science & technology, aviation, transportation, industrial, convention, casino, and hospitality facilities. Manhattan is an 18-time Associated Builders and Contractors (ABC) Accredited Quality Contractor (AQC), an ABC 2019, 2020, 2021, and 2022 Top Performing Contractor, a nine-time STEP Diamond Safety Award Winner, and a 2017 and 2021 National Safety Pinnacle Award winner. Manhattan Construction was the general contractor for AT&T Stadium (Home to the Dallas Cowboys), NRG Stadium (Home to the Houston Texans) and renovations and improvements of Raymond James Stadium (Home to the Tampa Bay Buccaneers).

## **Thornton Tomasetti**

Thornton Tomasetti was incorporated in 1933 and with over 70 years of experience, 50+ offices across the United States and the world and a history of delivering many of the world's most recognizable sport facilities. Thornton Tomasetti has 1,500+ professionals for planning, new design and construction support, sustainability consulting, peer review and value engineering, assessment and investigation, repairs, renovation, expansion, and deconstruction of buildings. Thornton Tomasetti has 10 NFL stadiums and 2,000+ professional sports and public assembly projects in their portfolio. Thornton Tomasetti has provided structural design services for Nissan Stadium, Met Life Stadium (Home to the New York Giants and Jets), U.S. Bank Stadium (Home to the Minnesota Vikings), Ford Field (Home to the Detroit Lions), renovations to Hard Rock Stadium (Home to the Miami Dolphins) and renovations to Lambeau Field (Home to the Green Bay Packers).

## **VDA**

VDA, Inc. is an internationally renowned elevator and escalator consulting firm that provides design and operational expertise for vertical transportation systems. They were founded in 1980 and currently have 160+ professionals located in 38 branches across the United States. VDA provides consulting services in maintenance, equipment design, new construction, peer review, code inspections, capital expense planning and specification and bid document development. VDA is experienced in a wide variety of facility types which includes airports, hotels, municipal buildings, and retail in addition to the stadium, arena, and convention center market.





# Overview Summary

## 1: Master Plan Design Review

*-VSG will independently evaluate and provide projected costs of the Nissan Stadium improvement plan developed by Gensler/Hastings in December of 2021*

**\$2,114,072,284**

## 2: Comparable Stadium Review

*-provide a high level comparison of improvements and relative costs for Hard Rock Stadium, home of the Miami Dolphins. Hard Rock Stadium is specifically listed as a comparable facility in the Tennessee Titans lease with Metro.*

## 3: Facility Condition Assessment

*-conduct a limited review of the Nissan Stadium focused on MEP, Structure, Vertical Transportation and Technology to establish potential costs for Metro between now and the anticipated opening of a new stadium in 2026*

**\$37,110,275**



# Master Plan Design Review

# NISSAN STADIUM





October 20, 2022

Russ Simons  
Venue Solutions Group  
7105 Peach Court, Suite 108  
Brentwood, TN 37027  
[Russ.simons@venuesolutionsgroup.com](mailto:Russ.simons@venuesolutionsgroup.com)

Dear Russ,

Legends Project Development along with Manhattan Construction are pleased to present our findings and estimates for Enabling Projects as well as proposed renovations to the existing Nissan Stadium, which opened in 1999. Our team completed a site assessment on August 30, 2022; reviewed the Gensler Sports Conceptual Design Package dated December 1, 2021; and reviewed the Facility Condition Assessment dated April 3, 2017. Based on our industry expertise, recent project experience, and facility renovation knowledge, we offer the following summary conclusions.

### **ASSUMPTIONS/INCLUSIONS**

**Below is a list of assumptions made and inclusions contained within our estimating exercise:**

1. Assumed construction start of 2023 and phased construction through 2026, both on and off season.
2. **Enabling Projects** are projects required to renovate and update Nissan Stadium to prepare the building for the renovations as well as maintain operations for the next 20 years have been included. These costs include but are not limited to:
  - a. Removal and replacement of the corroded domestic water piping system and associated work.
  - b. Replacement of outdated or damaged mechanical and electrical systems equipment.
  - c. Remedial repairs of concrete structure and masonry where noticeable.
  - d. Replacement of outdated and/or inefficient concession food service equipment.
  - e. Replacement of outdated light fixtures throughout the stadium with LED technology.
  - f. Updating vertical transportation elevators and escalators.
3. Costs to bring Nissan Stadium up to current NFL Standards, including but not limited to:
  - a. Updated interior finishes throughout the stadium.
  - b. Renewed home and visiting team locker room facilities.
  - c. Updated team store.
  - d. Enhanced security system.
4. Contingencies and escalation based on current market conditions with escalation projected at its current rate until buyout and construction starts in 2023.
5. Historical benchmarking data from past renovation projects combined with current pricing from recent similar facilities.
6. No costs have been included for hazardous waste remediation or upgrades to facilities outside of the stadium proper.
7. Assumed a complete technology upgrade as part of the renovations.

### **FINDINGS**

1. Total estimated cost including hard and softs for Enabling Projects is \$361,809,423.



2. Total estimated cost including hard and soft costs for proposed renovations as defined in Gensler's Conceptual Design Package and based on the assumptions/inclusions defined above (not including suites) totals \$1,517,182,800.
3. Total overall combined cost totals are estimated at \$1,878,992,223.

We look forward to presenting our findings to the city and are available to answer any questions regarding our reported findings.

Sincerely,

A handwritten signature in black ink that reads "Paula Party".

Chief Operating Officer  
Legends Project Development



# SUMMARY BUDGET

## NISSAN STADIUM REDEVELOPMENT ESTIMATED PROJECT BUDGET

10/31/22

ORIGINAL BUDGET	RATE	TOTAL
<b>CONSTRUCTION COSTS</b>		
Manhattan Construction Estimate - <b>Enabling Projects</b>		256,866,581.00
Manhattan Construction Estimate - <b>Renovation</b>		983,790,226.00
<b>TOTAL CONSTRUCTION COST</b>		<b>1,240,656,807.00</b>
<b>SOFT COSTS</b>		
Architectural/Engineering	8.00%	99,252,544.56
Other Required Consultants	7.00%	86,845,976.49
Legal	2.00%	24,813,136.14
Testing and Inspection	2.00%	24,813,136.14
Furnishings and Equipment		29,513,706.78
Insurance	4.00%	49,626,272.28
Project Administration	3.00%	37,219,704.21
Utility Fees/Services	0.05%	620,328.40
Fees, Permits, & Planning	2.00%	24,813,136.14
DAS / WIFI	LS	40,000,000.00
Technology Upgrades / Scoreboards	LS	50,000,000.00
City Required 1% for Art Program on Hard & Soft Costs	1.00%	-
<b>TOTAL SOFT COSTS</b>		<b>467,517,941.14</b>
Indirect Cost % of Const. Costs		38%
<b>Project Contingency</b>	10.00%	<b>170,817,474.81</b>
<b>TOTAL ADJUSTED PROJECT COSTS</b>		<b>1,878,992,222.96</b>
Capital Requirements Post-Renovation, Years 2027-2039		235,080,061.00
<b>TOTAL COST</b>		<b>2,114,072,283.96</b>

**NISSAN STADIUM MASTER PLAN ENABLING PROJECTS**  
**10/31/22**

<b>ORIGINAL BUDGET</b>	<b>RATE</b>	<b>TOTAL</b>
<b>CONSTRUCTION COSTS</b>		
Manhattan Construction Estimate		256,866,581.00
		-
<b>TOTAL CONSTRUCTION COST</b>		<b>256,866,581.00</b>
<b>SOFT COSTS</b>		
Architectural/Engineering	8.00%	20,549,326.48
Other Required Consultants	7.00%	17,980,660.67
Legal	2.00%	5,137,331.62
Testing and Inspection	2.00%	5,137,331.62
Furnishings and Equipment	0.00%	-
Insurance	4.00%	10,274,663.24
Project Administration	3.00%	7,705,997.43
Utility Fees/Services	0.05%	128,433.29
Fees, Permits, & Planning	2.00%	5,137,331.62
City Required 1% for Art Program on Hard & Soft Costs	0.00%	-
<b>TOTAL SOFT COSTS</b>		<b>72,051,075.97</b>
Indirect Cost % of Const. Costs		28%
<b>Project Contingency</b>	10.00%	<b>32,891,765.70</b>
<b>TOTAL ADJUSTED PROJECT COSTS</b>		<b>361,809,422.67</b>

**INDEPENDENT ESTIMATE OF GENSLER/HASTINGS MASTER  
PLAN 10/31/22**

<b>ORIGINAL BUDGET</b>	<b>RATE</b>	<b>TOTAL</b>
<b>CONSTRUCTION COSTS</b>		
Manhattan Construction Estimate		983,790,226.00
		-
<b>TOTAL CONSTRUCTION COST</b>		<b>983,790,226.00</b>
<b>SOFT COSTS</b>		
Architectural/Engineering	8.00%	78,703,218.08
Other Required Consultants	7.00%	68,865,315.82
Legal	2.00%	19,675,804.52
Testing and Inspection	2.00%	19,675,804.52
Furnishings and Equipment	3.00%	29,513,706.78
Insurance	4.00%	39,351,609.04
Project Administration	3.00%	29,513,706.78
Utility Fees/Services	0.05%	491,895.11
Fees, Permits, & Planning	2.00%	19,675,804.52
DAS / WIFI	LS	40,000,000.00
Technology Upgrades / Scoreboards	LS	50,000,000.00
City Required 1% for Art Program on Hard & Soft Costs	0.00%	-
<b>TOTAL SOFT COSTS</b>		<b>395,466,865.17</b>
Indirect Cost % of Const. Costs		40%
<b>Project Contingency</b>	10.00%	<b>137,925,709.12</b>
<b>TOTAL ADJUSTED PROJECT COSTS</b>		<b>1,517,182,800.29</b>

**CAPITAL REQUIREMENTS POST-RENOVATION, YEARS 2027-2039**  
**10/31/22**

<b>DISCIPLINE</b>	<b>Years 1-5</b>	<b>Years 6-10</b>	<b>Years 11-13</b>	<b>TOTAL</b>
Architecture		\$ 99,356,511		\$ 99,356,511
MEP & Fire Protection		\$ 704,346	\$ 1,687,846	\$ 2,392,192
Structure		\$ 11,136,699	\$ 6,084,686	\$ 17,221,385
Technology	\$ 2,744,747	\$ 72,211,007	\$ 2,916,860	\$ 77,872,614
Vertical Transportation			\$ 2,936,852	\$ 2,936,852
Roof & Envelope		\$ 238,644		\$ 238,644
Food & Beverage		\$ 27,563,716		\$ 27,563,716
Retail		\$ 7,498,148		\$ 7,498,148
<b>TOTAL COST</b>	<b>\$ 2,744,747</b>	<b>\$ 218,709,070</b>	<b>\$ 13,626,244</b>	<b>\$ 235,080,061</b>





October 20, 2022

Paula Portz  
Legends  
2051 Quarry Trail  
Winterset, IA 50273

RE: Nissan Stadium Concept Estimate and Schedule Analysis  
(based on Facility Condition Assessment and Gensler Concept Drawings)

Manhattan Construction was selected to provide conceptual pricing estimates for renovating Nissan Stadium located Nashville Tennessee. To develop the estimate, Manhattan utilized its historical cost database as well as current pricing from similar facilities, e.g.: Raymond James Stadium in Tampa, Florida, Kyle Field Stadium in College Station, Texas, and AT&T Stadium in Arlington, Texas.

The information we utilized was based upon The Facility Condition Assessment dated April 3, 2017 and The Gensler Sports Conceptual Design Package dated December 01, 2021. In addition, on August 30, 2022, Legends, Manhattan, and several design team members performed an on-site walk-through and visited with several facilities management and maintenance personnel, getting an in-depth look.

In our estimate, we have tried to capture the costs needed to a) renovate and update the facility to keep it running for another 20 years, b) bringing up to NFL standards, and c) provide new features to make the facility competitive for hosting major events and making it the “go-to” spot overlooking downtown Nashville.

For our schedule analysis, we have assumed a construction start on enabling work and renovations in the Fall of 2023 and have included contingencies to allow for design progression as well as potential market and supply-chain impacts. In a “normal” year one can expect 3% - 5% escalation. Therefore, for a 2023 start, we are carrying 5% to allow for escalation and supply-chain issues. We believe the project can be fast-tracked and be completed in three (3) off-seasons, however, this will be disruptive to stadium operations and events during this time-frame, and will require additional costs for overtime, expediting materials, and shift work.

Manhattan is proud to have been selected to provide this cost assessment and look forward to working with your team in the future.

Sincerely,

Greg McClure  
Senior Vice-President  
Manhattan Construction Company





**Nissan Stadium Renovations  
Program Estimate  
Start Renovations 2023 - Complete 2026  
October 20, 2022**

Enabling Project	Quantity	Unit	\$/Unit	Total Cost
<b>Sitework</b>				
Utilities, Paving, Landscape, Hardscape	3,000,000	SF	\$ 4.77	\$ 14,312,500
<b>Interior Renovations</b>				
Service Level	210,000	SF	\$ 90.95	\$ 19,099,000
Main Concourse Level	204,000	SF	\$ 107.29	\$ 21,886,775
Press Suite Level	81,500	SF	\$ 131.67	\$ 10,731,000
Club Level	120,000	SF	\$ 178.33	\$ 21,400,000
Lower Suite Level	93,000	SF	\$ 79.52	\$ 7,395,500
Upper Suite Level	91,000	SF	\$ 79.51	\$ 7,235,750
Upper Concourse Level	123,000	SF	\$ 113.15	\$ 13,917,300
<b>Seating Bowl</b>				
Seating Bowl	361,500	SF	\$ 58.57	\$ 21,172,500
<b>Exterior Skin</b>				
Exterior Skin	922,500	BSF	\$ 14.22	\$ 13,113,463
<b>Vertical Transportation</b>				
Elevators and Escalators	922,500	BSF	\$ 8.13	\$ 7,500,000
<b>Subtotal Hard Costs</b>	<b>922,500</b>	<b>BSF</b>	<b>\$ 171.02</b>	<b>\$ 157,763,787</b>
Contractor Cost (Insurances, Bonds, Fees, Gen Cond)				\$ 30,416,858
<b>Subtotal Cost of Construction</b>				<b>\$ 188,180,645</b>
Design Contingency (10%)				\$ 18,818,065
Contractor Contingency (10%)				\$ 18,818,065
Phasing / Difficulty Contingency (Build over 3 off-seasons minimum) (10%)				\$ 18,818,065
<b>Subtotal</b>				<b>\$ 244,634,839</b>
Escalation / Supply Chain Allowance - Assume Fall 2023 Start (5%)				\$ 12,231,742
<b>Total Cost of Construction (Enabling Project)</b>				<b>\$ 256,866,581</b>

New Construction Program	Quantity	Unit	\$/Unit	Total Cost
<b>Site Amenities</b>				
Demolition of Existing	810,000	SF	\$ 3.45	\$ 2,793,000
New Construction	3,250,000	SF	\$ 10.56	\$ 34,312,500
<b>Building Renovations</b>				
Service Level	49,800	SF	\$ 833.18	\$ 41,492,400
Main Concourse	115,000	SF	\$ 620.61	\$ 71,370,000
Press Suite Level	22,200	SF	\$ 398.56	\$ 8,848,000
West Sideline Clubs	78,500	SF	\$ 484.52	\$ 38,035,000
East Sideline Clubs	78,500	SF	\$ 484.52	\$ 38,035,000
Lower Suites	93,000	SF	\$ 341.26	\$ 31,737,500
Upper Suites	91,000	SF	\$ 341.08	\$ 31,038,500
300 Upper Concourse	61,500	SF	\$ 802.54	\$ 49,356,150
350 Upper Deck & Canopy	39,700	SF	\$ 420.25	\$ 16,684,000
North End Zone Theater Boxes and Outdoor Club	59,500	SF	\$ 666.84	\$ 39,677,110
South End Zone Theater Boxes and Outdoor Club	59,500	SF	\$ 666.84	\$ 39,677,110
Sports Bar	20,700	SF	\$ 700.22	\$ 14,494,500
Team Store	20,700	SF	\$ 700.22	\$ 14,494,500
Seating Bowl	361,500	SF	\$ 157.16	\$ 56,814,295
Exterior Skin Renovations	425,000	SF	\$ 113.60	\$ 48,281,463
Elevators and Escalators	789,600	SF	\$ 5.97	\$ 4,710,000
<b>Subtotal Hard Costs</b>	<b>789,600</b>	<b>SF</b>	<b>\$ 736.89</b>	<b>\$ 581,851,028</b>
Contractor Cost (Insurances, Bonds, Fees, Gen Cond)				\$ 112,180,878
<b>Subtotal Cost of Construction</b>				<b>\$ 694,031,906</b>
Design Contingency (10%)				\$ 69,403,191
Contractor Contingency (10%)				\$ 69,403,191
Phasing / Difficulty Contingency (Build over 3 off-seasons minimum) (15%)				\$ 104,104,786
<b>Subtotal</b>				<b>\$ 936,943,073</b>
Escalation / Supply Chain Allowance - Assume Fall 2023 Start (5%)				\$ 46,847,154
<b>Total Cost of Construction (New Construction Program)</b>				<b>\$ 983,790,226</b>

**Notes and Comments**

- 1) No Soft cost have been included.
- 2) Escalation Allowance is assuming a continuation of current rates until Fall of 2023.
- 3) No cost have been included for hazardous waster remediation.
- 4) It is assumed public infrastructure (gas, water, power, CHW, etc.) is available at the site and sufficient to be utilized in the new construction

**Side Note:**

Nissan Stadium was built in 1999  
Original Cost: \$290M  
Today's Cost: \$627,502,000 (per MCC Escalation Calc)



**Nissan Stadium Renovations  
Program Estimate  
October 5, 2022**

ENABLING WORK TO EXISTING FACILITY									
Demolition and Site Work									
General Area	Room Description	#	Unit	Total	UM	UP	COST	Comments	
SITE	<b>Demolition</b>								
		0	0	0	SF	\$20.00	\$ -		
		0	0	0	SF	\$20.00	\$ -		
	<b>Base Infrastructure (HVAC / Electrical)</b>								
	Cut / Cap / Make-safe HVAC	0	0	0	SF	\$1.50	\$ -		
	Electrical - Switchgear, Panels, Branch	0	0	0	SF	\$1.50	\$ -		
	<b>Sub-total Demolition</b>			<b>0</b>	<b>SF</b>	<b>\$</b>	<b>\$</b>		
	<b>New Construction</b>								
	Upgrade Existing Utilities	1	1	1	LS	\$1,500,000.00	\$ 1,500,000		
	Replacement of Existing Paving and Sidewalks 35% of overall Paving	0.35	2,500,000	875,000	SF	\$10.00	\$ 8,750,000		
	Patching / Repairs of Existing Paving and Sidewalks	0.65	2,500,000	1,625,000	SF	\$0.50	\$ 812,500		
	Upgrade Existing Landscaping	1	1	1	LS	\$750,000.00	\$ 750,000		
	Site Security Improvements	1	1	1	SF	\$2,500,000.00	\$ 2,500,000		
		0	1	0	SF	\$0.00	\$ -		
		0	0	0	SF	\$0.00	\$ -		
<b>Sub-Total Site Work</b>			<b>3,000,000</b>	<b>SF</b>	<b>\$</b>	<b>\$</b>	<b>14,312,500</b>		
<b>Total Construction Cost - Demolition and Sitework</b>			<b>3,000,000</b>	<b>SF</b>	<b>\$</b>	<b>\$</b>	<b>14,312,500</b>		
MAIN BUILDING	<b>Demolition</b>								
		0	0	0	SF	\$20.00	\$ -		
		0	0	0	SF	\$20.00	\$ -		
	<b>Base Infrastructure (HVAC / Electrical)</b>								
	Cut / Cap / Make-safe HVAC	0	0	0	SF	\$1.50	\$ -		
	Electrical - Switchgear, Panels, Branch	0	0	0	SF	\$1.50	\$ -		
	<b>Sub-total Main Building</b>			<b>0</b>	<b>SF</b>	<b>\$</b>	<b>\$</b>	<b>-</b>	
<b>Interior Renovations</b>									
SERVICE LEVEL	<b>New Construction (Renovations)</b>								
	Repair / Replace Structure where needed.	1	210,000	210,000	SF	\$5.00	\$ 1,050,000		
	Repair / Replace Waterproofing where needed.	1	210,000	210,000	SF	\$2.50	\$ 525,000		
	Refresh Finishes in BOH Offices	1	23,000	23,000	SF	\$15.00	\$ 345,000		
	Refresh Finishes in BOH General Areas (Storage, Maint, MEP Rooms)	1	132,000	132,000	SF	\$2.00	\$ 264,000		
	Refresh Finishes in Team Locker Facility	1	35,000	35,000	SF	\$100.00	\$ 3,500,000		
	Refresh Finishes in Visitor Locker Facility	1	8,800	8,800	SF	\$75.00	\$ 660,000		
	Repair / Replace Equipment in Central Commissary	1	11,000	11,000	SF	\$100.00	\$ 1,100,000		
	Repair / Replace Subroof System under Seating Bowl	1	42,000	42,000	SF	\$10.00	\$ 420,000		
	Repair / Replace Fire Protection Heads and Piping as needed.	1	210,000	210,000	SF	\$4.50	\$ 945,000		
	Replace Plumbing Lines, Fixtures, and Equipment	1	210,000	210,000	SF	\$10.00	\$ 2,100,000		
	Replace HVAC Ductwork and Equipment where necessary	1	210,000	210,000	SF	\$10.00	\$ 2,100,000		
	Replace Electrical Light Fixtures throughout with LED	1	210,000	210,000	SF	\$10.00	\$ 2,100,000		
	Replace and Tie-into Existing Lighting Controls throughout	1	210,000	210,000	SF	\$2.00	\$ 420,000		
	Relocate Electrical Equipment to meet code	1	210,000	210,000	SF	\$2.00	\$ 420,000		
	Provide new Panels to meet code.	1	210,000	210,000	SF	\$6.00	\$ 1,260,000		
	Repair / Replace Damaged Elect Branch Systems (Conduits, J-Boxes, Panels)	1	210,000	210,000	SF	\$4.00	\$ 840,000		
	Demolition and Replacement of Walls / Ceilings to facilitate MEP Replacement	1	210,000	210,000	SF	\$5.00	\$ 1,050,000		
		0	0	0	SF	\$	\$ -		
		0	0	0	SF	\$	\$ -		
	<b>Total Construction Cost - Service Level</b>			<b>210,000</b>	<b>SF</b>	<b>\$</b>	<b>91</b>	<b>\$ 19,099,000</b>	
	MAIN CONCOURSE LEVEL	<b>New Construction (Renovations)</b>							
		Repair / Replace Structure / Masonry where needed.	1	204,000	204,000	SF	\$5.00	\$ 1,020,000	
		Repair / Replace Waterproofing where needed.	1	204,000	204,000	SF	\$2.50	\$ 510,000	
		Provide new Roofing over Outdoor structures	1	51,000	51,000	SF	\$25.00	\$ 1,275,000	
Refresh Finishes in BOH Offices		1	10,500	10,500	SF	\$15.00	\$ 157,500		
Refresh Finishes in BOH General Areas (Storage, Maint, MEP Rooms)		1	34,000	34,000	SF	\$2.00	\$ 68,000		
Refresh Finishes in Concessions		1	30,000	30,000	SF	\$100.00	\$ 3,000,000		
Refresh Finishes in Restrooms		1	30,000	30,000	SF	\$75.00	\$ 2,250,000		
Refresh Finishes in Club / Team Store		1	10,000	10,000	SF	\$100.00	\$ 1,000,000		
Provide upgraded Ornamental Railings at Monumental Stairs		2	1	2	EA	\$75,000.00	\$ 150,000		
Repair / Replace Equipment in Concessions		1	30,000	30,000	SF	\$100.00	\$ 3,000,000		
Repair / Replace Fire Protection Heads and Piping as needed.		1	144,501	144,501	SF	\$4.50	\$ 650,255		
Replace Plumbing Lines, Fixtures, and Equipment		1	144,501	144,501	SF	\$10.00	\$ 1,445,010		
Replace HVAC Ductwork and Equipment where necessary		1	144,501	144,501	SF	\$10.00	\$ 1,445,010		
Replace Electrical Light Fixtures throughout with LED		1	204,000	204,000	SF	\$10.00	\$ 2,040,000		
Replace and Tie-into Existing Lighting Controls throughout		1	204,000	204,000	SF	\$2.00	\$ 408,000		
Relocate Electrical Equipment to meet code		1	204,000	204,000	SF	\$2.00	\$ 408,000		
Provide new Panels to meet code.		1	204,000	204,000	SF	\$6.00	\$ 1,224,000		
Repair / Replace Damaged Elect Branch Systems (Conduits, J-Boxes, Panels)		1	204,000	204,000	SF	\$4.00	\$ 816,000		
Demolition and Replacement of Walls / Ceilings to facilitate MEP Replacement		1	204,000	204,000	SF	\$5.00	\$ 1,020,000		
		0	0	0	SF	\$	\$ -		
	0	0	0	SF	\$	\$ -			
<b>Total Construction Cost - Main Concourse Level</b>			<b>204,000</b>	<b>SF</b>	<b>\$</b>	<b>107</b>	<b>\$ 21,886,775</b>		
PRESS SUITE LEVEL	<b>New Construction (Renovations)</b>								
	Repair / Replace Structure where needed.	1	81,500	81,500	SF	\$5.00	\$ 407,500		
	Repair / Replace Waterproofing where needed.	1	81,500	81,500	SF	\$2.50	\$ 203,750		
	Refresh Finishes in BOH Offices	1	1,700	1,700	SF	\$25.00	\$ 42,500		
	Refresh Finishes in BOH General Areas (Storage, Maint, MEP Rooms)	1	31,000	31,000	SF	\$2.00	\$ 62,000		
	Refresh Finishes in Club	1	1,800	1,800	SF	\$100.00	\$ 180,000		
	Refresh Finishes in Press Box Area	1	20,500	20,500	SF	\$50.00	\$ 1,025,000		
	Refresh Finishes in Suites	1	18,000	18,000	SF	\$200.00	\$ 3,600,000		
	Refresh Finishes in Suite Circulation	1	8,500	8,500	SF	\$100.00	\$ 850,000		
	Repair / Replace Fire Protection Heads and Piping as needed.	1	81,500	81,500	SF	\$4.50	\$ 366,750		
	Replace Plumbing Lines, Fixtures, and Equipment	1	81,500	81,500	SF	\$10.00	\$ 815,000		
	Replace HVAC Ductwork and Equipment where necessary	1	81,500	81,500	SF	\$10.00	\$ 815,000		
	Replace Electrical Light Fixtures throughout with LED	1	81,500	81,500	SF	\$10.00	\$ 815,000		
	Replace and Tie-into Existing Lighting Controls throughout	1	81,500	81,500	SF	\$2.00	\$ 163,000		
	Relocate Electrical Equipment to meet code	1	81,500	81,500	SF	\$2.00	\$ 163,000		
	Provide new Panels to meet code.	1	81,500	81,500	SF	\$6.00	\$ 489,000		
	Repair / Replace Damaged Elect Branch Systems (Conduits, J-Boxes, Panels)	1	81,500	81,500	SF	\$4.00	\$ 326,000		
Demolition and Replacement of Walls / Ceilings to facilitate MEP Replacement	1	81,500	81,500	SF	\$5.00	\$ 407,500			
	1	0	0	SF	\$0.00	\$ -			

General Area	Room Description	#	Unit	Total	UM	UP	COST		Comments
		1	0	0	SF		\$0.00	\$ -	
	<b>Total Construction Cost - Press Suite Level</b>			<b>81,500</b>	<b>SF</b>		<b>\$ 132</b>	<b>\$ 10,731,000</b>	
<b>CLUB LEVEL</b>	<b>New Construction (Renovations)</b>								
	Repair / Replace Structure where needed.	1	120,000	120,000	SF		\$5.00	\$ 600,000	
	Repair / Replace Waterproofing where needed.	1	120,000	120,000	SF		\$2.50	\$ 300,000	
	Refresh Finishes in BOH General Areas (Storage, Maint, MEP Rooms)	1	15,000	15,000	SF		\$2.00	\$ 30,000	
	Refresh Finishes in Club	1	78,500	78,500	SF		\$100.00	\$ 7,850,000	
	Refresh Finishes in Concessions	1	21,250	21,250	SF		\$200.00	\$ 4,250,000	
	Refresh Finishes in Restrooms	1	26,000	26,000	SF		\$75.00	\$ 1,950,000	
	Repair / Replace Fire Protection Heads and Piping as needed.	1	120,000	120,000	SF		\$4.50	\$ 540,000	
	Replace Plumbing Lines, Fixtures, and Equipment	1	120,000	120,000	SF		\$10.00	\$ 1,200,000	
	Replace HVAC Ductwork and Equipment where necessary	1	120,000	120,000	SF		\$10.00	\$ 1,200,000	
	Replace Electrical Light Fixtures throughout with LED	1	120,000	120,000	SF		\$10.00	\$ 1,200,000	
	Replace and Tie-into Existing Lighting Controls throughout	1	120,000	120,000	SF		\$2.00	\$ 240,000	
	Relocate Electrical Equipment to meet code	1	120,000	120,000	SF		\$2.00	\$ 240,000	
	Provide new Panels to meet code.	1	120,000	120,000	SF		\$6.00	\$ 720,000	
	Repair / Replace Damaged Elect Branch Systems (Conduits, J-Boxes, Panels)	1	120,000	120,000	SF		\$4.00	\$ 480,000	
	Demolition and Replacement of Walls / Ceilings to facilitate MEP Replacement	1	120,000	120,000	SF		\$5.00	\$ 600,000	
		1							
		1							
	<b>Total Construction Cost - Club Level</b>			<b>120,000</b>	<b>SF</b>		<b>\$ 178</b>	<b>\$ 21,400,000</b>	
<b>LOWER SUITE LEVEL</b>	<b>New Construction (Renovations)</b>								
	Repair / Replace Structure where needed.	1	93,000	93,000	SF		\$5.00	\$ 465,000	
	Repair / Replace Waterproofing where needed.	1	93,000	93,000	SF		\$2.50	\$ 232,500	
	Repair / Replace Finishes after MEP upgrades in BOH General Areas (Storage,	1	13,500	13,500	SF		\$10.00	\$ 135,000	
	Repair / Replace Finishes after MEP upgrades in Suites	1	34,000	34,000	SF		\$25.00	\$ 850,000	
	Repair / Replace Finishes after MEP upgrades in Suite Circulation	1	26,500	26,500	SF		\$25.00	\$ 662,500	
	Repair / Replace Finishes after MEP upgrades in Restrooms	1	3,000	3,000	SF		\$25.00	\$ 75,000	
	Repair / Replace Fire Protection Heads and Piping as needed.	1	93,000	93,000	SF		\$4.50	\$ 418,500	
	Replace Plumbing Lines, Fixtures, and Equipment	1	93,000	93,000	SF		\$10.00	\$ 930,000	
	Replace HVAC Ductwork and Equipment where necessary	1	93,000	93,000	SF		\$10.00	\$ 930,000	
	Replace Electrical Light Fixtures throughout with LED	1	93,000	93,000	SF		\$10.00	\$ 930,000	
	Replace and Tie-into Existing Lighting Controls throughout	1	93,000	93,000	SF		\$2.00	\$ 186,000	
	Relocate Electrical Equipment to meet code	1	93,000	93,000	SF		\$2.00	\$ 186,000	
	Provide new Panels to meet code.	1	93,000	93,000	SF		\$6.00	\$ 558,000	
	Repair / Replace Damaged Elect Branch Systems (Conduits, J-Boxes, Panels)	1	93,000	93,000	SF		\$4.00	\$ 372,000	
	Demolition and Replacement of Walls / Ceilings to facilitate MEP Replacement	1	93,000	93,000	SF		\$5.00	\$ 465,000	
	<b>Total Construction Cost - Lower Suite Level</b>			<b>93,000</b>	<b>SF</b>		<b>\$ 80</b>	<b>\$ 7,395,500</b>	
<b>UPPER SUITE LEVEL</b>	<b>New Construction (Renovations)</b>								
	Repair / Replace Structure where needed.	1	91,000	91,000	SF		\$5.00	\$ 455,000	
	Repair / Replace Waterproofing where needed.	1	91,000	91,000	SF		\$2.50	\$ 227,500	
	Repair / Replace Finishes after MEP upgrades in BOH General Areas (Storage,	1	14,500	14,500	SF		\$10.00	\$ 145,000	
	Repair / Replace Finishes after MEP upgrades in Suites	1	34,000	34,000	SF		\$25.00	\$ 850,000	
	Repair / Replace Finishes after MEP upgrades in Suite Circulation	1	27,730	27,730	SF		\$25.00	\$ 693,250	
	Repair / Replace Finishes after MEP upgrades in Restrooms	1	3,500	3,500	SF		\$25.00	\$ 87,500	
	Repair / Replace Fire Protection Heads and Piping as needed.	1	91,000	91,000	SF		\$4.50	\$ 409,500	
	Replace Plumbing Lines, Fixtures, and Equipment	1	91,000	91,000	SF		\$10.00	\$ 910,000	
	Replace HVAC Ductwork and Equipment where necessary	1	91,000	91,000	SF		\$10.00	\$ 910,000	
	Replace Electrical Light Fixtures throughout with LED	1	91,000	91,000	SF		\$10.00	\$ 910,000	
	Replace and Tie-into Existing Lighting Controls throughout	1	91,000	91,000	SF		\$2.00	\$ 182,000	
	Relocate Electrical Equipment to meet code	1	91,000	91,000	SF		\$1.00	\$ 91,000	
	Provide new Panels to meet code.	1	91,000	91,000	SF		\$6.00	\$ 546,000	
	Repair / Replace Damaged Elect Branch Systems (Conduits, J-Boxes, Panels)	1	91,000	91,000	SF		\$4.00	\$ 364,000	
	Demolition and Replacement of Walls / Ceilings to facilitate MEP Replacement	1	91,000	91,000	SF		\$5.00	\$ 455,000	
	<b>Total Construction Cost - Upper Suite Level</b>			<b>91,000</b>	<b>SF</b>		<b>\$ 80</b>	<b>\$ 7,235,750</b>	
<b>UPPER CONCOURSE LEVEL</b>	<b>New Construction (Renovations)</b>								
	Repair / Replace Structure where needed.	1	123,000	123,000	SF		\$2.00	\$ 246,000	
	Repair / Replace Waterproofing where needed.	1	123,000	123,000	SF		\$1.00	\$ 123,000	
	Provide new Roofing over Outdoor structures	1	55,000	55,000	SF		\$25.00	\$ 1,375,000	
	Refresh Finishes in BOH General Areas (Storage, Maint, MEP Rooms)	1	7,800	7,800	SF		\$1.00	\$ 7,800	
	Refresh Finishes in Concessions	1	21,250	21,250	SF		\$200.00	\$ 4,250,000	
	Refresh Finishes in Restrooms	1	26,000	26,000	SF		\$75.00	\$ 1,950,000	
	Repair / Replace Fire Protection Heads and Piping as needed.	1	123,000	123,000	SF		\$4.50	\$ 553,500	
	Replace Plumbing Lines, Fixtures, and Equipment	1	123,000	123,000	SF		\$10.00	\$ 1,230,000	
	Replace HVAC Ductwork and Equipment where necessary	1	123,000	123,000	SF		\$10.00	\$ 1,230,000	
	Replace Electrical Light Fixtures throughout with LED	1	123,000	123,000	SF		\$10.00	\$ 1,230,000	
	Replace and Tie-into Existing Lighting Controls throughout	1	123,000	123,000	SF		\$2.00	\$ 246,000	
	Relocate Electrical Equipment to meet code	1	123,000	123,000	SF		\$1.00	\$ 123,000	
	Provide new Panels to meet code.	1	123,000	123,000	SF		\$4.00	\$ 492,000	
	Repair / Replace Damaged Elect Branch Systems (Conduits, J-Boxes, Panels)	1	123,000	123,000	SF		\$2.00	\$ 246,000	
	Demolition and Replacement of Walls / Ceilings to facilitate MEP Replacement	1	123,000	123,000	SF		\$5.00	\$ 615,000	
	<b>Total Construction Cost - Upper Concourse Level</b>			<b>123,000</b>	<b>SF</b>		<b>\$ 113</b>	<b>\$ 13,917,300</b>	
<b>SEATING BOWL</b>	<b>New Construction (Renovations)</b>								
	Lower Seating Bowl								
	- Remove and Replace Caulking	1	150,000	150,000	SF		\$8.00	\$ 1,200,000	
	- Patch Spalling Concrete / Unlevel Concrete	1	150,000	150,000	SF		\$10.00	\$ 1,500,000	
	- Remove and Recoat Traffic Coatings (Cover Entire Seating Bowl)	1	150,000	150,000	SF		\$16.00	\$ 2,400,000	
	- Demo and Replace Existing CIP Steps	1	150,000	150,000	SF		\$5.00	\$ 750,000	
	Mid Seating Bowl								
	- Remove and Replace Caulking	1	80,000	80,000	SF		\$8.00	\$ 640,000	
	- Patch Spalling Concrete / Unlevel Concrete	1	80,000	80,000	SF		\$10.00	\$ 800,000	
	- Remove and Recoat Traffic Coatings (Cover Entire Seating Bowl)	1	80,000	80,000	SF		\$16.00	\$ 1,280,000	
	- Demo and Replace Existing CIP Steps	1	150,000	150,000	SF		\$5.00	\$ 750,000	
	Upper Seating Bowl								
	- Remove and Replace Caulking	1	131,500	131,500	SF		\$8.00	\$ 1,052,000	
	- Patch Spalling Concrete / Unlevel Concrete	1	131,500	131,500	SF		\$10.00	\$ 1,315,000	
	- Remove and Recoat Traffic Coatings (Cover Entire Seating Bowl)	1	131,500	131,500	SF		\$16.00	\$ 2,104,000	
	- Demo and Replace Existing CIP Steps	1	150,000	150,000	SF		\$5.00	\$ 750,000	



General Area	Room Description	#	Unit	Total	UM	UP	COST	Comments
	Remove and Replace Expansion Joints							
	- Main Concourse	1	1,400	1,400	SF	\$400.00	\$ 560,000	
	- Press / Suite Level	1	550	550	SF	\$400.00	\$ 220,000	
	- Club Level	1	870	870	SF	\$400.00	\$ 348,000	
	- Lower Suite Level	1	430	430	SF	\$400.00	\$ 172,000	
	- Upper Suite Level	1	430	430	SF	\$400.00	\$ 172,000	
	- Upper Concourse Level	1	475	475	SF	\$400.00	\$ 190,000	
	- Low Roof Expansion Joints	1	175	175	SF	\$400.00	\$ 70,000	
	- Upper Seating Bowl	1	530	530	SF	\$400.00	\$ 212,000	
	Video Board Maintenance	1	9,000	9,000	SF	\$150.00	\$ 1,350,000	
	Repair / Replace Video Board Steel Framing	1	9,000	9,000	SF	\$200.00	\$ 1,800,000	
	General Maintenance of Existing A/V Systems.	1	123,000	123,000	SF	\$12.50	\$ 1,537,500	
		1	1	1	SF	\$0.00	\$ -	
	Replace Field Lighting System with New LED	0	1	0	LS	\$4,500,000.00	\$ -	Already Done Previously.
		1	1	1	SF	\$0.00	\$ -	
	<b>Total Construction Cost - Seating Bowl</b>			<b>361,500</b>	<b>SF</b>	<b>\$ 59</b>	<b>\$ 21,172,500</b>	
<b>EXTERIOR SKIN</b>	<b>New Construction (Renovations)</b>							
	Patch / Repair / Replace Existing Waterproofing and Joint Systems							
	- Main Concourse Level +12'	12	5,201	62,412	SF	\$25.00	\$ 1,560,300	
	- Press Suite Level +25.5'	25.5	5,891.0	150,221	SF	\$25.00	\$ 3,755,513	
	- Club Level +12.5'	12.5	3,817.0	47,713	SF	\$25.00	\$ 1,192,813	
	- Lower Suite Level +12.5'	12.5	3,705.0	46,313	SF	\$25.00	\$ 1,157,813	
	- Upper Suite Level +15'	15	3,730	55,950	SF	\$25.00	\$ 1,398,750	
	- Upper Concourse Level +17'	17	3,643	61,931	SF	\$25.00	\$ 1,548,275	
		1		0	SF	\$0.00	\$ -	
	Painting / Refurbishing Existing Exposed Elements	1	1	1	LS	\$2,500,000.00	\$ 2,500,000	
		1				\$0.00	\$ -	
		1		0	SF	\$0.00	\$ -	
						\$0.00	\$ -	
	<b>Total Construction Cost - Exterior Skin</b>			<b>922,500</b>	<b>BSF</b>	<b>\$ 14</b>	<b>\$ 13,113,463</b>	
<b>ELEVATOR AND ESCALATOR SYSTEMS</b>	<b>New Construction (Renovations)</b>							
	Provide New Elevators and Equipment in existing Shafts						\$ -	
	NW Pass Elevators 6	1	6	6	STOPS	\$65,000.00	\$ 390,000	
	NW Pass Elevators 7 & 8	2	7	14	STOPS	\$65,000.00	\$ 910,000	
	NW Freight Elevator 5	1	7	7	STOPS	\$65,000.00	\$ 455,000	
	SW Pass Elevator 1	1	6	6	STOPS	\$65,000.00	\$ 390,000	
	SW Pass Elevator 2 & 3	2	7	14	STOPS	\$65,000.00	\$ 910,000	
	NW Freight Elevator 4	1	7	7	STOPS	\$65,000.00	\$ 455,000	
	Secondary Elevators at Corners	12	2	24	STOPS	\$65,000.00	\$ 1,560,000	
	Scoreboard Box Elevator	1	2	2	STOPS	\$90,000.00	\$ 180,000	
	North Club Escalator 1	1	1	1	FLGHT	\$200,000.00	\$ 200,000	
	North Club Escalator 2	1	1	1	FLGHT	\$200,000.00	\$ 200,000	
	North Club Escalator 4	1	1	1	FLGHT	\$200,000.00	\$ 200,000	
	South Club Escalator 1	1	1	1	FLGHT	\$200,000.00	\$ 200,000	
	South Club Escalator 2	1	1	1	FLGHT	\$200,000.00	\$ 200,000	
	South Club Escalator 3	1	1	1	FLGHT	\$200,000.00	\$ 200,000	
	Cab Finish-out Allowances	21	1	21	EACH	\$50,000.00	\$ 1,050,000	
	<b>Total Construction Cost - Elevator and Escalators</b>			<b>922,500</b>	<b>BSF</b>	<b>\$ 8</b>	<b>\$ 7,500,000</b>	
<b>TOTAL - ENABLING PROJECT</b>				<b>922,500</b>	<b>BSF</b>	<b>\$171.02</b>	<b>\$ 157,763,787</b>	

	<b>Subtotal Hard Cost</b>	<b>\$ 157,763,787</b>
	Contractor Cost (Insurances, Bonds, Fees and General Conditions)	\$ 30,416,858
	<b>Subtotal Cost of Construction</b>	<b>\$ 188,180,645</b>
	Design Contingency (10%)	\$ 18,818,065
	Contractor Contingency (10%)	\$ 18,818,065
Phasing / Difficulty Contingency (Build over 3 off-seasons minimum) (10%)		\$ 18,818,065
	<b>Subtotal</b>	<b>\$ 244,634,839</b>
	Escalation / Supply Chain Allowance - Assume Fall 2023 Start (5%)	\$ 12,231,742
	<b>Total Cost of Construction (Enabling Project)</b>	<b>\$ 256,866,581</b>

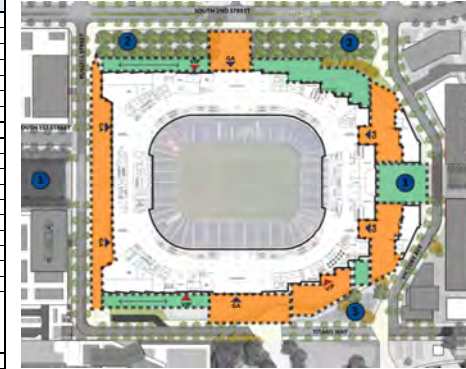
**Notes and Comments**

- 1) No Soft cost have been included.
- 2) Escalation Allowance is assuming a continuation of current rates until Fall of 2023.
- 3) No cost have been included for hazardous waster remediation.
- 4) It is assumed public infrastructure (gas, water, power, CHW, etc.) is available at the site and sufficient to be utilized in the new construction



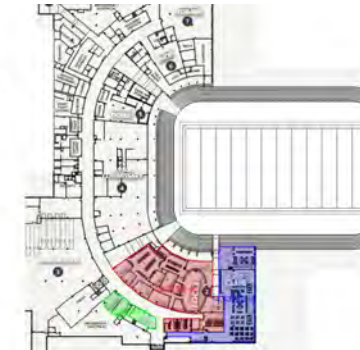
**Nissan Stadium Renovations  
Program Estimate  
October 5, 2022**

ADDED BUILDING AND AMENITIES							
New Construction - Site Amenities							
Room Description	Units	SF	Total SF	UP	Cost	Comments	
<b>Demolition</b>							
<u>Selective Demolition</u>							
Demo Site Paving and Structures for New Building Footprint	1	60,000	60,000	SF	\$5.00	\$ 300,000	
Demo Existing Paving for New Site Amenities	1	750,000	750,000	SF	\$3.00	\$ 2,250,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
Cut / Cap / Make-safe HVAC	1	810,000	810,000	SF	\$0.15	\$ 121,500	
Electrical - Switchgear, Panels, Branch	1	810,000	810,000	SF	\$0.15	\$ 121,500	
<b>Sub-Total - Demolition</b>			<b>810,000</b>	<b>SF</b>	<b>\$ 3.45</b>	<b>\$ 2,793,000</b>	
<b>New Amenities</b>							
<u>New Construction</u>							
Upgrade Existing Wet Utilities for New Building Amenities	1	1	1	LS	\$1,500,000.00	\$ 1,500,000	
Upgrade Existing Dry Utilities for New Building Amenities	1	1	1	LS	\$1,000,000.00	\$ 1,000,000	
Replacement of Existing Paving and Sidewalks 35% of overall Paving	0.35	2,500,000	875,000	SF	\$10.00	\$ 8,750,000	
Patching / Repairs of Existing Paving and Sidewalks	0.65	2,500,000	1,625,000	SF	\$0.50	\$ 812,500	
						\$ -	
New Site Hardscaping and Pedestrian Walkways, Planters, Stairs, etc.	1	750,000	750,000	SF	\$15.00	\$ 11,250,000	
Landscaping and Irrigation	1	1	1	LS	\$3,000,000.00	\$ 3,000,000	
In-ground Water Feature 1	1	5,000	5,000	SF	\$500.00	\$ 2,500,000	
In-ground Water Feature 2	1	5,000	5,000	SF	\$500.00	\$ 2,500,000	
Wall Water Feature 1	1	5,000	5,000	SF	\$300.00	\$ 1,500,000	
Wall Water Feature 2	1	5,000	5,000	SF	\$300.00	\$ 1,500,000	
<b>Sub-Total West Press - New Amenities</b>			<b>3,250,000</b>	<b>SF</b>	<b>\$ 11</b>	<b>\$ 34,312,500</b>	
<b>TOTAL - SITE AMENITIES</b>			<b>4,060,000</b>	<b>SF</b>	<b>\$9.14</b>	<b>\$ 37,105,500</b>	
<b>New Construction - Service Level</b>							
Room Description	Units	SF	Total SF	UP	Cost	Comments	
<b>Demolition</b>							
<u>Selective Demolition</u>							
Demo Existing Home Room Locker Room Facilities	1	26,500	26,500	SF	\$5.00	\$ 132,500	
Demo Existing Visitor Locker Room Facilities	1	8,800	8,800	SF	\$5.00	\$ 44,000	
Demo Existing Storage Area for Field Club	1	14,500	14,500	SF	\$5.00	\$ 72,500	
<b>Base Infrastructure (HVAC / Electrical)</b>							
Cut / Cap / Make-safe HVAC	1	49,800	49,800	SF	\$1.50	\$ 74,700	
Cut / Cap / Make-safe Electrical and Data	1	49,800	49,800	SF	\$1.50	\$ 74,700	
<b>Sub-Total - Demolition</b>						<b>\$ 398,400</b>	
<b>New Construction</b>							
<u>New Construction</u>							
New Home Team Locker Room Facilities	1	23,000	23,000	SF	\$750.00	\$ 17,250,000	
New Official Locker Room Facilities	1	3,500	3,500	SF	\$250.00	\$ 875,000	
New Visitor Locker Room Facilities	1	8,800	8,800	EA	\$250.00	\$ 2,200,000	
New Field Club	1	14,500	14,500	SF	\$900.00	\$ 13,050,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
HVAC and Plumbing Systems	1	49,800	49,800	SF	\$85.00	\$ 4,233,000	
Electrical - Switchgear, Panels, Branch	1	49,800	49,800	SF	\$70.00	\$ 3,486,000	
<b>Sub-Total - New Construction</b>						<b>\$ 41,094,000</b>	
<b>TOTAL - SERVICE LEVEL</b>			<b>49,800</b>	<b>SF</b>	<b>\$833.18</b>	<b>\$ 41,492,400</b>	

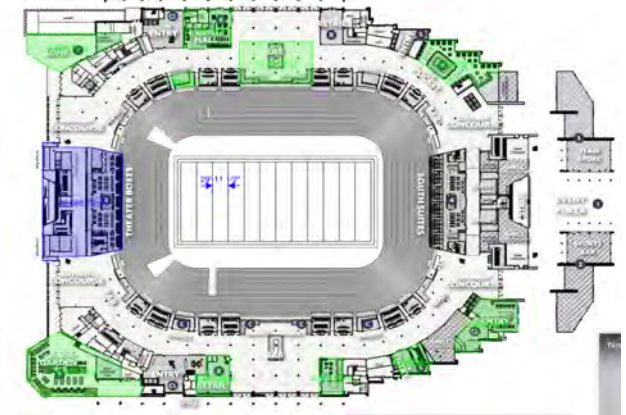


**KEY PROGRAM**

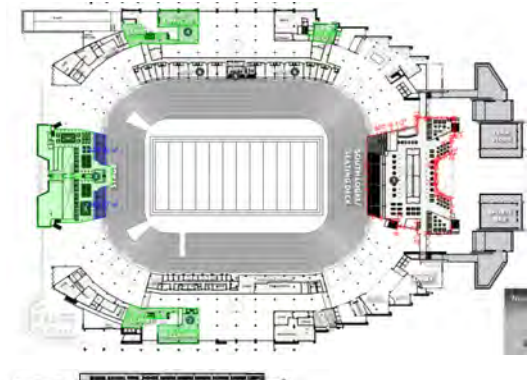
- 1 FIELD CLUB
- 2 TRANS LOCKER
- 3 LOADING DOCK
- 4 CENTRAL COMMISSARY
- 5 VISITOR LOCKER
- 6 MAINTENANCE SHED
- 7 GENERAL STORAGE
- 8 EGRESS RAMP



New Construction - Main Concourse Level							
Room Description	Units	SF	Total SF	UP	Cost	Comments	
<b>Demolition</b>							
<b>Selective Demolition</b>							
Demo Existing Main Concourse Areas (Light)	1	90,000	90,000	SF	\$2.00	\$ 180,000	
Demo Existing Main Concourse Areas (Heavy)	1	115,000	115,000	SF	\$5.00	\$ 575,000	
Relocate Existing Utilities for new foundations	1	30,000	30,000	SF	\$15.00	\$ 450,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
Cut / Cap / Make-safe HVAC	1	205,000	205,000	SF	\$1.50	\$ 307,500	
Cut / Cap / Make-safe Electrical and Data	1	205,000	205,000	SF	\$1.50	\$ 307,500	
<b>Sub-Total - Demolition</b>						<b>\$ 1,820,000</b>	
<b>New Construction</b>							
<b>New Construction</b>							
New Foundations and SOG	1	30,000	30,000	SF	\$25.00	\$ 750,000	
New Finishes in Concessions	1	30,000	30,000	SF	\$50.00	\$ 1,500,000	
New Finishes in Restrooms	1	30,000	30,000	SF	\$125.00	\$ 3,750,000	
New Finishes in Club Entries	1	10,000	10,000	SF	\$350.00	\$ 3,500,000	
New Ornamental Railings at Monumental Stairs	2	1	2	EA	\$150,000.00	\$ 300,000	
New Equipment in Concessions	1	30,000	30,000	SF	\$200.00	\$ 6,000,000	
New Retail	1	9,000	9,000	SF	\$250.00	\$ 2,250,000	
New Suite Entries	1	3,000	3,000	SF	\$350.00	\$ 1,050,000	
New Club Dining "The Pocket"	1	8,200	8,200	SF	\$750.00	\$ 6,150,000	
New Club Dining "Gridiron Garden"	1	18,800	18,800	SF	\$350.00	\$ 6,580,000	
New Club Dining 3Hundred Entry	1	8,100	8,100	SF	\$750.00	\$ 6,075,000	
Family Zone	1	9,200	9,200	SF	\$100.00	\$ 920,000	
West Market Bar	1	11,500	11,500	SF	\$250.00	\$ 2,875,000	
East Market Bar	1	11,500	11,500	SF	\$250.00	\$ 2,875,000	
New West "Food Service"	1	3,200	3,200	SF	\$500.00	\$ 1,600,000	
New "Flamthead Hall"	1	7,100	7,100	SF	\$500.00	\$ 3,550,000	
New "Bars" located at each corner	4	1,000	4,000	SF	\$250.00	\$ 1,000,000	
New "Market" at each inside corner	4	1,000	4,000	SF	\$250.00	\$ 1,000,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
HVAC and Plumbing Systems	1	115,000	115,000	SF	\$85.00	\$ 9,775,000	
Electrical - Switchgear, Panels, Branch	1	115,000	115,000	SF	\$70.00	\$ 8,050,000	
<b>Sub-Total</b>						<b>\$ 69,550,000</b>	
<b>TOTAL - MAIN CONCOURSE LEVEL</b>			115,000 SF		\$620.61	\$ 71,370,000	



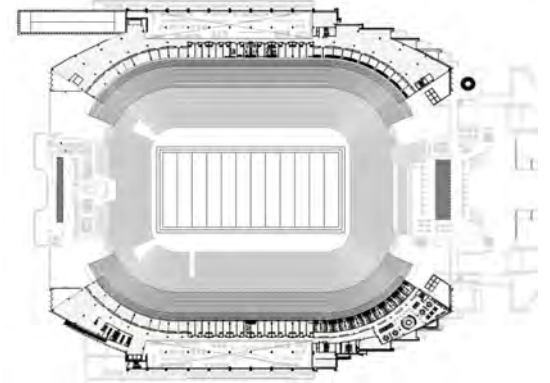
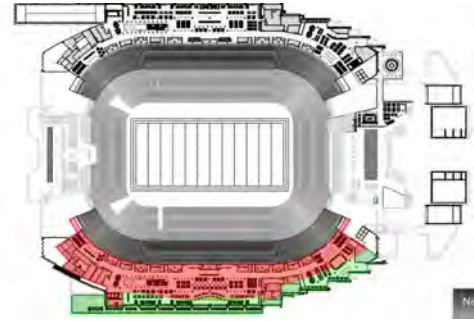
New Construction - Press Suite Level							
Room Description	Units	SF	Total SF	UP	Cost	Comments	
<b>Demolition</b>							
<b>Selective Demolition</b>							
Demo Existing	1	81,500	81,500	SF	\$5.00	\$ 407,500	
<b>Base Infrastructure (HVAC / Electrical)</b>							
Cut / Cap / Make-safe HVAC	1	81,500	81,500	SF	\$1.50	\$ 122,250	
Electrical - Switchgear, Panels, Branch	1	81,500	81,500	SF	\$1.50	\$ 122,250	
<b>Sub-Total</b>						<b>\$ 652,000</b>	
<b>New Construction</b>							
<b>New Construction</b>							
New Ticket Offices	1	5,300	5,300	SF	\$100.00	\$ 530,000	
New Club Lobby - East	1	3,600	3,600	SF	\$250.00	\$ 900,000	
New Club Lobby - West	1	3,600	3,600	SF	\$250.00	\$ 900,000	
Retail Mezzanine	1	5,300	5,300	SF	\$250.00	\$ 1,325,000	
Suite Lobby - East	1	2,200	2,200	SF	\$250.00	\$ 550,000	
Suite Lobby - West	1	2,200	2,200	SF	\$250.00	\$ 550,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
HVAC and Plumbing Systems	1	22,200	22,200	SF	\$85.00	\$ 1,887,000	
Electrical - Switchgear, Panels, Branch	1	22,200	22,200	SF	\$70.00	\$ 1,554,000	
<b>Sub-Total</b>						<b>\$ 8,196,000</b>	
<b>TOTAL - PRESS SUITE LEVEL</b>			22,200 SF		\$398.66	\$ 8,848,000	



New Construction - West Sideline Clubs (Lower)							
Room Description	Units	SF	Total SF	UP	Cost	Comments	
<b>Demolition</b>							
<b>Selective Demolition</b>							
Demo Existing	1	60,000	60,000	SF	\$25.00	\$ 1,500,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
Cut / Cap / Make-safe HVAC	1	60,000	60,000	SF	\$1.50	\$ 90,000	
Electrical - Switchgear, Panels, Branch	1	60,000	60,000	SF	\$1.50	\$ 90,000	
<b>Sub-Total</b>						<b>\$ 1,680,000</b>	
<b>New Construction</b>							
<b>New Construction</b>							
New Structure	1	30,000	30,000	SF	\$200.00	\$ 6,000,000	
New Club Finishout Area	1	48,500	48,500	SF	\$375.00	\$ 18,187,500	
<b>Base Infrastructure (HVAC / Electrical)</b>							
HVAC and Plumbing Systems	1	78,500	78,500	SF	\$85.00	\$ 6,672,500	
Electrical - Switchgear, Panels, Branch	1	78,500	78,500	SF	\$70.00	\$ 5,495,000	
<b>Sub-Total</b>						<b>\$ 36,355,000</b>	
<b>TOTAL - WEST SIDELINE CLUBS</b>			<b>78,500 SF</b>		<b>\$484.52</b>	<b>\$ 38,035,000</b>	

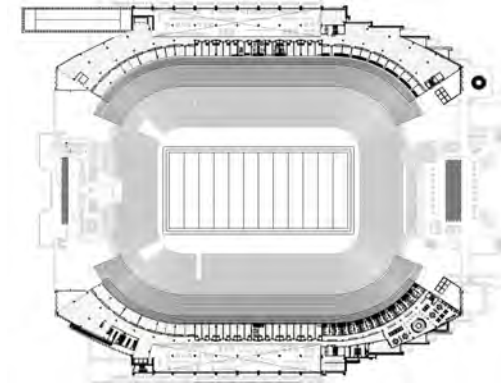
New Construction - East Sideline Clubs (Lower)							
Room Description	Units	SF	Total SF	UP	Cost	Comments	
<b>Demolition</b>							
<b>Selective Demolition</b>							
Demo Existing	1	60,000	60,000	SF	\$25.00	\$ 1,500,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
Cut / Cap / Make-safe HVAC	1	60,000	60,000	SF	\$1.50	\$ 90,000	
Electrical - Switchgear, Panels, Branch	1	60,000	60,000	SF	\$1.50	\$ 90,000	
<b>Sub-Total</b>						<b>\$ 1,680,000</b>	
<b>New Construction</b>							
<b>New Construction</b>							
New Structure	1	30,000	30,000	SF	\$200.00	\$ 6,000,000	
New Club Finishout Area	1	48,500	48,500	SF	\$375.00	\$ 18,187,500	
<b>Base Infrastructure (HVAC / Electrical)</b>							
HVAC and Plumbing Systems	1	78,500	78,500	SF	\$85.00	\$ 6,672,500	
Electrical - Switchgear, Panels, Branch	1	78,500	78,500	SF	\$70.00	\$ 5,495,000	
<b>Sub-Total</b>						<b>\$ 36,355,000</b>	
<b>TOTAL - EAST SIDELINE CLUBS</b>			<b>78,500 SF</b>		<b>\$484.52</b>	<b>\$ 38,035,000</b>	

New Construction - Lower Suites							
Room Description	Units	SF	Total SF	UP	Cost	Comments	
<b>Demolition</b>							
<b>Selective Demolition</b>							
Demolish Existing Interiors	1	93,000	93,000	SF	\$25.00	\$ 2,325,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
Cut / Cap / Make-safe HVAC	1	93,000	93,000	SF	\$1.50	\$ 139,500	
Electrical - Switchgear, Panels, Branch	1	93,000	93,000	SF	\$1.50	\$ 139,500	
<b>Sub-Total</b>						<b>\$ 2,604,000</b>	
<b>New Construction</b>							
<b>New Construction</b>							
Repair / Replace Structure where needed.	1	93,000	93,000	SF	\$1.00	\$ 93,000	
Repair / Replace Waterproofing where needed.	1	93,000	93,000	SF	\$0.50	\$ 46,500	
Refresh Finishes in BOH General Areas (Storage, Maint, MEP Rooms)	1	13,500	13,500	SF	\$25.00	\$ 337,500	
New Finishes in Suites	1	34,000	34,000	SF	\$300.00	\$ 10,200,000	
New Finishes in Suite Circulation	1	26,500	26,500	SF	\$125.00	\$ 3,312,500	
New Finishes in Restrooms	1	3,000	3,000	SF	\$150.00	\$ 450,000	
Repair / Replace Fire Protection Heads and Piping as needed.	1	93,000	93,000	SF	\$3.00	\$ 279,000	
<b>Base Infrastructure (HVAC / Electrical)</b>							
HVAC and Plumbing Systems	1	93,000	93,000	SF	\$85.00	\$ 7,905,000	
Electrical - Switchgear, Panels, Branch	1	93,000	93,000	SF	\$70.00	\$ 6,510,000	
<b>Sub-Total</b>						<b>\$ 29,133,500</b>	
<b>TOTAL - LOWER SUITES</b>			<b>93,000 SF</b>		<b>\$341.26</b>	<b>\$ 31,737,500</b>	





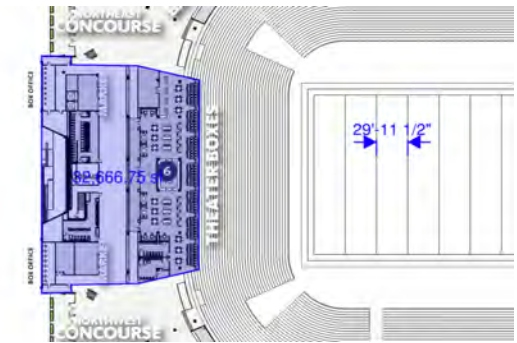
New Construction - Upper Suites								
	Room Description	Units	SF	Total SF	UP	Cost	Comments	
Demolition	<b>Selective Demolition</b>							
	Demolish Existing Interiors	1	91,000	91,000	SF	\$25.00	\$ 2,275,000	
	<b>Base Infrastructure (HVAC / Electrical)</b>							
	Cut / Cap / Make-safe HVAC	1	91,000	91,000	SF	\$1.50	\$ 136,500	
	Electrical - Switchgear, Panels, Branch	1	91,000	91,000	SF	\$1.50	\$ 136,500	
	<b>Sub-Total</b>						\$ 2,548,000	
New Construction	<b>New Construction</b>							
	Repair / Replace Structure where needed.	1	91,000	91,000	SF	\$1.00	\$ 91,000	
	Repair / Replace Waterproofing where needed.	1	91,000	91,000	SF	\$0.50	\$ 45,500	
	Refresh Finishes in BOH General Areas (Storage, Maint, MEP Rooms)	1	13,500	13,500	SF	\$1.00	\$ 13,500	
	New Finishes in Suites	1	34,000	34,000	SF	\$300.00	\$ 10,200,000	
	New Finishes in Suite Circulation	1	26,500	26,500	SF	\$125.00	\$ 3,312,500	
	New Finishes in Restrooms	1	3,000	3,000	SF	\$150.00	\$ 450,000	
	Repair / Replace Fire Protection Heads and Piping as needed.	1	91,000	91,000	SF	\$3.00	\$ 273,000	
	<b>Base Infrastructure (HVAC / Electrical)</b>							
	HVAC and Plumbing Systems	1	91,000	91,000	SF	\$85.00	\$ 7,735,000	
	Electrical - Switchgear, Panels, Branch	1	91,000	91,000	SF	\$70.00	\$ 6,370,000	
		<b>Sub-Total</b>						\$ 28,490,500
<b>TOTAL - UPPER SUITES</b>				91,000 SF		\$341.08	\$ 31,038,500	
New Construction - 300 Upper Concourse								
	Room Description	Units	SF	Total SF	UP	Cost	Comments	
Demolition	<b>Selective Demolition</b>							
	West Side Demo Rooms and Spaces on This Deck (Heavy)	1	61,500	61,500	SF	\$5.00	\$ 307,500	
	East Side Demo Rooms and Spaces on This Deck (Light)	1	61,500	61,500	SF	\$2.00	\$ 123,000	
	<b>Base Infrastructure (HVAC / Electrical)</b>							
	Cut / Cap / Make-safe HVAC	1	61,500	61,500	SF	\$1.50	\$ 92,250	
Electrical - Switchgear, Panels, Branch	1	61,500	61,500	SF	\$1.50	\$ 92,250		
	<b>Sub-Total</b>						\$ 615,000	
New Construction	<b>New Construction - West Side All New</b>							
	New Structure	1	20,000	20,000	SF	\$200.00	\$ 4,000,000	
	New Club Finishout Area	1	48,500	48,500	SF	\$275.00	\$ 13,337,500	
	<b>Base Infrastructure (HVAC / Electrical)</b>							
	HVAC and Plumbing Systems	1	68,500	68,500	SF	\$65.00	\$ 4,452,500	
	Electrical - Switchgear, Panels, Branch	1	68,500	68,500	SF	\$55.00	\$ 3,767,500	
	<b>New Construction - East Side Renovation</b>							
	New Structure	1	20,000	20,000	SF	\$75.00	\$ 1,500,000	
	New Club Finishout Area	1	20,000	20,000	SF	\$275.00	\$ 5,500,000	
	Repair / Replace Structure where needed.	1	61,500	61,500	SF	\$1.00	\$ 61,500	
	Repair / Replace Waterproofing where needed.	1	61,500	61,500	SF	\$0.50	\$ 30,750	
	Provide new Roofing over Outdoor structures	1	27,500	27,500	SF	\$25.00	\$ 687,500	
	Refresh Finishes in BOH General Areas (Storage, Maint, MEP Rooms)	1	3,900	3,900	SF	\$1.00	\$ 3,900	
	Refresh Finishes in Concessions	1	10,625	10,625	SF	\$200.00	\$ 2,125,000	
	Refresh Finishes in Restrooms	1	13,000	13,000	SF	\$75.00	\$ 975,000	
	Repair / Replace Fire Protection Heads and Piping as needed.	1	61,500	61,500	SF	\$1.00	\$ 61,500	
	Replace Plumbing Lines, Fixtures, and Equipment	1	61,500	61,500	SF	\$10.00	\$ 615,000	
	Replace HVAC Ductwork and Equipment where necessary	1	61,500	61,500	SF	\$10.00	\$ 615,000	
	Replace Electrical Light Fixtures throughout with LED	1	61,500	61,500	SF	\$10.00	\$ 615,000	
	Replace and Tie-into Existing Lighting Controls throughout	1	61,500	61,500	SF	\$2.00	\$ 123,000	
	Relocate Electrical Equipment to meet code	1	61,500	61,500	SF	\$1.00	\$ 61,500	
	Provide new Panels to meet code.	1	61,500	61,500	SF	\$4.00	\$ 246,000	
	Repair / Replace Damaged Elect Branch Systems (Conduits, J-Boxes, Panels etc.)	1	61,500	61,500	SF	\$2.00	\$ 123,000	
	Demolition and Replacement of Walls / Ceilings to facilitate MEP Replacement	1	61,500	61,500	SF	\$5.00	\$ 307,500	
	<b>Base Infrastructure (HVAC / Electrical)</b>							
	HVAC and Plumbing Systems	1	61,500	61,500	SF	\$85.00	\$ 5,227,500	
	Electrical - Switchgear, Panels, Branch	1	61,500	61,500	SF	\$70.00	\$ 4,305,000	
		<b>Sub-Total</b>						\$ 48,741,150
	<b>TOTAL - 300 UPPER CONCOURSE</b>				61,500 SF		\$802.54	\$ 49,356,150



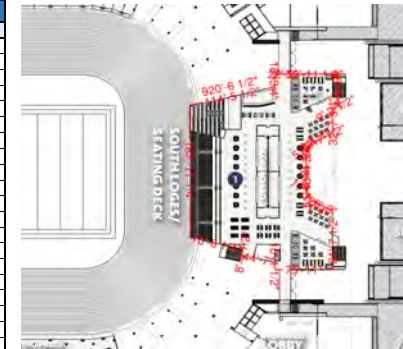
New Construction - 350 West Upper Deck & Canopy									
Room Description	Units	SF	Total SF	UP	Cost	Comments			
<b>Demolition</b>									
<b>Selective Demolition</b>									
Existing Seating Bowl	1	66,000	66,000	SF	\$50.00	\$ 3,300,000			
Replace Field due to Crane for Hoisting and Demo Operations	1	1	1	SF	\$1,500,000.00	\$ 1,500,000			
Demo Rooms and Spaces on This Deck	0	0	0	SF	\$25.00	\$ -			
<b>Base Infrastructure (HVAC / Electrical)</b>									
Cut / Cap / Make-safe HVAC	1	0	0	SF	\$1.50	\$ -			
Electrical - Switchgear, Panels, Branch	1	0	0	SF	\$1.50	\$ -			
<b>Sub-Total</b>						\$ 4,800,000			
<b>New Construction</b>									
<b>New Construction</b>									
New Seating Bowl	1	9,700	9,700	SF	\$85.00	\$ 824,500	New Precast Seating Bowl and CIP Rakers		
Outdoor Structural Deck	1	30,000	30,000	SF	\$65.00	\$ 1,950,000			
Canopy Structure	1	15,000	15,000	SF	\$250.00	\$ 3,750,000			
<b>Base Infrastructure (HVAC / Electrical)</b>									
HVAC and Plumbing Systems	1	39,700	39,700	SF	\$75.00	\$ 2,977,500			
Electrical - Switchgear, Panels, Branch	1	39,700	39,700	SF	\$60.00	\$ 2,382,000			
<b>Sub-Total</b>						\$ 11,884,000			
<b>TOTAL - 350 WEST UPPER DECK &amp; CANOPY</b>			39,700 SF		\$420.25	\$ 16,684,000			



New Construction - North End Zone Theater Boxes, Club, and Outdoor Deck Bar									
Room Description	Units	SF	Total SF	UP	Cost	Comments			
<b>Demolition</b>									
<b>Selective Demolition</b>									
Demo Existing	1	32,000	32,000	SF	\$5.00	\$ 160,000			
<b>Base Infrastructure (HVAC / Electrical)</b>									
Cut / Cap / Make-safe HVAC	1	32,000	32,000	SF	\$1.50	\$ 48,000			
Electrical - Switchgear, Panels, Branch	1	32,000	32,000	SF	\$1.50	\$ 48,000			
<b>Sub-Total</b>						\$ 256,000			
<b>New Construction</b>									
<b>New Construction</b>									
Modify Structure for New Building	1	32,000	32,000	SF	\$50.00	\$ 1,600,000			
Elevated Structure	1	27,500	27,500	SF	\$50.00	\$ 1,375,000			
Precast Seating Bowl	1	3,366	3,366	SF	\$85.00	\$ 286,110	Precast Seating Risers with CIP Rakers		
Lower Theater Box Club - Finishout	1	32,000	32,000	SF	\$500.00	\$ 16,000,000			
Upper Deck Theater Box and Stage - Finishout	1	27,500	27,500	SF	\$300.00	\$ 8,250,000			
Roof Deck Waterproofing	1	27,500	27,500	SF	\$35.00	\$ 962,500	Waterproofing and Sandwich Slab		
Exterior Skin +25'	25	920	23,000	SF	\$75.00	\$ 1,725,000			
<b>Base Infrastructure (HVAC / Electrical)</b>									
HVAC and Plumbing Systems	1	59,500	59,500	SF	\$85.00	\$ 5,057,500			
Electrical - Switchgear, Panels, Branch	1	59,500	59,500	SF	\$70.00	\$ 4,165,000			
<b>Sub-Total</b>						\$ 39,421,110			
<b>TOTAL - NORTH END ZONE THEATER BOXES, CLUB, AND OUTDOOR DECK</b>			59,500 SF		\$666.84	\$ 39,677,110			

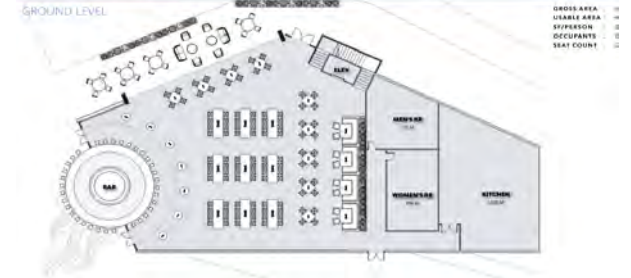


New Construction - South End Zone Theater Boxes, Club, and Outdoor Deck Bar									
Room Description	Units	SF	Total SF	UP	Cost	Comments			
<b>Demolition</b>									
<b>Selective Demolition</b>									
Demo Existing	1	32,000	32,000	SF	\$5.00	\$ 160,000			
<b>Base Infrastructure (HVAC / Electrical)</b>									
Cut / Cap / Make-safe HVAC	1	32,000	32,000	SF	\$1.50	\$ 48,000			
Electrical - Switchgear, Panels, Branch	1	32,000	32,000	SF	\$1.50	\$ 48,000			
<b>Sub-Total</b>						\$ 256,000			
<b>New Construction</b>									
<b>New Construction</b>									
Modify Structure for New Building	1	32,000	32,000	SF	\$50.00	\$ 1,600,000			
Elevated Structure	1	27,500	27,500	SF	\$50.00	\$ 1,375,000			
Precast Seating Bowl	1	3,366	3,366	SF	\$85.00	\$ 286,110			
Lower Theater Box Club - Finishout	1	32,000	32,000	SF	\$500.00	\$ 16,000,000			
Upper Deck Theater Box and Stage - Finishout	1	27,500	27,500	SF	\$300.00	\$ 8,250,000			
Roof Deck Waterproofing	1	27,500	27,500	SF	\$35.00	\$ 962,500			
Exterior Skin +25'	25	920	23,000	SF	\$75.00	\$ 1,725,000			
<b>Base Infrastructure (HVAC / Electrical)</b>									
HVAC and Plumbing Systems	1	59,500	59,500	SF	\$85.00	\$ 5,057,500			
Electrical - Switchgear, Panels, Branch	1	59,500	59,500	SF	\$70.00	\$ 4,165,000			
<b>Sub-Total</b>						\$ 39,421,110			
<b>TOTAL - SOUTH END ZONE SUITES &amp; CLUB</b>			59,500 SF		\$666.84	\$ 39,677,110			



New Construction - Sports Bar									
	Room Description	Units	SF	Total SF	UP	Cost		Comments	
Demolition	<b>Selective Demolition</b>								
	Demo Existing Site Conditions	1	6,900	6,900	SF	\$5.00	\$ 34,500		
	Re-route Infrastructure for new building	1	6,900	6,900	SF	\$25.00	\$ 172,500		
	<b>Base Infrastructure (HVAC / Electrical)</b>								
	Cut / Cap / Make-safe HVAC	0	6,900	0	SF	\$1.50	\$ -		
	Electrical - Switchgear, Panels, Branch	0	6,900	0	SF	\$1.50	\$ -		
<b>Sub-Total</b>							\$ 207,000		
New Construction	<b>New Construction</b>								
	New Foundations and SOG	1	6,900	6,900	SF	\$25.00	\$ 172,500		
	Elevated Structure - Lvl 2	1	6,900	6,900	SF	\$50.00	\$ 345,000		
	Elevated Structure - Lvl 3	1	6,900	6,900	SF	\$50.00	\$ 345,000		
	Exterior Waterproofing	1	15,000	15,000	SF	\$15.00	\$ 225,000		
	Exterior Skin	1	15,000	15,000	SF	\$75.00	\$ 1,125,000		
	Roofing	1	6,900	6,900	SF	\$25.00	\$ 172,500		
	Misc. Metals	1	6,900	6,900	SF	\$10.00	\$ 69,000		
	Interior Finishes - Lvl 1	1	6,900	6,900	SF	\$500.00	\$ 3,450,000		
	Interior Finishes - Lvl 2	1	6,900	6,900	SF	\$500.00	\$ 3,450,000		
	Upper Deck Finishes	1	6,900	6,900	SF	\$250.00	\$ 1,725,000		
	<b>Base Infrastructure (HVAC / Electrical)</b>								
	HVAC and Plumbing Systems	1	20,700	20,700	SF	\$85.00	\$ 1,759,500		
	Electrical - Switchgear, Panels, Branch	1	20,700	20,700	SF	\$70.00	\$ 1,449,000		
<b>Sub-Total</b>							\$ 14,287,500		
<b>TOTAL - SPORTS BAR</b>				20,700 SF		\$700.22	\$ 14,494,500		

FLOOR PLANS & RENDERINGS  
SPORTS BAR



New Construction - Team Store									
	Room Description	Units	SF	Total SF	UP	Cost		Comments	
Demolition	<b>Selective Demolition</b>								
	Demo Existing Site Conditions	1	6,900	6,900	SF	\$5.00	\$ 34,500		
	Re-route Infrastructure for new building	1	6,900	6,900	SF	\$25.00	\$ 172,500		
	<b>Base Infrastructure (HVAC / Electrical)</b>								
	Cut / Cap / Make-safe HVAC	0	6,900	0	SF	\$1.50	\$ -		
	Electrical - Switchgear, Panels, Branch	0	6,900	0	SF	\$1.50	\$ -		
<b>Sub-Total</b>							\$ 207,000		
New Construction	<b>New Construction</b>								
	New Foundations and SOG	1	6,900	6,900	SF	\$25.00	\$ 172,500		
	Elevated Structure - Lvl 2	1	6,900	6,900	SF	\$50.00	\$ 345,000		
	Elevated Structure - Lvl 3	1	6,900	6,900	SF	\$50.00	\$ 345,000		
	Exterior Waterproofing	1	15,000	15,000	SF	\$15.00	\$ 225,000		
	Exterior Skin	1	15,000	15,000	SF	\$75.00	\$ 1,125,000		
	Roofing	1	6,900	6,900	SF	\$25.00	\$ 172,500		
	Misc. Metals	1	6,900	6,900	SF	\$10.00	\$ 69,000		
	Interior Finishes - Lvl 1	1	6,900	6,900	SF	\$500.00	\$ 3,450,000		
	Interior Finishes - Lvl 2	1	6,900	6,900	SF	\$500.00	\$ 3,450,000		
	Upper Deck Finishes	1	6,900	6,900	SF	\$250.00	\$ 1,725,000		
	<b>Base Infrastructure (HVAC / Electrical)</b>								
	HVAC and Plumbing Systems	1	20,700	20,700	SF	\$85.00	\$ 1,759,500		
	Electrical - Switchgear, Panels, Branch	1	20,700	20,700	SF	\$70.00	\$ 1,449,000		
<b>Sub-Total</b>							\$ 14,287,500		
<b>TOTAL - TEAM STORE</b>				20,700 SF		\$700.22	\$ 14,494,500		

PLANNING & INSPIRATION  
SOUTH EVENT PLAZA



New Construction - Seating Bowl									
	Room Description	Units	SF	Total SF	UP	Cost		Comments	
SEATING BOWL	<b>New Construction (Renovations)</b>								
	Lower Seating Bowl			150,000	SF				
	Mid Seating Bowl			80,000	SF				
	Upper Seating Bowl			131,500	SF				
	New Video Board	2	9,000	18,000	SF	\$800.00	\$ 14,400,000		
	New Video Board Framing	2	9,000	18,000	SF	\$265.00	\$ 4,770,000		
	Upgrade new A/V Systems throughout	1	900,000	900,000	SF	\$25.00	\$ 22,500,000		
	New Sports Field Lighting System	1	1	1	LS	\$5,000,000.00	\$ 5,000,000		
	New Seating - Typical	59,271	1	59,271	SF	\$145.00	\$ 8,594,295		
	New Seating - Suites / Loges	5,000	1	5,000	SF	\$310.00	\$ 1,550,000		
<b>Sub-Total</b>							\$ 56,814,295		



New Construction - Exterior Skin (Main Building)						
Room Description	Units	SF	Total SF	UP	Cost	Comments
<b>Demolition</b>						
<b>Selective Demolition</b>						
Demo Existing Skin	1	425,000	425,000	SF	\$25.00	\$ 10,625,000
Demo Existing West Light Towers						
<b>Base Infrastructure (HVAC / Electrical)</b>						
Cut / Cap / Make-safe HVAC	0	425,000	0	SF	\$1.50	\$ -
Electrical - Switchgear, Panels, Branch	0	425,000	0	SF	\$1.50	\$ -
<b>Sub-Total</b>						<b>\$ 10,625,000</b>
<b>New Construction</b>						
<b>New Construction</b>						
Prep Structure to receive new Skin	1	425,000	425,000	SF	\$1.00	\$ 425,000
White Brick	1	3,200	3,200	SF	\$50.00	\$ 160,000
Stepped Massing with Brick	1	34,000	34,000	SF	\$100.00	\$ 3,400,000
Hot Rolled Steel Panels	1	69,000	69,000	SF	\$75.00	\$ 5,175,000
Expanded Steel Paneling	1	4,200	4,200	SF	\$75.00	\$ 315,000
Fiber Cement Panels	1	4,200	4,200	SF	\$50.00	\$ 210,000
Glass Curtain Wall	1	1,200	1,200	SF	\$90.00	\$ 108,000
Slatted Hot-rolled Steel Curtain Wall	1	15,000	15,000	SF	\$75.00	\$ 1,125,000
LED Media Screen	1	20,000	20,000	SF	\$250.00	\$ 5,000,000
Internal Support Steel for New Façade	1	425,000	425,000	SF	\$5.00	\$ 2,125,000
<b>Upgrade Remaining Facilities</b>						
- Main Concourse Level +12'	12	5,201	62,412	SF	\$25.00	\$ 1,560,300
- Press Suite Level +25.5'	25.5	5,891.0	150,221	SF	\$25.00	\$ 3,755,513
- Club Level +12.5'	12.5	3,817.0	47,713	SF	\$25.00	\$ 1,192,813
- Lower Suite Level +12.5'	12.5	3,705.0	46,313	SF	\$25.00	\$ 1,157,813
- Upper Suite Level +15'	15	3,730	55,950	SF	\$25.00	\$ 1,398,750
- Upper Concourse Level +17'	17	3,643	61,931	SF	\$25.00	\$ 1,548,275
	1		0	SF	\$0.00	\$ -
Painting / Refurbishing Existing Exposed Elements	1	1	1	LS	\$3,500,000.00	\$ 3,500,000
New Signage and Branding Throughout	1	1	1	LS	\$5,500,000.00	\$ 5,500,000
<b>Sub-Total</b>						<b>\$ 37,656,463</b>
<b>TOTAL - EXTERIOR SKIN</b>			<b>425,000 SF</b>		<b>\$113.60</b>	<b>\$ 48,281,463</b>
<b>New Construction - Elevators &amp; Escalators</b>						
<b>ELEVATOR AND ESCALATOR SYSTEMS</b>						
<b>New Elevators</b>						
- Southwest Elevators (3Hundred)	6	2	12	STOPS	\$65,000.00	\$ 780,000
- West Suite Entry	3	3	9	STOPS	\$65,000.00	\$ 585,000
- East Suite Entry	3	3	9	STOPS	\$65,000.00	\$ 585,000
- Southeast Elevators (The Pocket)	6	2	12	STOPS	\$65,000.00	\$ 780,000
- East Theater Boxes	2	2	4	STOPS	\$65,000.00	\$ 260,000
- South Suites	4	2	8	STOPS	\$65,000.00	\$ 520,000
- Elevator Cab Finish-out Allowance	24	1	24	EACH	\$50,000.00	\$ 1,200,000
<b>TOTAL - ELEVATORS &amp; ESCALATORS</b>			<b>789,600 SF</b>		<b>\$5.97</b>	<b>\$ 4,710,000</b>
<b>TOTAL - NEW CONSTRUCTION</b>			<b>789,600 SF</b>		<b>\$736.89</b>	<b>\$ 581,851,028</b>
<b>Subtotal Hard Cost</b>						
						<b>\$ 581,851,028</b>
<b>Contractor Cost (Insurances, Bonds, Fees and General Conditions)</b>						
						\$ 112,180,878
<b>Subtotal Cost of Construction</b>						
						<b>\$ 694,031,906</b>
<b>Design Contingency (10%)</b>						
						\$ 69,403,191
<b>Contractor Contingency (10%)</b>						
						\$ 69,403,191
<b>Phasing / Difficulty Contingency (Build over 3 off-seasons minimum) (15%)</b>						
						\$ 104,104,786
<b>Subtotal</b>						
						<b>\$ 936,943,073</b>
<b>Escalation / Supply Chain Allowance - Assume Fall 2023 Start (5%)</b>						
						\$ 46,847,154
<b>Total Cost of Construction (New Construction Program)</b>						
						<b>\$ 983,790,226</b>



- Notes and Comments**
- 1) No Soft cost have been included.
  - 2) Escalation Allowance is assuming a continuation of current rates until Fall of 2023.
  - 3) No cost have been included for hazardous waster remediation.
  - 4) It is assumed public infrastructure (gas, water, power, CHW, etc.) is available at the site and sufficient to be utilized in the new construction

## **Nissan Stadium Post Renovation Scenario Capital Improvement and Upgrades 2027 - 2039**

After the transformational renovation based on the Gensler Master Plan there will be required upgrades to the finished spaces, technology, and infrastructure systems of Nissan Stadium that will need to occur from 2027 through 2039.

### Architectural and Interior Spaces

1. Locker rooms for the Titans, Tennessee State University and Visiting NFL Team will require at least one refurbishment.
2. Press Interview, Media Dining and Press Box will require at least one refurbishment.
3. Premium spaces that includes suites, clubs and their food service amenities will require at least one refurbishment.
4. Wayfinding signage may require upgrading one time.

### Mechanical, Electrical and Plumbing Systems (MEP)

1. MEP and fire protection systems should only require preventive maintenance and periodic repairs until 2039.
2. Upgrades to LED lighting systems may need to occur one time.

### Structural

1. Expansion joint replacement will likely need to occur one time.
2. Waterproofing membrane replacement may need to occur one time.
3. Structural steel recoating may need to occur one time.
4. Concrete repairs to sidewalks may need to occur one time.

### Technology

1. Video boards, editing systems and video production equipment will need to be replaced one time.
2. Audio systems will need to be replaced one time.
3. Wi-Fi and distributed antenna systems (DAS) will need to be upgraded and or replaced at least one time.



3. Wi-Fi and distributed antenna systems (DAS) will need to be upgraded and or replaced at least one time.
4. Televisions and TV distribution systems will need to be replaced or upgraded at least one time.
5. Security Systems to include access control, CCTV, and video management systems (VMS) will need to be upgraded or replaced at least one time.

Vertical Transportation

1. Elevators and escalators should only require preventive maintenance and periodic repairs until 2039.

Food and Beverage

1. Concession stands will need to be upgraded at least one time.
2. Portables will need to be replaced one time.
3. Kitchen equipment will need to be upgraded or replaced one time.
4. Walk-in freezers and coolers may require major repairs or replacements.

Merchandise

1. Retail stores and portables will likely require one major upgrade and or replacement.

**Nissan Stadium 13 Year Cap Ex - Post Major Renovation (2027-2039)**

	Years 1-5	Years 6-10	Years 11-13	Totals
Architecture	\$ -	\$ 99,356,511	\$ -	\$ 99,356,511
MEP & Fire Protection	\$ -	\$ 704,346	\$ 1,687,846	\$ 2,392,192
Structure	\$ -	\$ 11,136,699	\$ 6,084,686	\$ 17,221,384
Technology	\$ 2,744,747	\$ 72,211,007	\$ 2,916,860	\$ 77,872,615
Vertical Transportation	\$ -	\$ -	\$ 2,936,852	\$ 2,936,852
Roof & Envelope	\$ -	\$ 238,644	\$ -	\$ 238,644
Food & Beverage	\$ -	\$ 27,563,716	\$ -	\$ 27,563,716
Retail	\$ -	\$ 7,498,148	\$ -	\$ 7,498,148
<b>Totals</b>	<b>\$ 2,744,747</b>	<b>\$ 218,709,070</b>	<b>\$ 13,626,245</b>	<b>\$ 235,080,061</b>



# Comparable Stadium Review

## NISSAN STADIUM



## HARD ROCK STADIUM RENOVATIONS REVIEW

Hard Rock Stadium is a multi-purpose outdoor stadium that opened in 1987 as Joe Robbie Stadium at a cost of \$115 million. The original stadium was built to hold the NFL Miami Dolphins and a future MLB team, the Miami Marlins, from 1993 thru 2011. Since 2008, the stadium has also served as the home field for the Miami Hurricanes college team. Over its lifetime the stadium has had many renovations with major ones in 1993, 2006 thru 2007, 2009 thru 2010, and 2015 thru 2017 summarized as follows.

**Original Opening:** 1987

**Size:** 1.2 million sf

**Seats:** Reduced from 76,081 to 65,326 in 2017

**Levels:** 8

**Architect:** HOK

**Interior Designer:** Rockwell Group

**Structural Engineer:** Thornton Tomasetti

**MEP Engineer:** ME Engineers

**CM:** AECOM Hunt

**Schedule:** Phased over three off-seasons (2015, 2016, 2017)

**2015-2017 Project Budget:** \$550m<sup>1</sup> escalated to 2023 is \$809m<sup>2</sup>

**2015-2017 Construction Cost:** Approx \$400m<sup>3</sup> escalated to 2023 is \$589m

**2015-2017 Soft Costs:** Assume 38%

**2015-2017 Funding.** NFL Loan: \$200m, Team Ownership (Stephen Ross) \$75m. The county will give Team Ownership up to \$5 million annually — for a total of up to \$75 million — in exchange for luring big events such as the Super Bowl.<sup>4</sup>

**2006-2010 Prior Renovations.** Added club level, new scoreboards, and widened concourses was a \$300m renovation over 5 years (escalated to 2023 is \$520m)

**Total Renovation Costs (2006 thru 2017) escalated to 2023: \$1,329 billion**

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<sup>1</sup> Miami Dolphins teams meeting on 10-10-2022

<sup>2</sup> ENR Index 2016 to mid 2022 with a projected 5% escalation to 2023

<sup>3</sup> South Florida Business Journal (01-20-2015) <https://www.bizjournals.com/southflorida/news/2015/01/20/sun-life-stadium-renovation-begins-renderings.html>

<sup>4</sup> Miami New Times (08-08-2016) <https://www.miaminewtimes.com/news/everything-you-need-to-know-about-the-dolphins-500-million-stadium-renovation-8659288>

## **A. PRIOR RENOVATIONS TO CURRENT OWNERSHIP (2006 – 2010)**

Under the previous ownership, the team spent \$300m on stadium upgrades over the five years prior to being renamed Sun Life Stadium. <sup>5</sup>Aside from baseball renovations, the stadium underwent some permanent renovations. In April 2006, the stadium unveiled two Daktronics large video boards, the largest in professional sports at the time. <sup>6</sup> The east display measured 50 ft (15 m) high by 140 ft (43 m) wide, and the west end zone display measured 50 ft (15 m) high by 100 ft (30 m) wide. A new 2,118-foot (646 m)-long LED ribbon board, again the largest in the world at the time, was also installed.

In addition, the upgrades included vastly widened 40,000-square-foot concourses on the stadium's north and south sides. Bars, lounges, and other amenities were also added. The ultra-modern 10,000 seat Club level at Sun Life Stadium offers a stellar experience for members, with its luxury décor and amenities that include private escalators, concierge attendants, fine-dining restaurants, a lounge, meeting and conference rooms, and the Gallery of Legends—a visual tour that covers Miami Dolphins team history;<sup>7</sup> and 40-foot-high glass curtain wall that encloses the Club Level and affords expansive views of the South Florida skyline.

## **B. RENOVATIONS FROM 2015 THRU 2017**

### **PHASE 1 (2015)**

1,000 laborers on site. \$1m per day in construction.

The seating at Sun Life Stadium shrank to 65,326 from 76,081. Front sideline seats are now 24 feet closer to the field, so the fans won't be set so far back from the game. Every seat in the stadium has been replaced, with the majority being replaced with the 408 series from American Seating, an ergonomically correct seat that provides better cushioning and wider seating space than before. In addition, the new configuration of the seats gives each fan additional room to make it up and down the seating row with less disruption to seated fans.

The first phase replaced every seat in the three-decade-old facility. This included introducing a Field Club, North Sideline Club and corner terraces. Innovative new “Living Room” boxes bring together home viewing and game-day experiences with recliners, programmable high-definition TVs and access to an indoor lounge called the 72 Club.

The team also rebuilt the 100 level and 300 level concourses.

**The Nine.** Exclusive area features nine private suites, each with customizable furniture, concierge service and access to a fully stocked buffet. Each of these suites is open-air and sits between the

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<sup>5</sup> Mediaventures June 24, 2010

<sup>6</sup> Sun Life Stadium Facts

<sup>7</sup> Destination360.com



30-yardlines, directly above The 72 Club. Besides including amenities that would be considered standard in a suite of this kind, the Dolphins have added several other benefits to ownership, including two Super Bowl tickets annually, a dedicated concierge, and exclusive field access passes for pregame mingling on the field.

**72 Club Living Room Boxes.** Located on the 50-yard line, they come with four recliners, flat-screens and iPads to catch every angle of the action on the field. A seat in the Living Room boxes comes with access to the 72 Club.

**72 Club.** The 72 Club is another exclusive experience that allows each of its members to have some of the most premium benefits anywhere, including a fast lane with valet parking and a private club for networking and entertainment before, during, or after the game. Similar to The Nine, exclusive field passes for pregame mingling on the field are also included with membership.

#### **Corner Terraces.**

**New Field:** New genetically enhanced Platinum TE Paspalum turf

#### **PHASE 2 (2016)**

A canopy that shades most of the spectators, four large high-definition video boards located in the four corners of the stadium, and a redesigned concourse on the 200 level.

The TPO roof canopy structure is 350 feet tall, spans 14 acres, weighs 17,000 tons, and is supported by eight reinforced concrete “super” columns designed to withstand South Florida’s volatile weather. The canopy provides shade and cover for over 91% of fans, the Dolphins were betting on two things: that protecting fans from the elements will encourage them to attend games, and that the canopy will act as a tool to capture and circulate the fan noise in a way that mimics the home-field advantage they enjoyed at the Orange Bowl.

The canopy provides shade over the stadium seating while leaving the area above the playing field open. At each corner, transfer trusses spanning between pairs of super columns support a 350-foot tall mast. Sixty-four locked coil steel cables, up to 300 feet in length, contribute to support of the canopy. This arrangement of structural elements provides redundancy in hurricane-prone Miami but also makes the canopy structure highly indeterminate, a feature that proved quite challenging when attempting to control the distribution of dead loads into the various structural members.





The stadium features four corner video displays, three ribbon boards and an external video display – all featuring 13HD pixel layouts. The main displays each measure roughly 49 feet high by 111.5 feet wide while the longest ribbon board measures 3.5 feet high by 2,105 feet long.<sup>8</sup>

**Public Restrooms.** Only architectural finishes were renovated.

**Audio/Video/IT.** Verizon is their Wi-Fi/DAS provider and any upgrades required were outside of the base budget. Added new speaker systems to the underside of the new canopy.

### **PHASE 3 (2017)**

The final phase of the renovation included comprehensive updates to all premium spaces on the 200 Club and 200 Mezzanine Suite Levels including 145 suites. HOK and the Rockwell Group collaborated on the design of two distinct new types of sideline clubs and end zone suites.

**Ford Field Club and the Atos Club presented by EMC.** In the end zone are a collection of 14 four-person suites located in either end zone.

**North Sideline Club.** Offers fans a premium seating experience between the 30-yardlines that includes another club created specifically for these fans to entertain, mingle, and network.

**MEP Systems.** No major equipment or systems were replaced if not associated with the respective renovation areas listed in this report.

### **C. POST RENOVATIONS (AFTER 2017 NOT INCLUDED IN RENOVATIONS ABOVE)**

After the major renovation projects from 2015 through 2017 listed above, there have been other upgrades to help support an Formula 1 Race setup, tennis tournaments, and other events now planned for the campus:

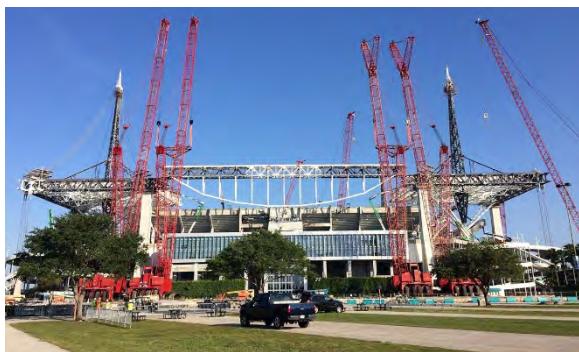
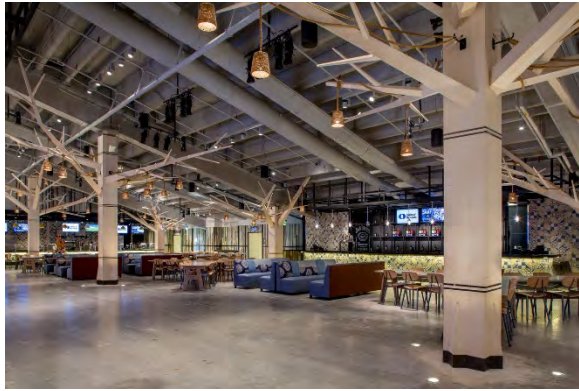
- Elevator and escalator upgrades / replacements
- Added 6<sup>th</sup> Chiller
- Field drainage replacement. Original system did not have the capacity to handle the water after the new field replacement and had to be upsized
- Field is replaced approximately 9 times a year. The grow lights were not as effective as anticipated and have since been sold.

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<sup>8</sup> Daktronics <https://www.daktronics.com/news/daktronics-installs-longest-ribbon-display-in-professional-sports-for-miami-dolphins>



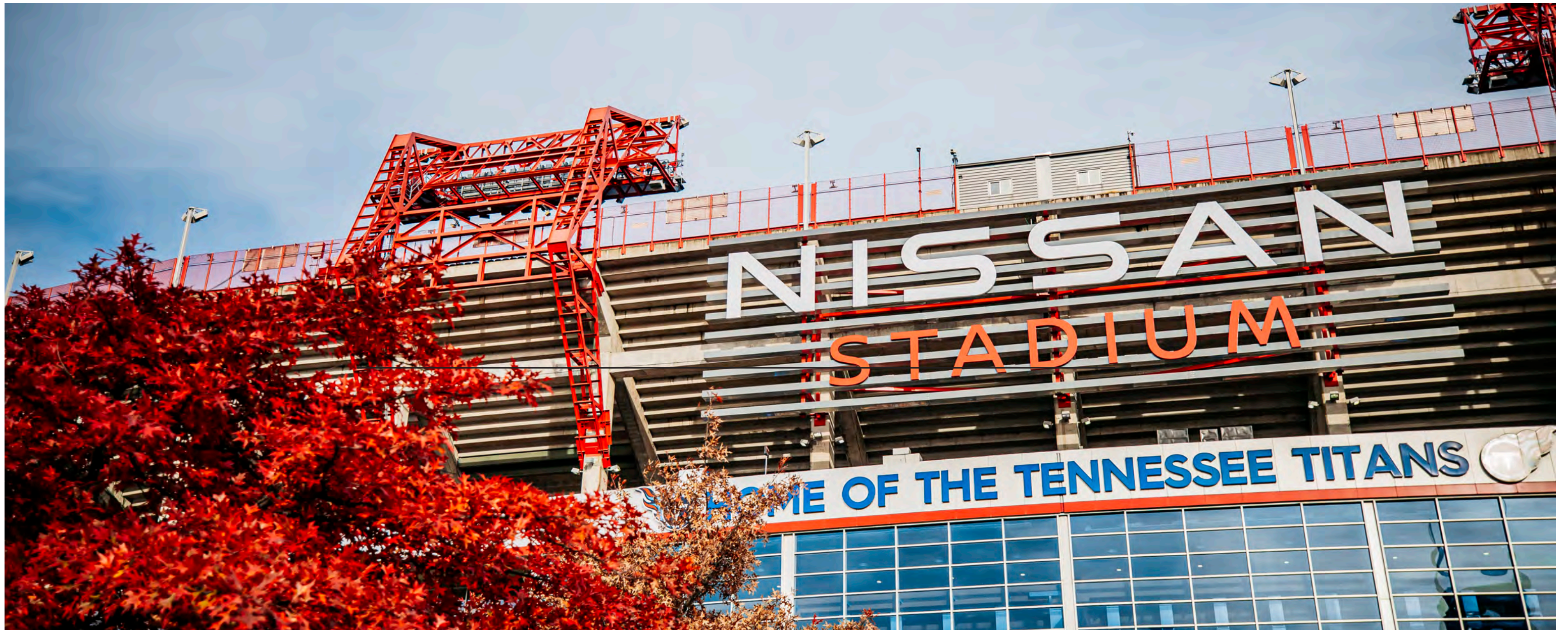






**NISSAN STADIUM**

**Facility Condition Assessment**





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## **Overview & Executive Summary**

### Overview

Venue Solutions Group was engaged by the Mayor's Office of the Metropolitan Government of Nashville and Davidson County to provide a comprehensive facility condition assessment of mechanical, electrical, plumbing and fire protection systems; the condition of the elevators and escalators; structural components; and the technology systems of Nissan Stadium that benchmarks its current condition. The previous comprehensive condition assessment was performed by VSG in 2016. As part of this assessment, VSG, in partnership with their consultant team, has developed a 4-year capital expense matrix to assist the owner/operator in understanding where major repairs and systems replacement may likely be needed between 2022 and 2026.

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

Henderson Engineers, Inc. (HEI), a MEP & technology design firm with expertise in large stadia and arenas, performed the review of the mechanical, electrical, plumbing and fire protection systems.

Thornton Tomasetti, a nationally recognized structural engineering firm, performed a structural review of the stadium that focused on load bearing walls, aisle steps, steel structures, and exterior sidewalks.

Idibri, a Salas O'Brien Company, reviewed the entertainment systems. The firm extensively reviewed video displays, sound, security, and cabling infrastructure.

VDA, Inc. reviewed the condition and performance of the elevators and escalators.

Manhattan Construction, a national construction firm, provided cost estimation for structural deficiencies and their remediation based on Thornton Tomasetti's observations.

VSG and the consultant team performed the on-site assessment on August 29 & 30 and September 6 & 7, 2022. The review consisted of a visual inspection of equipment and spaces, along with interviews with staff and a documents review. It should be noted that the Titans staff provided the review team with significant amounts of documentation and were available at all times during the on-site review to answer questions from the assessment team.

Many of the systems we reviewed are original and will need to be replaced soon due to end of life and or component obsolescence. As a part of the review, we have prioritized the need to replace these systems if they do fall within 2022 – 2026 time horizon. The goal would be to forgo replacement if systems can continue to be maintained and if parts and systems are still available in the near term. Where component obsolescence is likely to occur and parts difficult, if not impossible to obtain in the next few years, we recommend purchasing components now as attic stock in case of an unanticipated breakdown. An example of these types of mission critical components that would need to be procured in the near term are drives and controllers for elevators and escalators.

Cover photo courtesy of the Nashville Convention & Visitors Corporation.

### Executive Summary

#### **Mechanical, Electrical, Plumbing & Fire Protection**

##### Mechanical

A majority of the stadium's HVAC (heating, ventilation, and air conditioning) infrastructure is original to the stadium and is 23 years of age. Any information in the report that references repairs, or maintenance to be completed, is based on visual observations, review of original construction drawings and

conversations with the facilities teams. Service records were not provided for review and incorporated into the assessment. Functional and operational testing of systems was not completed during the site observation.

The chilled water equipment that conditions most of the stadium is operating at a reduced capacity and struggles to maintain set points. This is due to the significant scaling built-up within the chilled water piping and cooling coils that limits the chilled water flow and reduces the effectiveness of heat transfer at each cooling coil within air handling units. The chilled water loop is not de-coupled from the utility provider so the conditions inside the stadium are directly influenced by the conditions on the utility provider side and any modifications or repairs must be coordinated with the utility provider for approval. Most of the direct expansion (DX) equipment is past its life expectancy and utilizes R-22, which is a refrigerant that has been phased out of production due to its negative impacts to the ozone layer. However, we recommend maintaining these systems as long as R-22 is available.

##### Electrical

In general, the existing electrical distribution equipment (substations, switchgear, panelboards, etc.) is original to 1999. The equipment appears to be in fair condition considering its age, but many of the overcurrent protective devices are now obsolete making obtaining replacement of faulty components difficult, if not impossible.

All of the stadium's main switchboards, which are located in the four quadrants of the stadium (8 total switchboards), have nearly reached their 25-year life expectancy. A real risk of losing power to large sections of the stadium exists if any one of these eight main switchboards were to fail. As the original components are obsolete and unavailable, all replacements require custom builds and configurations, which may have lead times exceeding six months. In addition, the panelboards and transformers throughout the stadium have also nearly reached their 25-year life expectancy and should be inspected by a manufacturer's

technician to confirm existing conditions and identify lead times for replacement parts.

Both stadium generators were installed within the last 10 years and appear to be in very good operating condition, although emergency power distribution may not comply with current codes.

The original metal halide sports lighting system was replaced in 2019 with a new Musco LED system. The original fixtures in the club atriums and main concourses, and the lamps inside the original fixtures in the suites, have all been upgraded to LED. However, fluorescent, and HID lighting is still being used in multiple locations throughout the facility, including concession stands, offices, press areas, restrooms, clubs, and some areas of the concourses. Parking area lighting for the stadium is currently pole-mounted metal halide type luminaries, and the designed pulley system for fixture maintenance is no longer being utilized due to signage installations on the poles.

Wiring insulation for the circuits feeding the quartz re-strike metal halide fixtures located on the service level has deteriorated to the point of bare copper in several locations due to excessive heat build-up from the fixtures. Wall sconce fixtures located in the corridors outside of the suites on the press and lower & upper suite levels are obsolete and beginning to experience failures. These lights serve as the emergency egress illumination for these corridors, and equivalent replacements are no longer available.

Generally, all wiring and system monitoring and notification devices in the fire alarm system are still original, as well as almost all of the 30 power supplies throughout the stadium. Staff has reported that over the years water has begun to migrate through the conduit system (which contains indoor rated wiring) due to exposure to outdoor conditions which has led to many of the system ground fault issues. Low-level noise issues have been occurring within the system after paging through the PA system, as well as issues with horn/strobe synchronization.

### Plumbing

The main area of concern is the domestic water corrosion internal to the piping and the concern that it presents for distributing potable water to all occupants within the facility. The galvanized steel domestic cold-water piping throughout the stadium is corroding and introducing rust and piping debris into the potable water system. When the domestic water system is not operating at a high capacity during games and large events, rust and discolored water is present at fixtures throughout the facility. The full domestic water system must be flushed for two to three days at five to eight hours each day before events in order for the water to flow clear without orange/red discoloration. Spotting and an increased rate of deterioration were observed at the material fitting locations from galvanized steel to copper piping, as dielectric transition fittings were not present.

The domestic water lines serving the chemical dispensers are directly connected and no backflow mitigation is provided to prevent chemical infiltration within the potable domestic water system.

Many of the Hydrotek sensor flush valves serving water closets and urinals have failed throughout the stadium likely due to pipe corrosion and degradation debris clogging the diaphragms.

Additional considerations for the plumbing systems includes shutting down the master mixing valve systems and providing point of use thermostatic mixing valves to ensure 140-degree hot water is maintained to limit legionella concerns, heat tracing all exposed PVC piping to eliminate concerns for freezing and pipe failures and providing new shut-off valves to increase the maintainability of the domestic water systems throughout.

Odors were observed at the sewer ejector pump as the piping has been capped and the basin is no longer vented. Additionally, odors were observed at both grease trap interceptor manhole covers in the visitor locker room due to the gaskets around the covers being compromised.

### Fire Protection

While observed to be in good condition, both the electric horizontal split case fire pump, and the jockey pump, are in year 23 of their expected life range of 20-25 years. Several sprinkler heads were observed to have corrosion developing on the face of heads. In addition, some corrosion was observed on the exterior of piping, and missing slab penetration sleeves/collars were noted.

Although components of the fire protection system are nearing the end of their expected life, the system was observed to be in good condition, and routine testing, maintenance, and cleaning of the system should be continued.

### **Structure**

The cast-in-place concrete infill steps throughout the seating bowl were observed to have extensive cracking and occasional spalling of the stair nosing edge, with the worst cases observed in the upper seating bowl. It is noted that the cracking is limited to these specific steps, not at the steps formed by the nosing edge of the precast stadia units (every two to three steps, repeating). The condition of precast concrete stadia units (seating bowl) and double tee units (upper concourse slab support) was generally good. However, several stadia and double tee units were observed to have spalled concrete and exposed rebar.

The elevated main concourse slab above the loading dock, and the walls of the access ramp to the loading dock, were observed to have cracking and visual signs of water damage. In addition, extensive cracking was observed at many of the CMU vomitory walls at the west side of the main concourse level where the main concourse slab is an elevated slab over the field level.

Corrosion was observed in numerous structural steel members comprising the framing for scoreboards and exterior facing signage. The most prevalent corrosion was observed in the exterior signage, which is a result from the ponding of water during rain events exacerbated by incorrect placement of weep

holes in the beam web. Corrosion was also observed at numerous locations at the underside of the metal deck supporting the exterior upper concourse access ramps.

Conditions allowing water intrusion were observed at the west side plaza outside of the stadium, and at failed expansion joints throughout the stadium. While these observations are not structural concerns, the current conditions will allow for potential damages from water intrusion.

The primary structural components of the stadium, including slabs, beams, and columns is in generally good condition. The recommendations listed in the report are typical for the observed areas of deterioration and are needed for enabling the stadium to continue operating for four to five additional years.

## **Technology**

### Sound System

Overall, the sound system is meeting expectations for coverage throughout the stadium, but electronic signal processing has reached its end of life and at high risk of system failure. The Media Matrix products are no longer being manufactured with no direct replacements available. Life expectancy for electronics, specifically the digital signal processors, is 8-10 years of normal use and the current processors have exceeded this threshold.

### In House Video Production

The 1080i/59.94 in-house production system is functional and working to serve gameday operations. There have been several systems upgrades since the last large renovation in 2012. New wireless camera transceivers, intercom, and replay servers will last at least the next five years without major maintenance concerns.

### LED Displays

The current north/south end displays are functional; however, each year the chance of a major failure increases. If boards are to stay operational for the next four to five years additional processors should be acquired in the near term to address component failures. Consistent testing and maintenance should be a high priority before each event.

### Broadcast Cabling

The stadium broadcast cabling is original and is currently maintained to a satisfactory level to continue producing events. Most locations house additional connections that can be used if the primary connections fail. We do not perceive any major work in order to remain operational in this area, however boxes should be cleaned, and any failed connections repaired to prepare for the next four to five years.

### Distributed Television System

Televisions throughout the stadium are a mix of old and new ranging in age from 4-16 years being fed by modulated cable TV over COAX cabling and controlled by local handheld remotes. No televisions were identified as in need of expedited replacement, but it is recommended to continue carrying spare inventory for replacement of displays that fail due to age.

### Audio and Video Systems

Existing audio and video systems throughout the stadium are functional but are showing their age and require supplemental portable systems to be deployed for the majority of events. These systems need supplemental equipment to maintain operation into upcoming seasons and support the functionality of the space.

### Data Infrastructure

The data infrastructure systems are generally up to current industry standards and include space, power, and cabling for

future requirements. However, a rack mounted UPS should be added to all telecom rooms.

The facility network and wireless access are in good condition and serves the facility's current requirements well. Core network is approaching end of life and will need to be replaced soon, to keep up network reliability.

### Security

The current security system within the facility consists of electronic access control system, video surveillance system, and one control center. The installed systems have been updated and upgraded as required throughout the life of the facility.

The electronic access control system hardware currently meets the needs of the facility; however, the managing software presents challenges to the facility security staff. The facility should consider upgrading to a unified security management system to streamline daily and specialty operations.

The video surveillance system is managed using Genetec servers. The current servers were upgraded approximately five years ago. Considering the average lifecycle of 5-6 years, it is recommended to update the servers within the next year.

The manned security positions within the security control room meet the daily and specialty operational needs of staff. However, the video wall system within the control room is nearing end of life and a replacement should be considered to continue functionality for the next four to five years.

## **Vertical Transportation**

We surveyed the vertical transportation systems which included the following:

- Eight (8) geared traction elevators
- Twelve (12) MRL gearless traction elevators
- Four (4) escalators



The focus of the assessment was to identify and evaluate the primary equipment life cycle and support for existing equipment components, 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/controller rooms, hoistways and pits, and for the escalators, we evaluated the external areas and removed the upper and lower landing plates. The deficiencies outlined at the end of the vertical transportation section should be addressed by the service provide expeditiously.

#### Elevators

The six passenger elevators identified as West #1-#3 and East #6-#8 are the original equipment which was manufactured and installed by Montgomery Elevator/KONE in 1998. The elevators are 24 years old and have reached the end of their estimated life cycle. The normal life expectancy for the original passenger elevators is 20 to 25 years under normal conditions. Due to the limited use of these units during non-event periods and with enhanced maintenance the useful life may extend past the estimated years of reliable service by three to five years.

However, with the limited availability of parts such as controller components, and obsolete SCR DC drives from the original equipment manufacturer (OEM), units will be out-of-service longer than normal and cost more to repair. It should be noted, obsolete drives can be updated with a newer version when they fail.

To avoid longer down times, the facility may want to consider one of the following options:

1. Continue with the original equipment and rely on the service provider TKE/NME to find the necessary parts.
2. Acquire/purchase spare controller and drive parts to have on site before a failure occurs.

3. Modernize either elevator group, East or West, preferably West due to the press and club access, and retain the spare parts to eliminate long down times in the East group.

The freight elevators FE4 and FE5 were modernized in 2017 with a new Smartrise microprocessor controller, AC drive, machine motor changed to an AC version, and Courion G door controller and other components. If the improved preventative maintenance practices are implemented, the elevator should provide reliable service for the next five plus years. Due to the nature and use of the freight elevators, an occasional repair will be necessary within the next five years.

The twelve express elevators are MRL units and tend to be of a lighter duty construction, so we project their life expectancy closer to 10-15 years versus the typical 20-25. The elevators are ten years old and are used mostly during events. After the maintenance deficiencies are corrected, and regular preventative maintenance is completed on a regular basis, these units should give reliable service for the next five years. However, due to the outdoor exposure during adverse weather conditions these units will require occasional repairs and upgrades.

There are a few items of concern that are building related such as water entering both the hoistways as well as the pit areas that are noted in the deficiency section of the report.

#### Escalators

The four escalators are original equipment with some minor upgrades. There were several deficiencies found and are listed in the deficiencies section of this report. The estimated life expectancy for escalators is also 20-25 years. The escalators are 24 years old and are approaching their projected end of their life cycle. However, due to the limited use of these units during nonevent periods, the escalators appear to be in relatively good condition with the exceptions of the deficiencies found during the inspections. If annual clean downs and enhanced maintenance practices are performed on each of these units then they should operate reliably for another five plus years except for potential

lack of available controller parts due to obsolescence. These are high maintenance devices that require considerable uninterrupted scheduled maintenance.

#### **Capital Expense Matrix**

The 4-year capital expense matrix is a tool to be utilized by facility owners and management for planning and prioritizing capital improvements. The information we have been provided by manufacturers and current facility users is based on “best practices” for similar sized venues. The matrix is intended to be a “living” document, whereby it is continually updated as changes occur in costs, priorities and in the consumer price index or CPI.

The coronavirus pandemic from March 2020 through the 3<sup>rd</sup> quarter of 2022 has impacted costs associated with systems and equipment described in this report. Inflation as of August 2022 has risen to 8.3% over the last year, the highest in over 30 years. The more recent spike in inflation is primarily due to surging gas prices and the War in Ukraine. Supply chains started being significantly impacted in 2021 and worsened though the second quarter of 2022 as manufacturing capacity has been reduced due to pandemic related disruptions and the aforementioned world events. The transportation sector has been significantly impacted due to labor shortages at ports and overland freight carriers. Materials critical to venue construction such as metal decking, electrical components and restroom fixtures have become more difficult to procure.

In the attached capital plan, we have assigned an 10% CPI in 2023 and 10% in 2024 and reduces to 5% in 2025 and 4% in 2026. As there is much unknown on how the current events will continue to impact the United States and world economies, we recommend that the capital plan be updated every six months moving forward. Within the capital plan we have accounted for demolition, installation, design services, general conditions, contractor profit and insurance. Not every upgrade or equipment replacement will require a general contractor.

Since VSG has no control over construction costs or contractor prices, any equipment or infrastructure cost estimates are made based on VSG and the consultants' experience and judgment. VSG cannot and does not warrant or guarantee that future contractors' proposals, bids or costs will not vary from these estimates. Before undertaking a project involving items in the capital expense matrix, we recommend a full vetting and identification of all costs prior to an allocation of or request for funding.

In the capital improvements matrix provided with the report, VSG has prioritized each capital item based on the following methodology:

High Priority - items that should be addressed immediately due to end of life or component obsolescence, to maintain serviceability of the associated item and/or to 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 is maintained.

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

## MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION

A majority of the stadium's HVAC infrastructure is original and is 23 years of age. Any information in the report that references repairs, or maintenance completed, is based on conversations with the facilities.

Estimates of equipment life are based on ASHRAE 2015 handbook. In addition to ASHRAE, RS Means Data from Gordian was also utilized to estimate the unit cost for each of the critical upgrade systems recommended for replacement. All of the costs for repair noted within this assessment are above and beyond the average annual maintenance and operating costs that the stadium facilities already incur.

### Mechanical

#### Critical Mechanical Infrastructure Upgrades

The following items are anticipated to need repair or replacement within the next four to five years to maintain stadium operation and should be considered critical.

#### Chilled Water Pumps

The triplex chilled water pumps have had significant repair work completed over the last five years. The three VFDs have all been replaced, one impeller has been replaced, and two motors have been replaced. There have been noted issues with maintaining water flow around the stadium due to scale build-up within the pipes from corrosion and water quality so pump set points and operations have changed throughout the years to maintain adequate flows.

- Capacity: 50 HP motor, 1200 GPM and 100 ft of head, each
- Manufactured Date: 2000
- Age/Expected Life: unknown/15 years
- Condition: Poor

#### Recommendation

Due to the amount of repair work recently completed, it is anticipated that the pumps are not a critical upgrade requirement, but it is recommended to consider for holistic replacement. Pumps appear to be at or exceeding their expected life. Inspect pumps including impeller, seals, bearings, housing and motor and replace all components if worn.



Chilled water pump skid

#### CRAC Units

There are six computer room air handling units that were installed with the original stadium construction. All of these units are chilled water with the exception of 2A1 that serves the AV communications room which is DX and utilizes R-22 refrigerant.

Per feedback from the facilities team, there has been minor and routine maintenance completed on these air handling units. Most of the original components remain for each of these air handling units.

- Capacity: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life of Cooling Coils: 23 years/20 years
- Age/Expected Life of Fans: 23 years/20-25 years
- Age/Expected Life of DX: 23 years/20 years
- Condition: Fair

#### Recommendation

Continue to maintain chilled water units if R-22 refrigerant is still available for purchase.

#### DX Air Handling Units

In total, there are four DX air handling units that were installed with the original stadium construction. These units serve the elevator equipment rooms. All of these units utilize R-22 refrigerant which is now obsolete.

- Capacity: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/15 years
- Condition: Fair

#### Recommendation

Continue to maintain chilled water units if R-22 refrigerant is still available for purchase.

#### DX Rooftop Units

In total, there are approximately nine DX rooftop units that were installed with the original stadium construction. These units serve the fan accommodations and ticketing areas on the main concourse. All of these units utilize R-22 refrigerant which is now obsolete.

- Capacity: Ranging from ~1-2 tons, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/15 years
- Condition: Fair



**Recommendation**

Continue to maintain chilled water units if R-22 refrigerant is still available for purchase.



DX RTU Quad C

Smoke Exhaust/Stair Pressurization Fans

In total, there are approximately 12 smoke exhaust/stair pressurization fans which are all part of the original construction.

- Capacity: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20-25 years
- Condition: Fair to poor

**Recommendation**

Functional testing should be performed to confirm there are no issues. Consider replacing due to life safety functions, or pending functional testing, continue with routine maintenance.



DX RTU Quad C

Grease/Kitchen Exhaust Fans

In total, there are approximately 20 grease/kitchen exhaust fans which are all part of the original construction.

- Capacity: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20-25 years
- Condition: Fair to poor

**Recommendation**

Grease exhaust fans, ductwork, and hoods should be professionally cleaned at a minimum in order to eliminate the current concerns for smoke removal while cooking. Continue with routine maintenance and replace non-operational fans as needed.



Kitchen exhaust fan Quad B

**Recommended Mechanical Infrastructure Service**

The following items are anticipated to need repair or replacement within the next four to five years to maintain stadium operation and should be considered as moderate to low but budgeted for operations.

Chilled Water Air Handling Units.

In total, there are 16 air handling units that were installed with the original stadium construction. Of these units, eight are located on the service level; four within Quad C and four within Quad D. These units serve the locker rooms, commissary, media, and operations areas. The remaining eight of these units are located on the press level, two in each Quad A, B, C and D mechanical rooms. These units serve the club level, press and team merchandise store. It has been noted that each air handling unit struggles to maintain discharge temperatures and zone level temperatures due to scale build-up within cooling



coils which limits chilled water flow through the coil and heat transfer from air-water.

AHUs on the Service Level (1C1, 1C3, 1C4, 1C5, 1D1, 1D2, 1D3, 1D4).

- Capacities: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life of Cooling Coils: 23 years/20 years
- Age/Expected Life of Fans: 23 years/20-25 years
- Condition: Fair

**Recommendation**

Continue with routine maintenance and consider replacing all cooling coils starting with critical areas first. Air handling unit 1C1 shall be considered for complete replacement as it is no longer operational.

AHUs on the press level (3A1, 3A2, 3B1, 3B2, 3C1, 3C2, 3D1, 3D2). Air handling unit 3B1's return air mixing box's structural integrity is compromised and was damaged/dented upon the original installation.

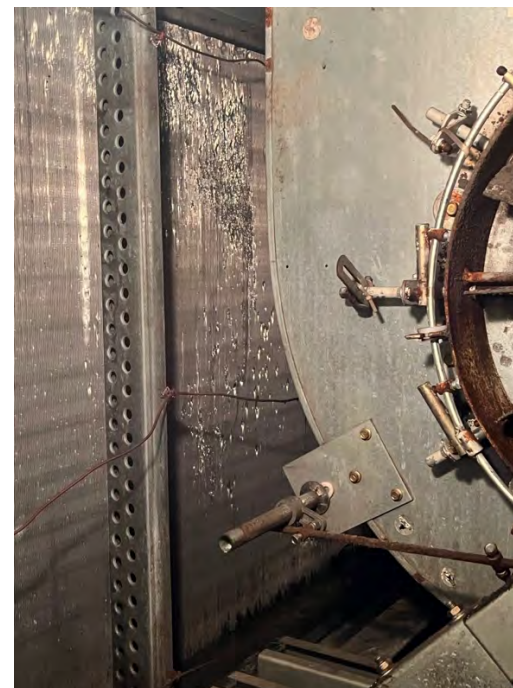
- Capacities: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life of Cooling Coils: 23 years/20 years
- Age/Expected Life of Fans: 23 years/20-25 years
- Condition: Good to Fair

**Recommendation**

Continue with routine maintenance, consider replacing all cooling coils starting with critical areas first. Review 3B1's return air mixing box for any airflow leakage losses.



*Buckled return air plenum AHU 3B1*



*Fin damage of cooling coil on service level AHU*

Chilled Water Fan Coil Units

In total, there are approximately 240 fan coil units which are all part of the original construction. These fan coil units primarily serve suites, electrical/telecom rooms, and MEP utility rooms. The facilities team has noted that approximately 30-40 fan coil units have been flushed in the last five years and isolation valves have been installed. The cooling coils show significant signs of scaling build-up internally and struggle to maintain leaving air temperature setpoints.

- Capacity: Ranging from 0.5-5 tons, per unit schedule
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20 years
- Condition: Fair to poor

**Recommendation**

Continue with routine maintenance and replace non-operational fan coil units as needed and add with isolation valves.

General Exhaust Fans

In total, there are approximately 150 general exhaust fans which are all part of the original construction. These fans primarily serve general and toilet exhaust systems.

- Capacity: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20-25 years
- Condition: Fair to poor

**Recommendation**

Continue with routine maintenance and replace non-operational fans as needed.

Vehicle Exhaust Fans

The vehicle exhaust system was not noted to have any issues with operation or maintenance recently however it is believed to be undersized for the increased usage over the years.

- Capacity: 3 HP, 2400 CFM

- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20-25 years
- Condition: Fair

#### Recommendation

Functional testing should be performed to confirm there are no issues. Consider replacing due to life safety functions, or pending functional testing and continue with routine maintenance.

#### Economizer Fans

In total, there are approximately 16 general economizer fans which are all part of the original construction.

- Capacity: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20-25 years
- Condition: Fair to poor

#### Recommendation

Continue with routine maintenance.

#### Electric Baseboard Radiant Heaters

Baseboard radiant heating is utilized throughout the high-volume spaces are all part of the original construction. It was noted that several sections of baseboard heaters have started to fail.

- Capacity: 2.5kW
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/13 years
- Condition: Fair to poor

#### Recommendation

Continue with routine maintenance and replace non-operational heaters as needed.



Baseboard heaters in Quad A

#### Electric Cabinet Unit Heaters

Electric cabinet unit heaters are utilized throughout the stadium and are all part of the original construction. There were no major noted concerns with these systems.

- Capacity: 5-50kW
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/13 years
- Condition: Fair to poor

#### Recommendation

Continue with routine maintenance and replace non-operational heaters as needed.

#### Ceiling/Wall Mounted Unit Heaters

Ceiling/wall mounted unit heaters are utilized throughout the stadium and are all part of the original construction. These systems are primarily used at entry doors, stairwells, restrooms, and MEP/utility areas. There were no major noted concerns with these systems.

- Capacity: 1.5-5kW
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/13 years
- Condition: Fair to poor

#### Recommendation

Continue with routine maintenance and replace non-operational heaters as needed.

#### Fly Fan/Air Curtains

Electric air curtains are utilized throughout the stadium on the main and upper concourses and are all part of the original construction. There were no major noted concerns with these systems, but facilities staff has been replacing about four to five of these per winter over the last several years.

- Capacity: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20 years
- Condition: Fair to poor

#### Recommendation

Continue with routine maintenance and replace non-operational heaters as needed.

#### Hydronic Piping

The chilled water piping is in poor condition. There has been significant scaling build-up internal to the piping that is limiting flow throughout the system and preventing most chilled water air handling equipment from maintaining desired setpoints. The facilities team has discussed an entire flush of the system but



the chilled water utility provider, NDEES, has pushed back due to the quantity of make-up water that would be required to their plant because of the amount of water that would be flushed and drained. In addition to the make-up water required, NDEES is concerned about any additional impurities/sediment that may then be sent back to the NDEES plant and impact their equipment.

It should be noted that the facilities team has been isolating the piping in the suites and flushing the built-up scaling which has made it possible for the units to start reaching their intended set points.

#### Recommendation

Met with NDEES to discuss an overall system flush and additional strainers that can be added on the chilled water return piping to minimize concerns or impacts to the NDEES plant. If an overall flush of that magnitude is not viable, consider decoupling the chilled water piping from the NDEES loop via a heat exchange and primary pumps.



Chilled water scaling build-up within fan coil unit

#### Hydronic Piping Insulation

The piping insulation is in poor condition as observed throughout the service level.

#### Recommendation

Replace hydronic piping insulation in areas where the original insulation has been compromised. There are several areas where the vapor barrier has not been maintained continuously which allows air/humidity to get behind the insulation and ultimately condense on the chilled water piping behind the insulation. This condensation compromises the integrity of the insulation, allows for biological growth to form, and continues to worsen over time.



Compromised chilled water insulation

#### Building Automation System / Controls (BAS)

The BAS head end and all controllers are obsolete. The facilities team has noted that they do have support from the manufacturer and are able to replace controllers that are faulty.

#### Recommendation

Continue to replace non-functional controllers as needed.

#### Additional Mechanical Infrastructure Observations

The following items are systems that are anticipated to need minimal repair or replacement within the next four to five years to maintain stadium operation.

Dedicated Outside Air System (DOAS) Unit

There is a new DOAS unit that was installed on the roof of the main concourse in Quad C for a food service and walk-in cooler expansion that is not part of the original stadium construction.

- Capacity: unknown, access not obtained
- Manufactured Date: unknown, stated to be within last five years
- Age/Expected Life: unknown/20 years
- Condition: Good

**Recommendation**

Continue with routine maintenance.

Variable Refrigerant Flow (VRF) Split Systems

There are several VRF systems that were installed on the upper concourse concessions that are not part of the original stadium construction.

- Capacity: ~3 tons, per unit schedules
- Manufactured Date: 2020
- Age/Expected Life: 2 years/20 years
- Condition: Good

**Recommendation**

Continue with routine maintenance.

CAV/VAV Boxes

In total, there are approximately 290 constant air volume and variable air volume boxes which are all part of the original construction.

- Capacity: Varying, per unit schedules
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20 years
- Condition: Fair

**Recommendation**

Continue with routine maintenance and replace non-operational boxes as needed.

**Miscellaneous Recommendations**

The following items general recommendations for the facilities group to consider increasing operability of the stadium over the next four to five years.

General Repairs and Maintenance Items

Remove abandoned and unused portions of mechanical equipment, ductwork, piping, and other associated items.

Commissioning, retro-commissioning (commissioning of the existing systems) is recommended for all HVAC equipment and system controls to verify systems are operating as intended, have proper operational schedules, and to identify any additional items based on current system operation that would benefit system life, efficiency, and effectiveness.

Perform test and balance of all existing HVAC systems, especially large central systems, to verify operation and to adjust as necessary to achieve expected performance. The scale build-up on hydronic coils within chilled water air handling equipment has caused the decreased output and heat transfer performance of all air-to-water equipment. As a result, it is our understanding that facilities staff has made adjustments to decrease outside airflows at major air handling units in order to maintain leaving air temperatures. General building exhaust has been maintained at the original design levels. This is likely causing the building to be negatively balanced and introduces infiltration through each of the openings that are not adequately protected. This is a potential source for issues with maintaining individual zones setpoints along the exterior of the stadium.

Seal all exterior doors, windows, and openings to prevent air and moisture leakage in through the envelope.

Recommend sealing all insulation tears/gaps on both ductwork and piping insulation. Replace duct/pipe insulation where damaged beyond repair, including any fiberglass insulation that is currently or has been wet. Areas with ceilings may require removal of ceiling to gain access to duct/pipe insulation. Repairing and replacing insulation will allow for better system performance, decreased energy usage, and prevent damage to adjacent materials by preventing condensation from forming on duct/pipe.

Clean mechanical systems according to the National Air duct Cleaners Association (NADCA) standards to improve indoor air quality, provide better performance/lower energy, and prolong life of systems. Cleaning should include but not be limited to interior of rooftop unit/fan coil unit casings, evaporator coils, condenser coils, and interior of supply and return ductwork.

Seal all supply ductwork to prevent air leakage to avoid system capacity loss.

Flush and clean existing hydronic piping systems. Refill and setup with new chemical treatment. Clean all piping system strainers, this service should be completed at regular intervals. Pressure test existing hydronic piping and replace all leaking hydronic valves and fittings to prevent damage and water loss.

Replace all air system filters, this should be done in regular intervals. Recommend using minimum MERV-8 filters in equipment serving non-regularly occupied spaces and MERV-13 filters in equipment serving occupied spaces if system fans can handle the added static pressure.



## Electrical

### Electrical Infrastructure

In general, the existing electrical distribution equipment (substations, switchgear, and panelboards) is original to when the stadium was built in 1999. The equipment appears to be in fair condition considering its age but many of the overcurrent protective devices are now obsolete making obtaining replacement of faulty components difficult if not impossible.

The primary service to the stadium originates from a single point of entry to the site at the NW corner of the stadium from NES owned primary metering and distribution switchboard. The switchboard is located outdoors just north of parking Lot M. From there a primary loop feeds four separate NES owned outdoor service entry switch cabinets located outside of each NES transformer vault serving Quadrants A, B, C and D.

#### Main Switchboards

Main switchboards MSA1 and MSA2, located in main electrical room in Quadrant A at the southeast corner of the stadium, has nearly reached its 25-year life expectancy. Facilities management reported that the 4,000A main circuit breaker for each switchboard and the tie breaker between the two boards have all been replaced within the last three years. Each replacement required a custom-built replacement switchboard section with a new bus bar configuration in order to accept new equivalent replacement circuit breakers due the original breakers being obsolete and no longer available. According to facilities staff, the lead time for the custom-built bus configurations exceeded six months.



*New main circuit breaker*

Main switchboards MSB1 and MSB2, located in main electrical room 2.25.04 in Quadrant B at the southwest corner of the stadium, has nearly reached its 25 year life expectancy.

Main switchboards MSC1 and MSC2, located in main electrical room 2.37.06 in Quadrant C at the northwest corner of the stadium, has nearly reached its 25 year life.

Main switchboards MSD1 and MSD2, located in main electrical room 2.50.10 in Quadrant D at the northeast corner of the stadium, has nearly reached its 25 year life expectancy.

#### **Recommendation**

A real risk of losing power to large sections of the stadium exists if any of the main, branch or tie breakers within any of the main switchboards were to fail within the next four years. Due to the difficulties in finding replacement breakers and the long lead times associated with having to custom-build new switchboard bus sections, recommendation is to formulate a systematic plan

to begin phasing the replacement of all of the original switchboard sections as quickly as possible.

Each switchboard should be inspected by a manufacturer's technician to confirm that all switchgear interior components including breakers, bussing, terminations, and insulation are in good working order. The technician should provide a report of any deficiencies found with recommended corrective actions.

#### Distribution and Branch Panelboards

In general, the panelboards and transformers throughout the stadium have nearly reached their 25 year life expectancy and should be inspected by a manufacturer's technician. While existing equipment appears to be in good condition and may continue to function properly for another four to five years, due to the age of the equipment, the risk of failures will increase each year and replacement parts will only become more difficult to obtain.

#### **Recommendation**

No action is necessary if the stadium will only be used for the next four to five years. Otherwise, begin phasing the replacement of the panelboards and transformers over the next several years or when renovations to individual areas of the stadium are completed, whichever is soonest.

Provide thermal imaging scanning of all existing-to-remain electrical distribution equipment per FM Global Property Loss Prevention Data Sheet 5-20 "Electrical Testing" and NETA Frequency of Maintenance Test standards. Provide report of testing results and recommendations for corrective actions required to address all deficiencies.

#### Show Power Panels

Broadcast truck and tour bus power is located in the loading dock area. There are currently two 208Y/120V 200A Cam-Lok and one 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.



Existing show power panel

Show power is also provided on the field in the north end zone and is comprised of four 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.

#### Recommendation

The equipment appears to be in adequate condition to continue to function properly for the next five years.

#### Generators & Emergency Distribution System

There are currently two generators for the stadium, a 1,000kW generator located inside the stadium on the main concourse level in Quadrants A & B. Both generators were installed within the last ten years and appear to be in very good operating condition.

#### Recommendation

They do not require replacement within the next five years.



Existing generator

Current emergency power distribution does not provide separation between emergency (NEC Article 700), legally required standby (NEC Article 701), and optional standby (NEC Article 702) loads as required by current codes.

#### Recommendation

This condition may be allowed to remain in the short term but if the life of the building undergoes any extensive renovations the emergency distribution system may be required to be modified to comply with current codes.

#### Lighting

##### Light Fixtures

Fluorescent and high intensity discharge (HID) lighting is still being used in multiple locations throughout the facility, including concession stands, offices, press areas, restrooms, clubs, and some areas of the concourses.

The lamps in the original fixtures for the suites have been replaced with retrofit LED version lamps that were compatible with the existing lamp sockets.

The original field and seating bowl metal halide sports lighting system was replaced in 2019 with a new Musco LED system. There is not a need to provide any modifications for the next five years.

Parking area lighting for the stadium is currently pole mounted metal halide type luminaires. 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 installed in 2015.

The only spaces within the stadium where the original fixtures have been upgraded to new LED technology fixtures is the club atriums and main concourse.

**Recommendation**

We recommend that all fluorescent and HID lighting be replaced with LED fixtures to increase energy efficiency and decrease maintenance cost associated with fixture re-lamping only if the building life will be extended beyond 5 years.

Wall Sconces in Corridors Outside of Suites

Wall sconce fixtures located in the corridors outside of the suites on the press and lower & upper suite levels are obsolete and beginning to experience failures. Equivalent replacements are no longer available. These lights serve as the emergency egress illumination for those corridors.

**Recommendation**

Commence replacement with new LED type fixtures.

Metal Halide Wall Packs on Service Level Corridors

Facilities staff has reported that the wiring insulation for the circuits feeding the quartz re-strike metal halide fixture located on the service level has deteriorated to the point of exposed bare copper in several locations due to excessive heat build-up from the fixtures.

**Recommendation**

Replace the fixtures and provide new circuiting back to the branch panelboard as soon as possible.

Lighting Controls

The original Microlite control panels have been replaced within the last few years with a Lutron centralized network lighting control system that allows for control of lighting zones from centralized locations via manual switches or touchscreens and via system timeclock. The system provides an interface between the lighting control system and building automation system

(BAS) for monitoring and global control of lighting control zones via BAS user interface.

**Recommendation**

No replacement required within the next five years.

**Fire Alarm System**

The original Edwards fire alarm system control panel is located in fire command center (FCC) and is backed up by the stadium's generator system and battery back-up in the panel. The batteries were last replaced approximately two years ago and are regularly replaced every five years. The original panel modules and main board were replaced two to three years ago. The nodes (subpanels to main fire alarm control panel, three total) are mostly original and experiencing ground fault issues. Staff reported that processor boards were replaced when the fire alarm control panel modules were replaced. There is one remote annunciator located at the employee entrance to stadium (east side of facility).

Generally, all wiring and system monitoring and notification devices are still original. Wiring is indoor rated cabling installed in conduit. Staff reported that over the years water has begun to migrate through the conduit system due to the amount of raceway exposed to outdoor conditions. This has led to many of the system ground fault issues. There are roughly 30 power supplies scattered throughout the stadium. Most are original with less than 10% reported by staff as having been replaced over the years. Some of the original speaker/strobes that were installed in exterior locations were only rated for indoor use and have since been replaced with outdoor rated devices because failures occurred due to environmental conditions.

Voice evacuation is achieved utilizing the overall fire alarm speaker system supplemented by the stadium PA system. There are some issues occurring within the system after paging thru the PA system. The staff reported experiencing low level noise requiring adjustments to the PA system. In addition, there some horn/strobe synchronization issues. Foldback occurs due

to insufficient power at some locations throughout the stadium causing flashing to occur that interrupts momentarily then later restarts.

**Recommendation**

Recertification of the system including replacement of originally installed notification and monitoring fire alarm devices and cabling as necessary to alleviate the ground fault and low-level noise issues currently plaguing the system.

**Recommendations from Previous report**

Primary Distribution to the Site

Condition is unchanged. Facilities management reports there is adequate capacity for the stadium electrical demands, but no redundancy should an outage occur at the utility substation. The stadium has functioned under these conditions since the stadium was built.

**Recommendation:** No action taken unless the stadium remains in use beyond the next five years.

Main Switchboards

Procurement of replacements to original breakers is no longer viable. Similar molded case type breakers are not compatible with existing switchboard bus configurations.

**Recommendation:** Replacement plan be developed and implemented as soon as practical to upgrade all switchboards.

Connect Main Switchboard Power Meters to BAS

A new meter with the capability to be centralized at the BAS was installed at Quad A when the main circuit breakers were replaced. The existing meters at Quad B, C & D are not capable of being centralized.



**Recommendation:** Replacement of remaining existing meters at same time switchboards are updated.

Annual Infrared Scans

This has not occurred annually but has happened twice in the last six years or as needed at isolated locations when a specific issue arises that warrants a panel to be checked.

**Recommendation:** Annual scans be performed for the next five years.

Close Open Junction Boxes and Covers

Items were addressed when previous report was issued.

**Recommendation:** Any missing cover currently found throughout the facility be re-installed.

Separate Normal & Emergency Power Systems

Condition remains unchanged. While the stadium has functioned under these conditions since the stadium was built it is in violation of the National Electric Code.

**Recommendation:** No action taken unless the stadium remains in use beyond the next five years.

Close Enclosure Doors

Items were addressed when previous report was issued.

**Recommendation:** NA

PVC Jacketed Metal Clad Cable Failures

Facilities staff has been addressing on an as needed basis and reports approximately 15 have been repaired. The majority of the PVC jacketed metal clad cable feeders remain as originally installed.

**Recommendation:** Repairs continue to be performed as the failures occur.

Maintain Electrical Room Clearances

Items were addressed when previous report was issued but keeping the required clearance in front of panelboards and other electrical equipment persists as a reoccurring issue.

**Recommendation:** NA

Dust in Upper Concourse Electrical Rooms

Rooms were cleaned when previous report was issued but keeping the rooms dust-free is a continuous challenge.

**Recommendation:** May require better seals at the doors into the rooms.

Maintain Electrical Clearances in Concessions

Items were addressed when previous report was issued but keeping the required clearance in front of panelboards and other electrical equipment persists as a reoccurring issue.



*Example of clearance at a concession panel*

**Recommendation:** Continue to police areas and keep clearance free of obstructions.

Portable Food Cart Power on Concourses

Staff reports several locations have been added since the previous report was issued but the demand for more continues to grow. Same issue with physical space for more circuit breakers still exists.

**Recommendation:** Address on as needed basis.

Replace Damaged Portable Cart Receptacles

Facilities staff has been addressing on an as needed basis.

**Recommendation:** Continue to address as needed.

Need for Additional Show Power Distribution

Facilities staff reported the amount of show power currently at the truck dock would be sufficient of the next five years. The more pressing need on the field at the south end of the stadium but the need has not been addressed due to there being no clear path to easily extend service to that part of the stadium.

**Recommendation:** No action taken unless the stadium remains in use beyond the next five years.

Annual Generator Load Bank Testing

Facilities staff confirmed this does not occur on an annual basis.

**Recommendation:** No action required.

Verify Generator Testing Documentation

Facilities staff verified there is a procedure in place for documentation for bi-weekly testing.

**Recommendation:** No action required.

Pedestrian / Plaza Area LED Lighting

Pedestrian and plaza site lighting has been upgraded to LED as indicated in the previous assessment.

**Recommendation:** No action required.

Integrate Facade Sign Controls w/ Building Network Lighting Control System

Condition is unchanged. Facade lighting mainly consists of LED linear flood luminaires that are mounted to the building's facade to illuminate advertisement signage which is controlled wirelessly with a separate lighting control system manufactured by Autani. This separate lighting control system remains

separated from the building's overall network lighting control system.

**Recommendation:** No action taken unless the stadium remains in use beyond the next five years.

Replace Damaged Pedestrian Pole Light

Item was addressed when previous report was issued.

**Recommendation:** No action required.

Replace Original Building Lighting Control System

The original Microlite lighting control system has been replaced with a new Lutron system since the previous report was issued.

**Recommendation:** No action required.

Occupancy Sensors to Control BOH Lighting

Occupancy sensors were added to control BOH lighting when the previous report was issued but staff reports that as many as 30 have since been removed due to nuisance complaints.

**Recommendation:** No action required.

Photocell Sensors to Control Exterior Lighting

Photocell controls were installed at only the gate locations. All other site lighting fixtures are controlled thru the building lighting control system time clock schedule.

**Recommendation:** No action required.

Aisle Step Lights in Suites

Condition is unchanged. Suites cannot be globally swept "off" without also turning out the attached bathroom lights. The stadium has functioned under these conditions since the stadium was built.

**Recommendation:** No action taken unless the stadium remains in use beyond the next five years.

Replace Existing Sports Lighting Fixtures

Original metal halide light fixtures and have been replaced with a new Musco LED lighting system including new lighting controls in 2019.

**Recommendation:** No action required.

Replace Existing Fire Alarm Control Panel

Original EST-Edwards fire alarm control panel still remains however staff reported upgrades to main board were done two to three years ago.

**Recommendation:** Recertification of the system as outlined earlier in this report.



## Plumbing

### Plumbing Infrastructure

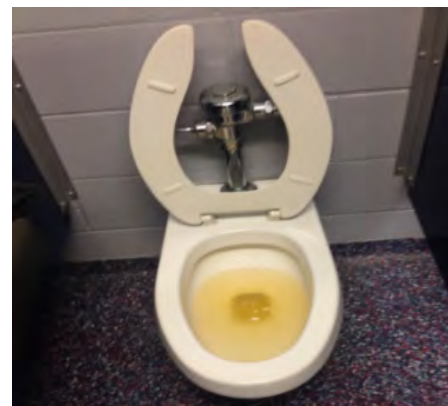
The galvanized steel domestic cold-water piping throughout the stadium is corroding and introducing rust and piping debris into the potable water system. Galvanized steel is provided for all domestic cold-water piping 6-inches through 12-inches, and copper is provided for all domestic cold water piping 4-inches and smaller. When the domestic water system is not operating at a high capacity during games and large events, rust and discolored water is present at fixtures throughout the facility. Orange/red water is visible and prevalent in water closet and urinal bowls and residue is left behind after the flush valves are activated and water has been evacuated. There are four 2-1/2-inch domestic water connections within the restrooms on both the main and upper concourse levels utilized for flushing out the entire domestic water system. There is a total of eight of these connections. The full domestic water system must be flushed for two to three days and five to eight hours each day before events in order for the water to flow clear without orange/red rust discoloration. The existing 6-inch through 12-inch galvanized steel domestic water piping throughout the stadium needs to be demolished and replaced with stainless steel piping.

To achieve this the following work will need to be performed on every level of the stadium:

- Schedule work to coordinate system shutdowns in segments.
- Drain down the domestic water system in the area(s) where the work is being performed.
- Demolish galvanized steel piping in its entirety including at penetrations through elevated floor slabs.
- Install stainless steel piping in place of the galvanized steel following the same routing and connect into the 4-inch and smaller existing copper systems.
- Flush the entire domestic cold-water system once the new stainless-steel piping is installed and complete testing procedures.



*Domestic water galvanized steel pipe corrosion*



*Corroded water within water closet bowl*

The domestic water lines serving the chemical dispensers are directly connected and no backflow mitigation is provided. In order to prevent chemical infiltration within the potable domestic water system backflow preventers need to be provided.

To achieve this the following work will need to be performed within each food service space with a chemical dispenser:

- Drain down the domestic water system in the area(s) where the work is being performed.
- Demolish sections of piping where the shutoff valves will be installed.
- Install the backflow prevention devices along the wall in an accessible location.

- Flush the domestic water systems once the new backflow preventers are installed and complete testing procedures.



*Domestic water tap serving chemical dispenser without backflow preventer*

### Dielectric / Transition Fittings for Domestic Water

We observed spotting and increased rate of deterioration at the material fitting locations from galvanized steel to copper. Fittings at all domestic water change in material locations need to be replaced with dielectric and transition fittings.

To achieve what has been mentioned above the following work will need to be performed on every level:

- Drain down the domestic water system in the area(s) where the work is being performed.
- Demolish sections of piping where the new fittings will be installed.
- Install approximately 250 fittings throughout the stadium.
- Flush the domestic water systems once the new fittings are installed.



### Recommended Plumbing Infrastructure Upgrades

The items below are anticipated to need full or partial repair or replacement within the next four to five years to maintain stadium operation.

Decommission the two master mixing valve systems and allow 140-degree water to circulate within domestic hot water piping.

The Holby master mixing valves are located on the service level in the space outside of the domestic boiler room. The valves mix the 140-degree water down to 120 degrees prior to supplying portions of fixtures within the service level. Legionella growth is prevalent in water temperatures between 68 and 122 degrees Fahrenheit. Legionella cannot multiply and will die within 32 minutes in 140-degree water. The two Holby master mixing valves should be removed from operation and the existing 120-degree hot water piping shall serve as 140-degree piping. Point of use thermostatic mixing valves at fixtures receiving 120-degree hot water shall be checked and replaced with new devices if required.

To achieve what has been mentioned above the following work will need to be performed on the service level:

- Turn shut off valves to inhibit domestic cold and hot water flow through the existing master mixing valve assemblies. Lockout existing shut off valves or provide new lockable valves to ensure master mixing valve system shutdown.
- Confirm full line sized bypass piping provided at existing master mixing valve assembly.
- Check, recalibrate, and replace the point of use thermostatic mixing valves if needed at fixtures previously receiving 120-degree hot water.
- Rebalance the hot water recirculation system and test hot water system temperatures to ensure 140-degree water is being circulated within existing 120-degree domestic hot water piping.
- Flush the domestic water systems once new valve assemblies are installed as required.

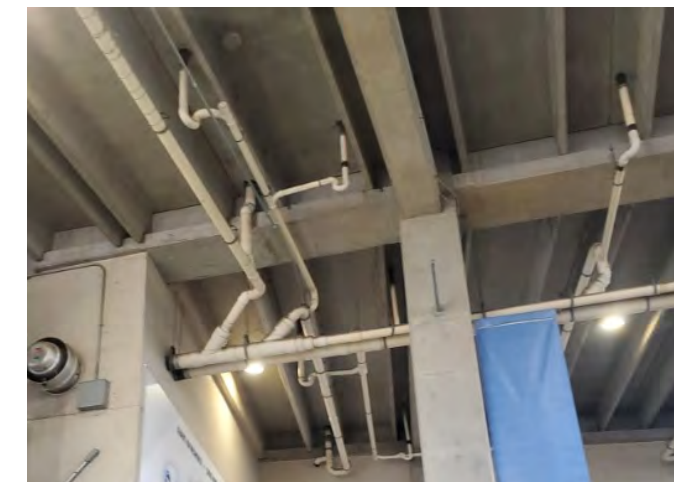


*Domestic water galvanized steel pipe corrosion*

Heat trace all exposed PVC piping. There is no heat trace on any of the exposed PVC waste piping throughout the facility. Antifreeze is poured into the p-traps of drains for events such as TSU and Titans game days to prevent freezing. To prevent freezing the PVC, piping must be wrapped with heat trace and insulated.

To achieve what has been mentioned above the following work will need to be performed below the press/suite level and visible from the main concourse:

- Provide heat trace for the exposed PVC piping and locate the control panels in accessible back of house spaces.
- Insulate the PVC piping around the heat tracing.



*Exposed PVC uninsulated waste piping observed from main concourse*

There is a limited number of shutoff valves provided on the domestic water systems so additional shut off valves are needed. Repairs to the system currently requires shutting off the main(s) and draining down significant portions of the system prior to performing the work. In addition, the system will need to be flushed once the new valves are installed.



To achieve what has been mentioned above the following work will need to be performed on every level of the stadium:

- Drain down the domestic water systems in the area(s) where the work is being performed.
- Demolish sections of piping where the shutoff valves will be installed.
- Install approximately 420 shut off valves throughout the stadium to provide adequate controllability of the domestic water systems.
- Flush the domestic water systems once the new shutoff valves are installed.



Lack of shutoff valves on domestic water branches

The auxiliary condensate drain from mechanical equipment serving the suites on the press/suite, lower suite and upper suite levels are terminated above the entry of the spaces, lavatories, and trash bins. The drain lines need to be rerouted to not discharge near or on patrons within the spaces.

To achieve what has been mentioned above the following work will need to be performed within every suite.

- Demolish the existing auxiliary condensate drain lines and supports.
- Provide new auxiliary drain lines with hangers, supports, and rods routed to approved drain receptor such as a floor sink, service sink, or branching tailpiece and terminate with air gap.

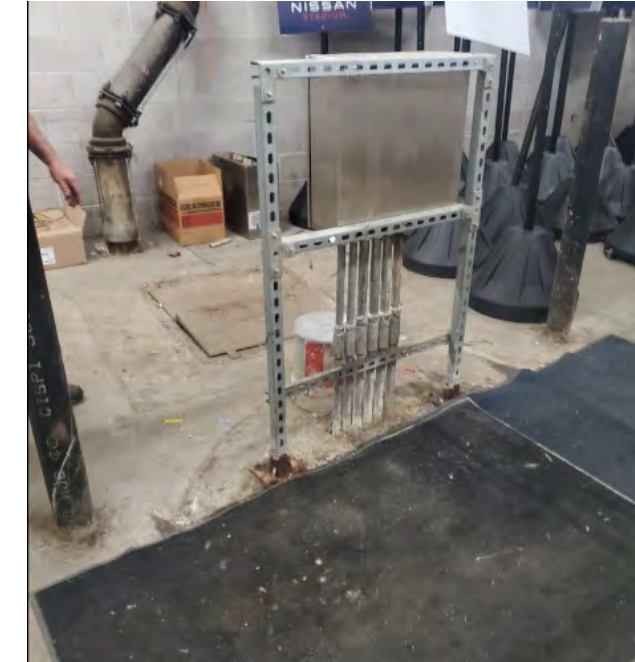


Auxiliary condensate terminations above suite entrances and lavatories

Sewage ejector upgrades should be considered to remove unwanted odors. The observed vent piping from the sewage ejector has been capped and the basin is no longer vented. Strong sewer gas smells are present in the space. Replacing or fixing the currently capped vent piping along with replacing the pit cover is needed. A replacement sewage ejector pump was observed next to the pit for future use.

To achieve what has been mentioned above the following work will need to be performed on the service level:

- Replace the sewage ejector pit cover with a new gas-tight rated unit.
- Revise and/or replace the existing vent piping stubbing out from the pit with new cast iron piping and connect it into an appropriately sized vent main.



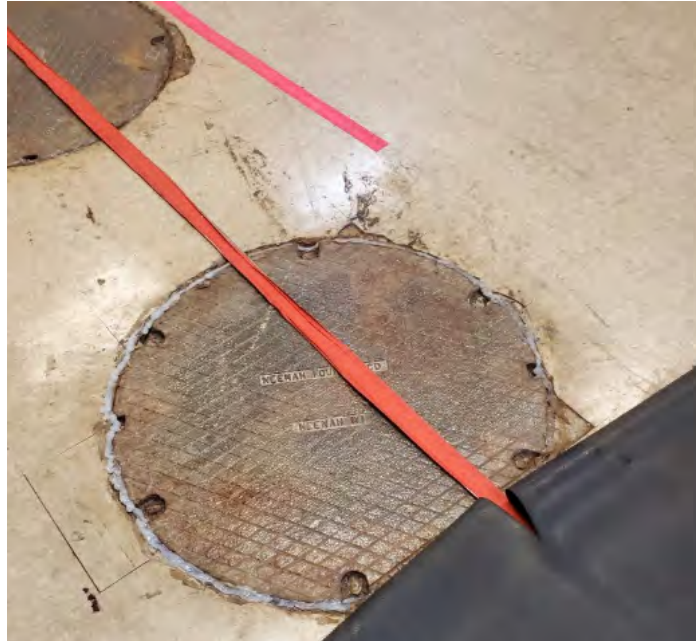
Sewage ejector pit cover and capped vent

The grease interceptor manhole covers need to be replaced. Per statements at the time of visit the gravity grease interceptor in the visitor locker room is pumped out every four months. The truck is able to drive up to the nearest door of the service level and extend the hose to the unit. The manholes are lined with caulking to seal and reduce odors escaping from the unit. It's expected replacement of the gasketed covers will be required.

To achieve what has been mentioned above the following work will need to be performed on the service level:

- Replace the two existing manhole covers with new gas-tight covers.





Grease interceptor manhole covers with caulking to prevent gas permeation

Fire-proof caulking was not observed at numerous locations throughout the facility where plumbing penetrations are through rated walls. Further investigation to determine if remediation is required is recommended. A plan of action can be established if corrective means are determined to be needed.



Fire proof caulking not observed at plumbing penetrations through rated walls

The Hydrotek flush valves have failed throughout the stadium likely due to pipe corrosion and degradation debris clogging the diaphragms. There have been approximately 50 fixtures fail with the majority of them being on the upper concourse level. It can be assumed 25 flush valves will need to be replaced each year.

To achieve what has been mentioned above the following work will need to be performed as the flush valves fail:

- Shut down and drain the domestic cold water system in the zone where the flush valve(s) need to be replaced.
- Replace the failed flush valve with a new unit and test to ensure it's operable.



Hydrotek sensor flush valves serving water closets and urinals

### Possible Future Plumbing Upgrade

The items below are not required to be completed at this time but should be monitored for possible future work.

The space/zone specific electric water heaters throughout the stadium appear to be in good working order currently. However, multiple units have passed the typical operating lifespan and will likely need to be replaced in the coming years. Scaling within the domestic water copper piping was noted as prevalent. Replacement of the copper piping or installation of a full domestic water softening system is not required per the expected remaining lifespan of the stadium. However, water supply and flow issues should be monitored.

A few domestic water copper pipe manufacturing deficiencies were noted, but very limited at the time of the visit. Copper domestic water systems should be intermittently examined for signs of expedited degradation and corrosion.

All suites with restrooms contain tank type water closets. It was noted there have been limited complaints involving toilet bowl cleanliness after flushing. Retrofitting flush valve water closets for the current tank type ones is not required at this time but should be considered in the future.

Numerous floor drains within restrooms and food service spaces were not installed flush with the tile and gaps are prevalent between strainers and edge of tile. This could lead to tile grout damage along with moisture accumulation. These deficient floor drain installations should be monitored and assessed if excessive damage is noted.

Intermittent cases of ponding water accumulation not draining to nearby area/scupper drains was observed within the bowl seating areas. This is likely due to the slab pours not being sloped appropriately to the drains. Ponding frequency and size should be monitored to prevent future issues.

The sand and oil separator within the loading dock area has only been pumped out once in last four years. It was stated black oily



substance never stopped coming out of unit at time of pumping. The concrete unit may have deteriorated to the point of failure and separation of oil from sanitary/storm system is not occurring. The separator should be pumped out with greater frequency and monitored if excessive deterioration is observed.

The below slab sanitary waste piping serving the visitor training room (1.48.04) no longer functions, and a separate sink pump was provided. It is possible the underground piping could be deteriorating, settling, and facing damaging forces from river ground water infiltration. However, there is not enough information to determine the cause of the sink sanitary piping failure currently. Any future underground sanitary piping backups/clogs should be noted and monitored.

#### Plumbing Upgrades Already Completed

There are two domestic boilers and two storage tanks on the service level. A boiler and storage tank set was replaced approximately two years ago, and the other set was replaced one and a half years ago. The storage tanks have been adequately insulated and the full system is operating properly.

There are two Holby master mixing valves serving the domestic hot water system on the service level. Replacement of one of the master mixing valves was completed approximately three months ago.

Replacement of one of the two sump pumps within the loading dock area of the service level was completed within the last five years.

Manual flush valves and faucets throughout the stadium were replaced within the last five years with sensor operated Hydrotek 0.5 GPM faucets, 0.5 GPF urinals and 1.6 GPF water closets. It was stated some of these 1.6 GPF valves are not adequately cleaning the bowls.

Plastic twenty gallon per minute point of use grease traps are located at all three compartment sinks where not tied into the

central gravity grease interceptor. These units were replaced within the last five years.

Twelve bottle fillers were installed within the last year in addition to the four drinking fountains on the lower suite, four on the upper concourse and four on the service level. None of the units are refrigerated.

#### Fire Protection

##### Fire Sprinkler System

The stadium is fully sprinklered and protected with standpipes. There are two separate fire service entries for the stadium. The fire pump is located in Quad D and serves the East, North and West side of the stadium. There is a separate dedicated fire service that serves the South end zone.

An electric horizontal split case fire pump is located on the East side in Quad D on the main concourse.

- Capacity: 50 HP motor, 1250 GPM and 45 PSI
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20-25 years
- Condition: Good

##### Recommendation

The fire pump and casing does not show significant signs of corrosion or deterioration. Continue routine testing, maintenance, and cleaning of the system.



Fire pump

A jockey pump is located in the same room and maintains system pressure during non-fire pump operation.

- Capacity: 1 HP motor, 8 GPM and 67 PSI
- Manufactured Date: 1999/2000
- Age/Expected Life: 23 years/20-25 years
- Condition: Good

##### Recommendation

The fire pump and casing does not show significant signs of corrosion or deterioration. Continue routine testing, maintenance, and cleaning of the system.





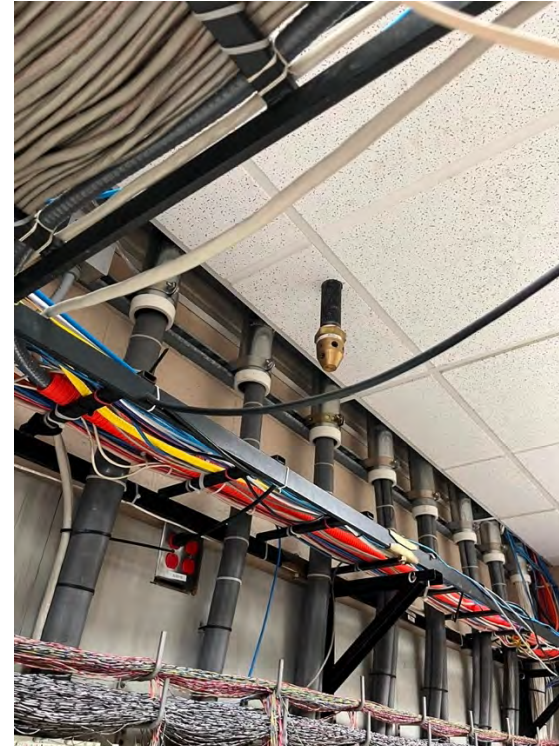
Jockey pump

The DAS room in the service Level, North endzone is protected with a clean agent suppression system.

- Condition: Good

**Recommendation**

Continue routine testing, maintenance, and cleaning of the system.



Clean agent in DAS

There are several dry pipe systems that serve exterior concessions and operational areas on the main concourse and the upper concourse.

- Install Date: Unknown but noted within 10 years
- Condition: Good

**Recommendation**

Continue routine testing, maintenance, and cleaning of the system.

Standpipes and hose connections are provided throughout the stadium. There was observed to be minimal amounts of corrosion developing on these systems at the time of the on-site assessment. There were no exposed interior section of sprinkler piping at the time of the site observation, but the facilities team noted that they had replaced several sections and those that were demolished were removed from site before we arrived.



Corrosion on piping exterior and missing slab penetration sleeve/collar

Several sprinkler heads were observed to have corrosion developing on the face of heads and escutcheons. We recommend replacing these as needed.

**Miscellaneous Recommendations**

Continue the current testing, service, and maintenance of the existing system.

For dry-pipe systems, Per NFPA 25, the service contractor shall replace sprinkler heads, or representative samples shall be tested every 10 years.

Fast-response elements in service for 20 years should be replaced, or representative sample should be tested. If tested, they shall be tested every 10 years, per NFPA 25.



## STRUCTURE

The structural assessment and recommendations contained in this report is being completed as part of an effort to supplement an earlier comprehensive facility condition assessment completed in 2017. Thornton Tomasetti (TT) was not a part of the 2017 assessment, but it was made available to us for review as we observed the stadium in its current state. This earlier assessment report will be referred to as “the 2017 report”.

At the time of the assessment TT understands that the primary intent of this assessment is to document the structural condition of the stadium as it relates to the stadium’s ability to continue to meet operational requirements for the next four to five years. Amid ongoing studies into options of a replacement stadium or a large renovation of the current one, this report aims to summarize observations relevant to the stated four to five year continuation of current operations while also commenting on the overall state of the structure as it may relate to future use and/or modifications. It is noted that the structural condition assessment was limited to visual observation of representative areas of the stadium that were accessible and visible without the use of ladders, scaffolds, or the removal of structural or finish materials.

### Structure Overview

TT was the engineer of record in the original structural design and has had an occasional presence in the stadium in subsequent years for miscellaneous structural work.

The stadium has a primarily concrete superstructure that provide the main gravity supporting system and the concrete moment frame lateral system of the structure.

- Main Concourse (Elevated Portions)
  - Columns
  - Beam and slab system
  - Long-span girders over loading dock

- Suite and Upper Concourse Levels
  - Columns
  - Primary radial and circumferential girders (between columns)
  - Cantilever rakers
  - Flying beams at perimeter for cladding support
- Upper Bowl
  - Columns
  - Rakers

Precast concrete is prevalent throughout the structure in the following applications:

- Lower bowl
  - Under-bowl columns
  - Rakers
  - Seating stadia units
- Suite and Upper Concourse Levels
  - Double tees at elevated floor areas
  - Tub stadia units at suite level seating
- Upper bowl
  - Seating stadia units.

Structural steel is used in miscellaneous applications as summarized below:

- North and south endzone scoreboards
  - Scoreboard superstructure
  - Access platforms and stairs
  - Girts and struts for exterior facing signage behind scoreboard
- Stadium Lighting
  - Trussed framing and lighting access catwalks mounted to discrete exterior columns at the top of the structure
- Exterior Ramps (four corners of stadium from main concourse to upper concourse)
  - Columns
  - Beams supporting composite metal deck
  - Steel braced frame components

## Observations

### Seating Bowl Cast-in-Place Concrete Infill Steps

Cast-in-place concrete infill steps throughout the seating bowl were observed to have extensive cracking and occasional spalling of the stair nosing edge. The worst cases observed were at the upper seating bowl. The prevalent nature of the cracking and observation of the spalled regions appears to indicate that this concrete is undergoing an alkali-silica reaction. This is a chemical reaction that occurs within the concrete that has the result of producing a swelling behavior when combined with water. The presence of water is not a surprise given the exterior location. The chemical reaction is made possible due to the presence of reactive forms of silica within the concrete aggregate.



*Seating bowl infill step deterioration*



It is noted that the cracking is limited to the steps formed as cast-in-place concrete, not at the steps formed by the nosing edge of precast stadia units (every two to three steps, repeating). This is further evidence that the underlying variable cause of the cracking is reactive concrete aggregate in the cast-in-place steps.

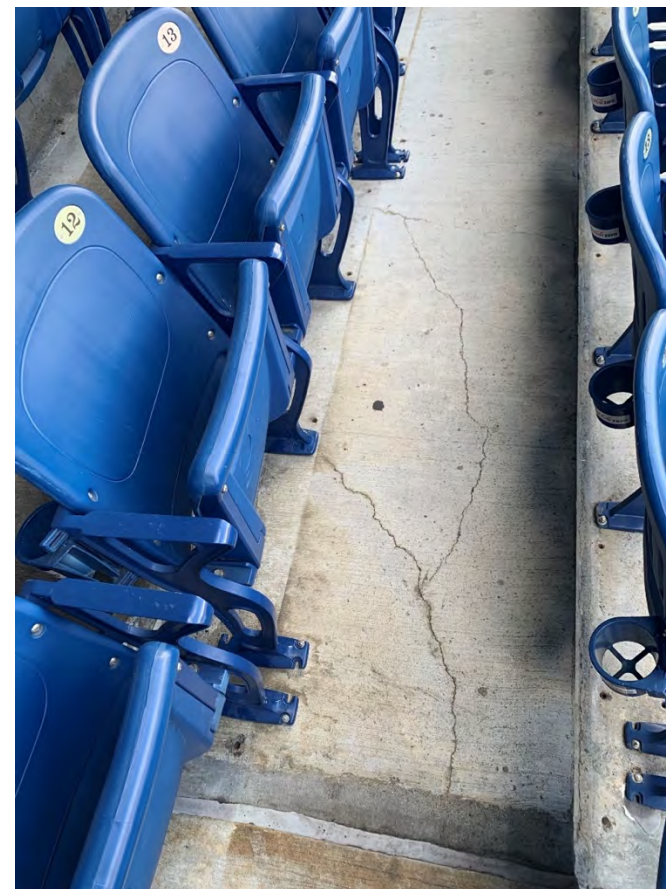
It is our understanding that infill steps throughout the stadium have been replaced in recent years on a case-by-case basis as needed. Additionally, we understand that the bottom approximate eight rows of steps at the upper bowl were recently replaced. We approximate that 1/2 to 2/3 of the remaining upper bowl steps are in a poor enough condition to merit replacement. The lower bowl had fewer occurrences or poor condition steps and these should be replaced on a case-by-case basis.



Upper bowl infill step deterioration prevalence

#### Precast Concrete Stadia and Double Tee Units

The condition of precast concrete stadia units (seating bowl) and double tee units (upper concourse slab support) was generally good. The majority of these units did not show any signs of degradation aside from general surface wear which is more aesthetic than of a structural concern. Several precast concrete stadia units were observed to have propagating cracks in the top surface of their tread portions, as viewed from above. These cracks are likely the result of environmental temperature fluctuations and shrinkage occurring naturally in concrete units. These cracks do not elicit concern about the current structural integrity of the stadia units. However, it would be prudent to seal the cracks as they are encountered to prevent against water intrusion and increased cracking due to freeze thaw cycles.



Cracking in lower bowl stadia unit tread

Several stadia and double-tee units were observed to have spalled concrete and exposed and corroding reinforcing steel (rebar) along the bottom of their vertical stem components. These occurrences were observed from the event level team tunnels, the main concourse and the upper concourse looking up at the visible extents of seating bowl and concourse structure above. Some instances of falling spalled concrete were reported by stadium personnel which is an obvious safety issue. A common cause for this kind of deterioration is insufficient concrete cover over rebar, enabling water intrusion which can trigger concrete corrosion. The expansive nature of corroding rebar can spall the surrounding concrete which further exposes the rebar. The rebar running along the bottom of these stems is an important structural component which enables the spanning capability of the precast unit. As such, it is important that instances of exposed and corroding rebar be remediated.

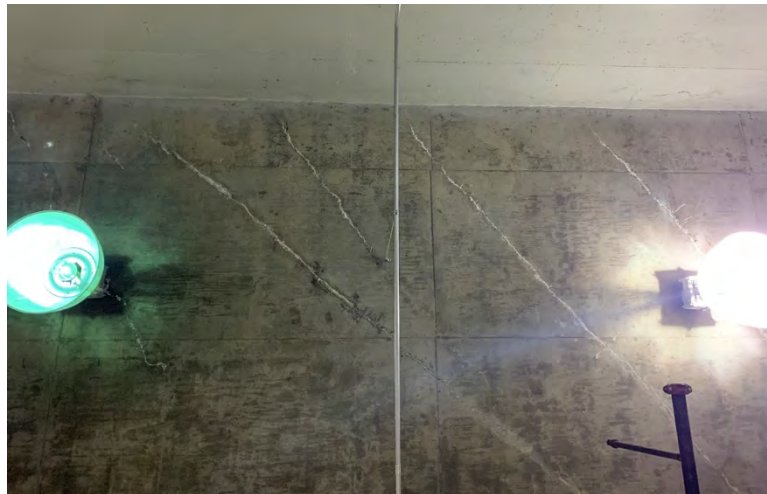


Exposed corroding rebar at precast concrete stems

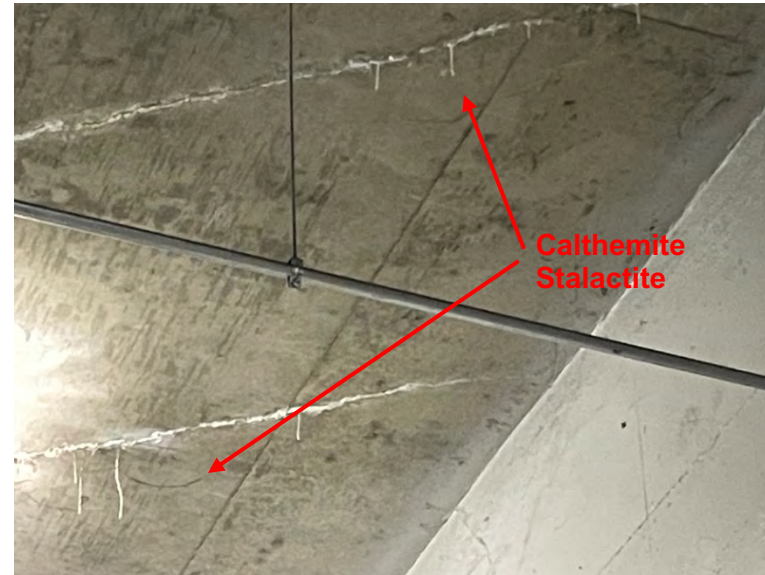


Elevated Slab Above Loading Dock

The elevated main concourse slab above the loading dock was observed to have cracking along the underside as viewed from the loading dock below near the north foundation wall northwest of the dock levelers. Additionally, several calthemite stalactites were observed originating from the cracks. This is an indication that the cracks permeate through the slab to the top surface to a sufficient extent to allow water to permeate through the full depth of the crack.



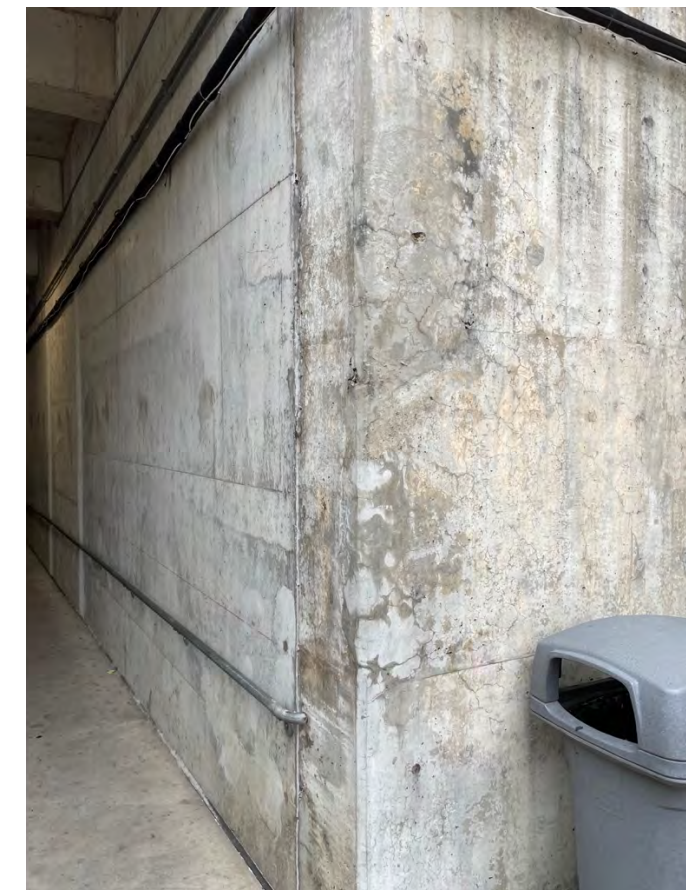
Cracking in slab above loading dock



Under-slab calthemite stalactite

Loading Dock Exterior Ramp Foundation Wall

The access ramp to the loading dock was observed to have a variety of cracks and deteriorating regions along its length. This is likely a result of moisture building up behind the wall and leaching through the wall. Once moisture is present within the wall it is subject to expansive freeze and thaw cycles which can create internal stresses in the concrete, further exacerbating the issue.





Scoreboard and Signage Structural Steel

Corrosion was observed in numerous structural steel members comprising the framing for scoreboards and exterior facing signage. The most prevalent corrosion was observed in the web-horizontal wide flange sections acting as girts for exterior signage. It appears that the corrosion is the result of ponding water during rain events exacerbated by incorrect placement of weep holes in the beam web. While the corrosion is extensive in these members, it does not appear to have substantially increased since the documented photos from the 2017 report.



*Corrosion at scoreboard signage girt*

Numerous double-angle braces were observed to be missing the spacer bolt intended to connect braces at their mid-point. It is not clear if the noted bolts were never installed or were removed at some point subsequent to construction. Nevertheless, a spacer bolt serves the function of reducing the unbraced length of individual angle elements which is often a consideration in the design of the overall bracing system. It is noted that a spacer plate between and welded to the individual angles would serve the same function as a spacer bolt. However, TT did not have sufficient access to visually confirm the presence of a welded plate in lieu of the apparent intended bolt.



*Missing spacer bolt at angle bracing*

Access Ramp Metal Deck

Corrosion was observed at numerous locations at the underside of the metal deck supporting the exterior upper concourse access ramps. In many cases corrosion, appears to be originating at locations of deck attachments and sidelap screws. This is an indication that water is migrating through the slab and reaching the top side of the metal deck. It was noted that some portions of the metal deck and supported slab at end east side ramp had recently been replaced as a result of excessive corrosion in those areas.



*Corrosion of metal deck at access ramps*



*Corrosion of metal deck at access ramps*



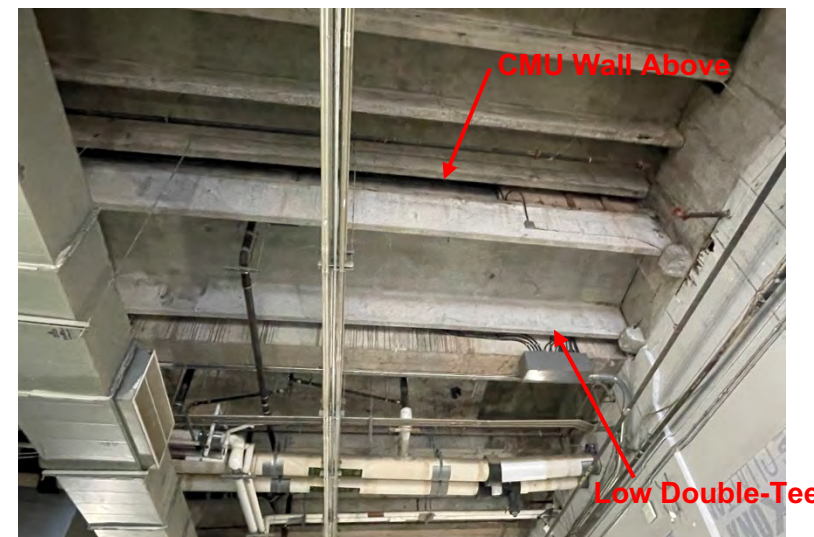
CMU Vomitory and Concession Walls (Main Concourse)

Extensive cracking was observed at many of the CMU vomitory walls at the west side of the main concourse level where the main concourse slab is an elevated slab over the field level. The cracks were typically observed near the vomitory outlet to the seating bowl. These walls also separate the vomitories from numerous concession and pantry spaces. The cracks are an indication of potential excessive deflection of the supporting slab. Additionally, cracks may be an indication that CMU walls are attracting lateral load due to unintended positive connection to the structure above the wall.



Cracking in CMU vomitory wall at main concourse

In order to further investigate the cause of the noted cracking, an effort was made to observe the structural elements supporting these walls from the field level below. In field level rooms without a ceiling, it was observed that the portion of CMU walls with cracking are typically supported directly on a single precast double-tee unit with removed flanges to form a downward facing "C" shape. Based on original structural drawings, it appears that the single double-tee unit is located immediately behind the rearmost lower bowl precast stadia unit and immediately inboard of the column line where a traditional cast-in-place elevated slab begins. Additionally, the double-tee unit is at a low elevation with respect to the adjacent cast-in-place slab structure. This was done to enable a low floor in the concession pantries. The cracks in the CMU walls may be the result of excessive deflection of the supporting precast double-tee unit.

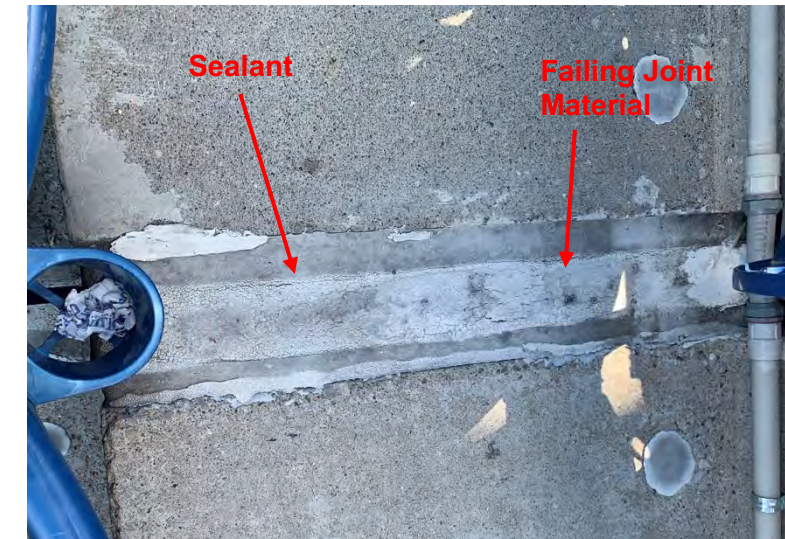


Precast double-tee supporting CMU walls

Expansion Joints

There are two primary types of expansion joints in the stadium: precast seating bowl joints with flexible material and structured floor structure joints with joint covers over physical gaps. These joints were observed in a variety of conditions. It is our understanding that some joints have been replaced in recent years while others are original. At numerous locations within the

seating bowl, the expansion joint material was in the process of failing. Cracks and gapping were pervasive in the expansion joint material. At some locations, sealant appears to have been applied overtop of portions of the failing expansion joint material.



Expansion joint degradation at upper bowl

At some of the structured floor joint covers, it was observed that the joint covers were anchored to the structure on both sides of the joint. Properly installed joint covers should only be secured to one side of a joint to prevent lateral load transfer across the joint





Expansion joint cover anchored at both sides of joint

A room was observed at the field level in which mechanical and electrical equipment was located below an expansion joint. This room was located directly below the north endzone portion of the main concourse which is exposed to direct rainfall. Plastic sheeting was installed to protect equipment from water.



Expansion joint above electrical equipment

### Exterior Plaza Slab

The slab-on-grade on the west side plaza outside the stadium appeared to have settled and cracked in areas such that a gap had formed between the slab and the base of precast wall panels. It appears that the wall panels are attached to other structural elements in that they have not settled with the slab. This has resulted in the bottom caulk joint remaining attached to the precast panel and elevated about the slab on grade. While this is not a structural concern, the current condition will allow for water intrusion into the base of the precast wall panel and under the slab which may cause damage to the base of wall grout and further cracking of the slab on grade.



Plaza slab settlement at exterior wall



Plaza slab settlement at exterior wall

### **Recommendations**

The following recommendations are made in support of the aforementioned objective of enabling the existing structure to continue operating for an additional four to five years in a safe and functional manner.

#### Seating Bowl Cast-in-Place Concrete Infill Steps

Deterioration in a large percentage of the upper bowl and some lower bowl steps is evident and will require attention in the near future. Given the extent of concrete degradation, there is not a viable remediation aside from continuing the remove and replace effort that has thus far been performed

As an immediate safety action, we recommend that portions of spalling concrete, including those being held in place or hanging from traffic coating, be removed and patched to a solid/sound condition to eliminate a current tripping hazard



#### Precast Concrete Stadia and Double Tee Units

In the tunnel and concourse areas where deterioration, spalling and potential falling concrete exists, perform an immediate comprehensive inspection and sounding to determine the extent of repairs that are required.

Visible cracks in the top of precast stadia treads should be sealed by routing and sealing or with a pourable crack sealer/healer.

#### Elevated Slab Above Loading Dock

The visible cracks in the slab underside do not appear to be a short-term concern but would likely need to be addressed in the long-term if the stadium life were to be extended beyond five years. In such a case, or if conditions are observed to be deteriorating, it would be prudent to perform an up-close inspection and sounding of representative areas to verify that areas are not deteriorated to the point of needing immediate repair.

The exterior plaza slab located above the observed under-slab cracks does not appear to be a short-term structural problem but would likely need to be addressed in the long term. If possible, cracks should be routed and sealed from above.

#### Loading Dock Exterior Ramp Foundation Wall

The moisture leaching and cracking does not appear to be a short-term structural problem but would likely need to be addressed in the long-term if the stadium life were to be extended beyond five years.

#### Scoreboard and Signage Structural Steel

Corrosion of structural steel does not appear to have increased significantly from the photos in the 2017 report and does not appear to be a short-term structural problem. To minimize future corrosion, it is recommended that new weep holes be drilled at the low point of the sloped web-horizontal girts to minimize ponding water. Spacer bolts should be installed in double angle

bracing members.

#### Access Ramp Metal Deck

Some areas appear to have advanced deterioration. If deterioration is observed to continue, it may be necessary to remove and replace the slab and deck within the applicable bays. Further close-up investigation is required to verify this.

#### CMU Vomitory and Concession Walls (Main Concourse)

Additional deflection of the precast double-tee supporting the ends of the main concourse CMU vomitory walls is not anticipated. Cracking of these partition walls do not appear to need an immediate structural repair. Cracks in the CMU walls should be sealed to prevent water intrusion

#### Expansion Joints

Although not a structural issue, failing expansion joints with visible cracking, gapping or where a tripping hazard exists, or where water leaking is an issue should be repaired or replaced.

#### Exterior Plaza Slab

Settling slab on grade is not a structural concern. Caulk along the base of exterior walls should be replaced wherever it has failed.

### **Overall Conclusions**

The primary structural components of the stadium, including slabs, beams, and columns is in generally good condition. The recommendations made are typical for the observed areas of deterioration and are needed for enabling the stadium to continue operating for five additional years.

## TECHNOLOGY

### High Risk Technology Systems

#### Sound System Headend

The primary digital signal processing (DSP) for the sound system is at the end of its normal useful life. These Media Matrix products are no longer manufactured and there are no direct replacements available. If one portion of the core headend were to fail, a full system would need to be designed, installed, and programmed.

At the moment, there are very long lead times for this type of equipment. To this point in its life cycle there have been no major failures and there is a slight chance that it would remain operational with minor maintenance. However, we do see this as a high-risk item that would have the potential to affect the bowl and back of house sound.



MediaMatrix DSP

#### Large Format LED Videoboards

The primary LED boards on the north and south end of the stadium are at the end of their projected normal lifespan. There are a number of spare modules, and the venue has contracted the manufacturer to be onsite for all games. Depending on the quantity of failures it is possible to extend the life of the displays a few more years. Having two displays, one north and one south, does help mitigate a total system failure, however any

failure of hardware processing at the headend would affect both displays. We would advise testing by the manufacturer on the backup processors to help reduce the risk of failures in a game.

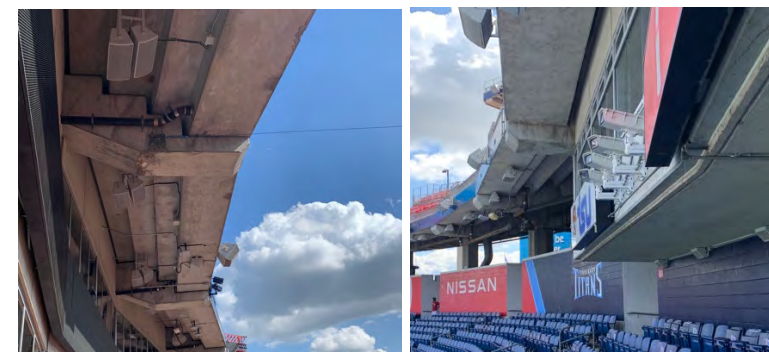


North videoboard with module failures

### Audio Systems

#### Bowl PA System

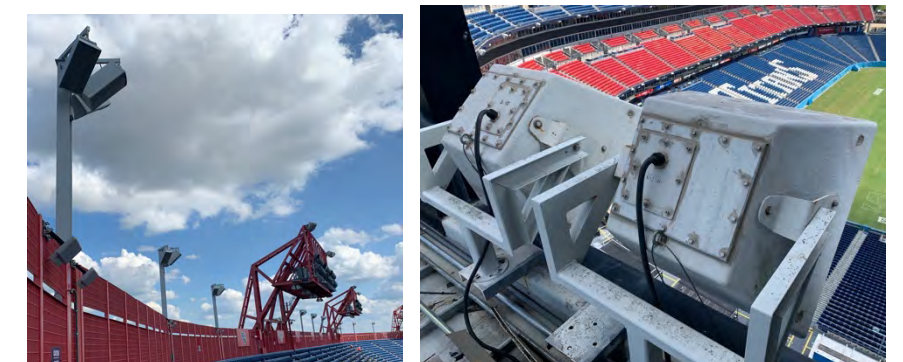
The bowl speaker system was updated in 2012 and consists of EAW loudspeakers, Lab Gruppen amplifiers, and Media Matrix DSP processors in a distributed rear firing orientation.



Typical seating zone speaker conditions

The coverage of the speakers and overall performance grade high on annual NFL intelligibility reports. Annual tuning of the system takes place to validate systems integrity and a report of speakers requiring maintenance is generated.

During the site assessment speakers performed well and coverage in the areas assessed aligned to similar system types. Although coverage is adequate, the system does not provide the full-range impact more accustomed of modern PA systems and is best suited for speech reproduction over music.



Typical eating zone speaker conditions

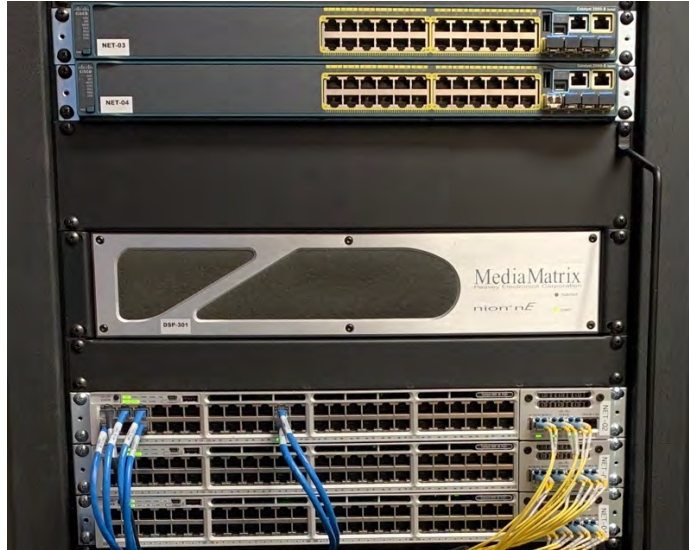
Life expectancy for a modern speaker system is about 8-10 years. This is driven largely by the life of the electronic components in the system in addition to wear and tear on the speaker's drivers.

Annual Maintenance: Check and clean amplifier fans/filters, check speaker drivers for issues.

#### Audio Network & DSP System

Directly supporting the bowl PA system is a distributed Cisco network and Media Matrix DSP system. Network switches have been replaced in the last four years, but the DSP is original to the 2012 PA system renovation.





Core network switches and DSP processor location

As noted in the high-risk section; the DSP system is at the end of its normal useful life with no direct replacements available from the manufacture and very long lead times on equivalent equipment from alternative manufactures.

Replacement of the DSP system should be investigated as the system is beginning to extend past the normal 8 to 10-year replacement cycle for active sever and processing equipment.

Examples of replacement hardware include QSC Q-SYS and Symetrix Edge.

Front of House (FOH) Console

Dueling Yamaha consoles are located in the audio control booth which have been replaced in the last five years. The Yamaha QL5 console handles the heavy lifting and matrix distribution of the bowl audio system and the Yamaha TF1 busses together drum microphones and other ancillary connections.



Audio consoles located in audio control room

The use of an outboard console in addition to a primary console is the result of the primary console reaching its input channel limitations. This stop gap solution meets the needs of the current operators and is not a concern.

Life expectancy on a digital mixing console is around 10 years. We would recommend procuring a spare power supply.

Annual Maintenance: Check fans, clean air filters, and add firmware updates.

Concourse Coverage

There are two notable conditions as the concourses are both exterior open air and interior. The exterior concourses contain distributed One Systems loudspeakers over each concession stand and ceiling speakers in the restrooms. This accounts for about 50% of coverage throughout the exterior concourses.



Typical concourse speaker coverage

Throughout the interior concourse areas, coverage is located in the ceilings over each concession stand and in ceilings of the restrooms. This accounts for about 40% of coverage throughout the exterior concourses.



Typical concourse speaker coverage

Gate Coverage

All entrance gates contain full range speakers for gate announcements. These are a mixture of One Systems and EV loudspeakers ranging in age from 8 to 12 years of age. These speakers are fully exposed to the elements in all areas and are beginning to show signs of degradation faster than other distributed speakers.





Main entrance gate speaker coverage

## Video Systems

### In House Production

Although the room is well maintained, the primary production switcher is nearly ten years old and can be problematic if a power supply or other connections fail. We would recommend purchasing a spare Ross Carbonite switcher to keep on hand for any major failures. This switcher could be used in some form in any future control room builds.



Primary video production switcher

The primary production baseband router is nearing end of life. No new input/output cards are available and any card that fails must be shipped back for repair. An entire new routing core upgrade is not feasible at this stage, so we recommend the immediate repair of any card that fails to ensure any spare parts are able to be swapped without delay.

The primary router control system is end of life and needs to be upgraded. It is possible that this hardware/software could be transitioned to a new building in the future.



Primary video router

The rack room UPS is at 96% capacity and does not fully support all of the necessary equipment. Additional UPS units should be procured to ensure minimal equipment failures during power drops.

The current analog KVM system is outdated and needs to be upgraded to accommodate digital monitoring. The newer KVM systems are more robust, and we would expect to be able to reuse any KVM gear in any future control room builds.

The current Triax camera systems is outdated and is already on schedule to be replaced. The new SMPTE cameras will be a good upgrade and we would expect them to be used in any future builds.

The current Yamaha QL5 mixing console does not have a redundant power supply and is at risk of failure. We would recommend procuring a spare power supply.

Other portions of the system have been recently upgraded and are in good condition; EVS, Riedel Intercom, XPression Graphics.

New broadcast cameras are anticipated to be purchased after the '22 - '23 season.

### Scoreboards

The scoreboard structure is in good condition with adequate space to maintain the display. No obvious surface rust on the primary connections. There were several boxes of spare parts on the catwalks for repair.



Primary scoreboard structure

The current 4-digit timing system is a limitation for the types of events that can be hosted in the facility. The venue management is currently pursuing a 6-digit replacement system.





4-digit timing system

The fascia display is currently 16mm and should be maintained for the remaining years of service of the stadium.

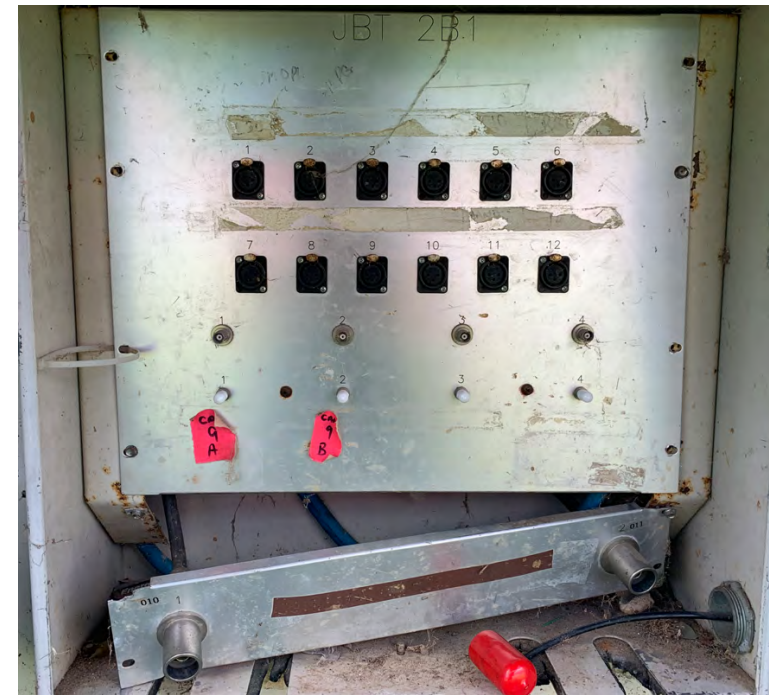
#### Broadcast Cabling

The truck dock headend just received a portable HVAC unit to cool the space prior to our arrival. A permanent system should be considered to ensure consistent operation. Broadcast, IT, and NFL systems are housed in this area, therefore an investment in cooling for this space will prevent possible equipment failures and costly repairs/replacements.



Truck dock head end room with portable HVAC

Individual JBT boxes are in poor condition. Each box should be clean, and terminations tested to ensure full functionality.



JBT

### **Distributed Television System**

#### Televisions

We estimate approximately 690 televisions in the facility with an average display age of 11 years old. The age range varies from 4 to 16 years with the newer displays largely located in premium spaces and suites. The older displays are found on the concourses or at concession stands.

All displays are fed over the modulated cable TV over building distributed coax cabling and controlled by local handheld remotes. Concession menu board displays receive content from USB sticks that are inserted into each of the display.



Typical display conditions

No televisions were identified as in need of expedited replacement, but it is recommended to continue carrying spare inventory for replacement of displays that fail due to age.

#### Modulated RF Cable

The heart of the visual experience throughout the venue is an RF cable distribution system feeding the televisions over coax cabling.

The modulated equipment utilized has surpassed the typical 12-year life expectancy with several devices no longer having manufacture support nor a coax equivalent replacement option. This system is functional, but a possible risk for distributing content throughout the building for fan enjoyment.

Modulated cable TV systems are becoming uncommon across stadiums and have limited support as product availability is less abundant.





*MATV headend components and cable set top boxes*

An IPTV system is typical for more modern NFL stadia but the cost to maintain the current modulated cable system is low. An IPTV system would introduce the following capabilities which are able to assist in a timelier return on the investment: track/sell advertisements to discrete displays with real-time analytics, remote control of content/power status from a centralized control system, and monitoring of display status at each TV throughout the venue.

## Audio & Video Systems

### Clubs (Typical of Two)

Current premium clubs are equipped with audio systems, TVs, and LED screens on opposing walls in each of the rooms. Existing systems are generally adequate for current use cases but contain several layers of stopgap measures that have been added to mend previous failures in each space or have equipment that has been abandoned. It is common for operations staff to deploy supplemental portable systems for events to have a fully functional system within the space.



*Wesley Mortgage Club*

Video presentation is facilitated on the 4:3 aspect ratio LED screens utilizing a local HDMI input. All content contains letterboxing unless reformatted to be natively displayed on the LED screens. When not used for video presentation, a local cable set top box feeds a processor where additional graphics are added prior to routing the signal to the screen to mitigate the impact of the letterboxing. The LED screens and their associated processing are nearing the end of their expected 10–12-year life cycle.



*Wesley Mortgage Club LED display*

Audio and video connectivity in each space is sparse and has largely been abandoned and supplemented within each of the supporting audio and video equipment racks. Additional supplemental equipment is recommended to be procured to bolster the clubs functionality and reduce reliance on current stopgap measures.



*Wesley Mortgage Club AV racks*

### Suites

There are varying sizes of suites, though the functionality within all spaces consists of televisions and overhead speakers for bowl audio with a local volume control.





Typical suite conditions

This operational experience of these amenities is adequate for current use cases but is behind the times when compared to similar facilities technology within premium ticket holder suites.

#### Back of House (BOH) Spaces

Player spaces, locker rooms, and event staff areas have a minimum accompaniment of technology within these rooms. These spaces contain televisions only.



Titans locker room

This operational experience of these amenities is adequate for current use cases but is behind the times when compared to similar facilities technology within back of house and player spaces.

#### Interview Room

Many of the systems within the space are original. Due to the age of these systems, the space is not aligned with what is deployed at more modern stadiums as it relates to interconnectivity to the truck dock and in-house production rooms, studio lighting for the platform, and in room sound reinforcement.



Interview room

Operators rely on temporary cabling to be deployed per event to support interviews. The room is lacking local automated controls for AV devices, and the sound operator is located in an adjoining closet without working lights or a view to the interview platform.



Interview room sound operator

It is possible for the room to continue functioning as noted if it aligns with the facilities standard operating practices, but it is recommended to enhance the systems within the space to better align the room with what is more common with its peers. These updates consist of adding a local control system with wall mounted touch panels, four channels of wireless microphones, full-range surface mounted speakers to cover the press area, foldback speakers, a digital mixer with remote i/o stage boxes, additional connectivity to the truck dock and in-house production room, and studio lighting mounted from an overhead pipe grid above and in front of the interview platform.

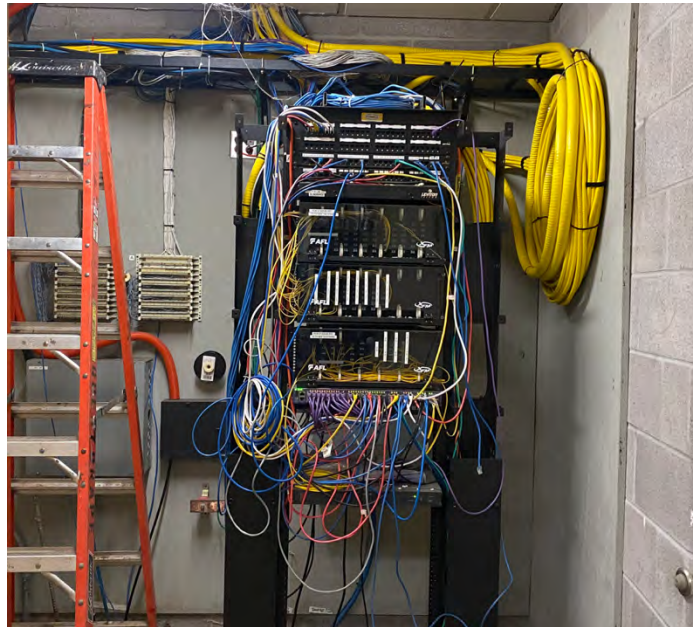
#### **Telecommunications Systems**

##### Data Infrastructure

The existing structured cabling, telecom rooms, and pathways are limited throughout the facility. Most rooms are full but should be appropriate for the facility needs for the next four to five years. A rack mounted UPS should be added to all telecom rooms to provide power to all network switches. Clean power from UPS will extend the life of the existing network switches.



Portable AC units should be added to any telecom room that cannot maintain a temperature of 75 degrees or lower. Cooler rooms will extend the life of the existing network switches.



Typical IDF with no UPS, no HVAC and open ceiling tiles

Existing DAS system is old but functional. The existing system is acceptable for the next five years.



Existing DAS antennas with carrier responsible for upgrades

Existing video production studio green room space should be converted to IT storage (after training facility upgrade is completed), so that stored equipment can be moved out of current office.



Potential space for IT storage

## Security Systems

### Electronic Access Control System (EAC)

The electronic access control system is comprised of an Open Options management system with Schlage card readers and keypads. Card readers and keypads are primarily deployed within the administrative and production areas of the facility.

The decision to update to Schlage was 7-8 years ago from Lenel. There are still some Lenel card readers in the facility, but upon failure, they are replaced with the current Schlage model. The card readers and keypads meet the current operational needs of the team and operations, and they are pleased with the functionality of them.



Card reader (left) & card reader keypad combination device (right)

Last year, the facility changed its access control management platform from Lenel to Open Options to align the stadium's system with the training facility. However, the Open Options system proves to be a hindrance to the primary daily operators. The web access portal that tracks metrics and events has a distinct and notable delay between the event and displaying the associated information. The security staff juggle multiple applications at one time in order to gather thorough information about real time events.

### Video Surveillance System (VSS)

The video surveillance system is comprised of a Genetec video management platform with IP based cameras. At present, there are around 300 cameras throughout the facility with plans to expand coverage with 20 more cameras for previously defined blind spots such as the suite corridors and ramps. The cameras range in manufacturers.





*Security camera with corner mounted multi-imager*

Camera coverage within the facility spans the interior, exterior, bowl, and parking lots. Within the facility, cameras are mounted within the concourses and high-profile areas. The cameras that cover the bowl are installed at each corner of the bowl as a bank of four cameras. The parking lots surrounding the stadium are covered by security cameras mounted to the light poles. At locations with cameras, fiber is fed from the nearest telecom closet to an enclosure mounted at the pole where it is terminated and fed to a local switch where category cable connects to the camera above. Cameras that service the parking lots further from the venue (Lots E & F) are wireless. An antenna is mounted to the top of the structure at the South end zone and provides signal transmission between the two destinations.



*Long range bowl security cameras*

The servers for the Genetec video management system (VMS) were updated around five years ago. They are housed within the main telecom room on the service level. It is the only location where video is stored within the system as there is no cloud back-up. It is recommended that the VMS servers be updated as they are near the end of their typical lifecycle. It is also highly recommended to consider a secondary back-up location either physically within the facility at another telecommunications closet, or a cloud-based back-up.



*Video management system Genetec rack-mounted servers*

## Security Control Suite

The security control suite was renovated five years ago. Comprised of rooms for main command, event command, elevator and fire panel control, and operations and events management (OEM), it provides space for both daily and special event operations. The main security control room has a video wall of six displays that is primarily leveraged for monitoring camera feeds and workstations for both daily and events management. The video wall runs on a 24/7 schedule for the manned security positions. For special events and game days, the security control room provides workstations for local fire and police departments for on-site support. The event command room was renovated at the same time as the main security control room and has a smaller video wall for the workstations within. The OEM room has a conference table and display for security team meetings and use during events.



*Main security control room with video wall and individual workstations*

The security control suite currently meets the operational needs of the security team. However, when the security team needs to change the source to one of the displays, the process requires physical disconnection of the common sources and a significant delay upon source change. It should also be noted that the typical lifecycle for a similar video wall would be 7-8 years. This system should be updated and replaced within the next two years to maintain optimal functionality.

## **Recommendations**

### Current Upgrade / Replacement Plans

- Retain plan to expand video surveillance camera coverage within the facility to cover problematic blind spots.
- Continue to upgrade security cameras as needed given technology replacement cycles.
- Continue to replace Lenel card readers upon failure with the facility standard Schlage equivalent.

### Critical Recommendations

- Recommend upgrading the security control room video wall system. The typical lifecycle of video wall displays that run 24/7 are around 6-8 years. It is recommended to update the head-end of the system at the same time. Consider a video wall processor that integrates natively with the security management system.
- Recommend updating the access control management platform to a unified system to manage access control and video surveillance within one platform. Consider updating to Genetec to unify the access control and video management systems.
- Recommend replacing the current Genetec servers that are nearing the end of the typical lifecycle for the product (5-6 years). Consider implementing a secondary digital storage location either physical within the facility at a different location or cloud-based storage.

### General Recommendations

- Recommend choosing a security camera manufacturer as the facility standard and replacing failing cameras with a consistent manufacturer. Axis was mentioned as a primary manufacturer in the latest installed cameras. It would be recommended to use Axis since they offer cameras with analytic capabilities to leverage in a unified security system.



## VERTICAL TRANSPORTATION

We reviewed the condition of the machine/controller room, hoistway and pit condition of each elevator, and the upper and lower ends and surface areas of the escalators 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 and 2 (West) are similar in design and type to elevators 7 and 8 (East). Passenger elevator 3 (West) and 6 (East) is also similar in design and type.

Floor levels are designated as:

### East Elevators

- 1<sup>st</sup> floor: Service Level
- 2<sup>nd</sup> floor: Main landing street level
- 3<sup>rd</sup> floor: East Suites
- 4<sup>th</sup> floor: Club Level
- 5<sup>th</sup> floor: East Suites
- 6<sup>th</sup> floor: East Suites
- 7<sup>th</sup> floor: Upper Level

### West Elevators

- 1<sup>st</sup> floor: Service Level
- 2<sup>nd</sup> floor: Main landing street level
- 3<sup>rd</sup> floor: Press Level
- 4<sup>th</sup> floor: Club Level
- 5<sup>th</sup> floor: West Suites
- 6<sup>th</sup> floor: West Suites
- 7<sup>th</sup> floor: Upper Level

### Elevators West #1 & #2

#### Overall - Rating 2

These units are automatic duplex operation with a load capacity of 4,500 lbs. and have a rated speed of 350 fpm. They serve front landings and floors: 1, 2, 3, 4, 5, 6 and 7. They are equipped with KONE Miprom A-1 microprocessor car controls with Allen Bradley SCR DC motor drives. The geared hoist machines are Hollister Whitney 63-OH with a 40HP DC motor. The landing doors are two-speed side slide 48” W x 84” H and are operated by MAC PMSSC model car door operators.



*Elevators #1 and #2 top landing (7<sup>th</sup> floor) open to the outdoors*

#### Machine Room - Rating 2

The machine room was fairly clean, however, there are signs that indicate the area has not been serviced recently. For example, the floor is dusty, and the machine area has rope debris on the floor. We found spare parts and materials on the storage shelf. The lubrication containers are sitting on the floor and are not properly stored.

Both elevators are up to date with required state inspections, and the required 5-year full load Category 5 tests were

performed on 2/1/2020 and the Annual Category 1 Test were performed on 6/1/2022. The Tennessee State inspection was last completed on 5/2022. All tags were posted on the controller doors. The written maintenance control program (MCP) documents were up to date on any elevator on site.

The equipment is 24 years old and has reached its expected end of its life cycle of 20-25 years. However, due to the limited use of these units during nonevent periods and with enhanced maintenance, the useful life may extend past the estimated years of reliable service.

The original KONE Miprom A-1 microprocessor car controls with SCR DC motor drives have been reported obsolete by the OEM/KONE and is no longer supported, but replacement drives are available. The service provider, ThyssenKrupp, currently has access to replacement parts.

The DC drive hoist motor commutators need to have the carbon dust removed to help prolong motor life. The gear oil levels were found to be adequate during our review. The hoist ropes show signs of crown wear, but with appropriate preventative maintenance and proper tensioning of the ropes, the venue should see several more years of use. If the maintenance is performed to industry standards, the elevators should provide three to five more years of reliable service except for the availability of Montgomery/KONE controller parts, and SCR drives.



Original Montgomery/KONE 1996 Hollister Whitney 63-OH geared machines

#### Hoistway Equipment - Rating 2

Both unit cartops were dusty and do not appear to have had preventative maintenance performed recently. The cartop surfaces are showing signs of weather-related deterioration and it is recommended that the car top equipment be painted to help prevent rust and extend equipment life. Note, there is an extension cord laying on the cartop that is not code compliant. The cord appears to be supplying power to the added monitor inside the cab. The MAC door operator appears to be in fair overall condition. All door operator belts appeared to be in good condition and operate smoothly. The door closing torque on elevators 1 and 2 exceed the code requirements and need adjustment to 30 pound of force (lbf) or less. The hoistway door track has surface rust due to the high moisture condition in the hoistways. The door equipment requires preventative maintenance, and the surface rust should be removed, and inhibitor applied to the track surfaces.



Passenger elevator #1 has signs of water damage and dust cover is being stored on the cartop and should be reinstalled



Hoistway door tracks are showing signs of rust



Extension cord is laying on cartop and greenfield is pulled loose from the duct fitting

#### Fixtures – Rating 2

All push button fixtures appear to be original and are 24 years old. It is recommended that they be replaced with vandal resistant fixtures. The push button lighting levels do not match on several floors which is an aesthetic issue and should all be replaced when the next one burns out so they match.





Fans are plugged into the car operating panel behind inspection doors



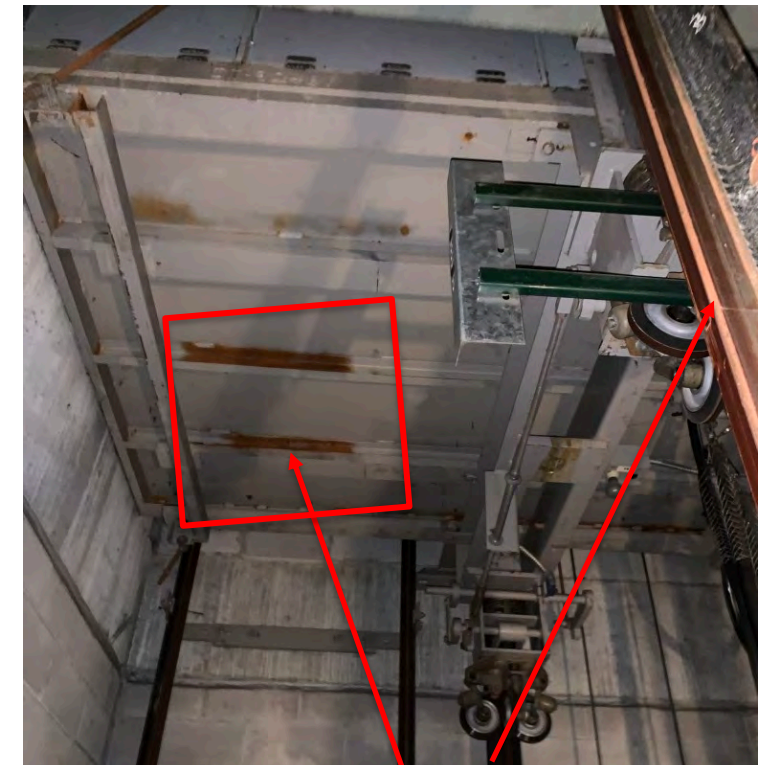
Temporary fans have been installed in the elevator cabs and are used during warm conditions

### Pits - Rating 2

The pits are in fair condition with no water present. Sump pump and sprinklers are present, and debris was found on the pit floors. The underside of the elevators shows signs of surface rust. It is recommended to remove the rust and paint surfaces.



No counterweight run by data tags in place and trash was found on pit floor



Underside of elevators are showing signs of surface rust in addition to the rust found on the guide rail blades



**Passenger Elevator #3**

**Overall - Rating 2**

Passenger elevator #3 is in the same bank as #1 and #2 elevators. However, the unit operates as a simplex with a separate hall button riser to access levels 1 through 6.

The simplex unit has a load capacity of 4,500 lbs. with a rated speed of 350 fpm. The unit uses a KONE Miprom A-1 microprocessor car controls with a SCR DC motor drive. The geared hoist machines are Hollister Whitney 63-OH with a 40HP DC motor. The landing doors are two-speed side slide 48" W x 84" H and are operated by a MAC PMSSC model car door operator. The unit serves six front landings designated as 1, 2, 3, 4, 5, and 6.



*Elevator West #3 entrance with directional arrows and hall button fixture*

**Machine Room - Rating 2**

The machine room is shared with elevators 1 and 2, and has the same general findings. The required state inspections, and the required 5-year full load Category 5 tests were performed on 2/1/2020 and the Annual Category 1 Test were performed on 6/1/2022. The Tennessee State inspection was last completed in May of 2022. All tags were posted on the controller door. The written maintenance control plans (MCP) were not current on any elevator on site.

The equipment is 24 years old and has reached the end of its expected life cycle of 20-25 years. However, due to the limited use of these units during nonevent periods and with proper maintenance, the useful life may extend past the estimated years of reliable service.

The original KONE Miprom A-1 microprocessor car controls with SCR DC motor drives have been reported obsolete by the OEM/KONE and is no longer supported, but replacement drives are available. Service provider ThyssenKrupp should have access to replacement parts.

The DC drive hoist motor commutators need to have the carbon dust removed to extend equipment life. The gear oil levels were adequate at the time of our review. The hoist ropes show signs of crown wear but with recommended preventative maintenance and proper tensioning of the ropes, should provide several years of use. If the maintenance is continued to industry standards the elevators should give three to five years of reliable service except for the availability of Montgomery/KONE controller parts, and SCR drives.

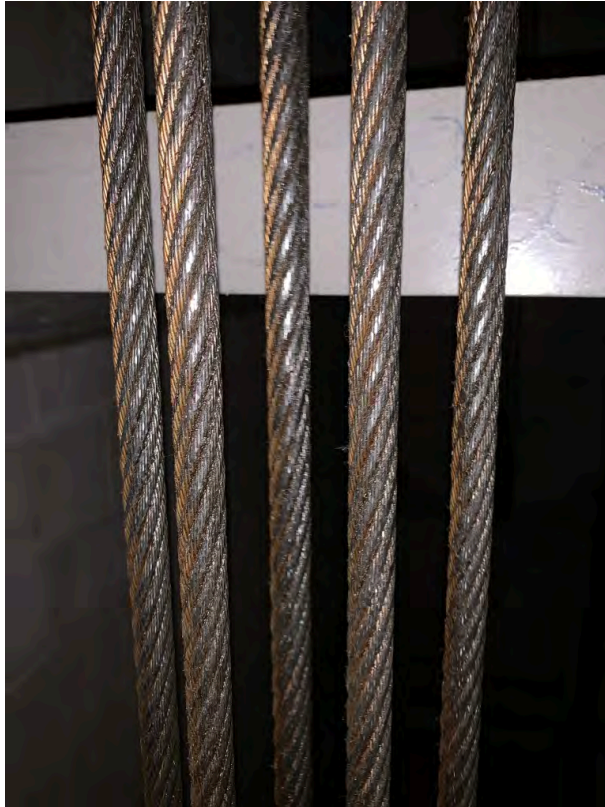


*Original Montgomery/KONE 1996 controller and drive*

**Hoistway Equipment - Rating 2**

The cartop was dusty and does not appear to have had preventative maintenance performed recently. The cartop surface is showing signs of weather-related deterioration and it is recommended that the car top equipment be painted to help prevent rust and extend equipment life. There is an extension cord laying on the cartop that is not code compliant. The cord appears to be supplying power to the added monitor inside the cab. The MAC door operator appears to be in fair overall condition. All door operator belts appeared to be in good condition and operate smoothly. The hoistway door track has surface rust due to the high moisture condition in the hoistway. The door equipment requires preventative maintenance, and the surface rust should be removed, and inhibitor applied to exposed metal surfaces.





Hoist ropes show signs of slight crown wear and need tensioning, cleaning, and lubrication

**Fixtures – Rating 2**

All push button fixtures appear to be original and are 24 years old. It is recommended that they be replaced with vandal resistant fixtures. The push button lighting levels do not match on several floors which is an aesthetic issue, and should all be replaced when the next one burns out so they match.



Fixture buttons are original plastic design

**Pits - Rating 2**

The pit area is in fair condition with some debris on the pit floor and there was no water present on the day of inspection. The metal pit equipment is showing signs of rust and needs to be cleaned and should be painted.



The pit equipment is showing signs of rust

**Passenger Elevator East #6**

**Overall - Rating 2**

Passenger elevator #6 is in the same bank as elevators #7 and #8. The unit operates as a simplex with a separate hall button riser with to access levels 1 through 6.

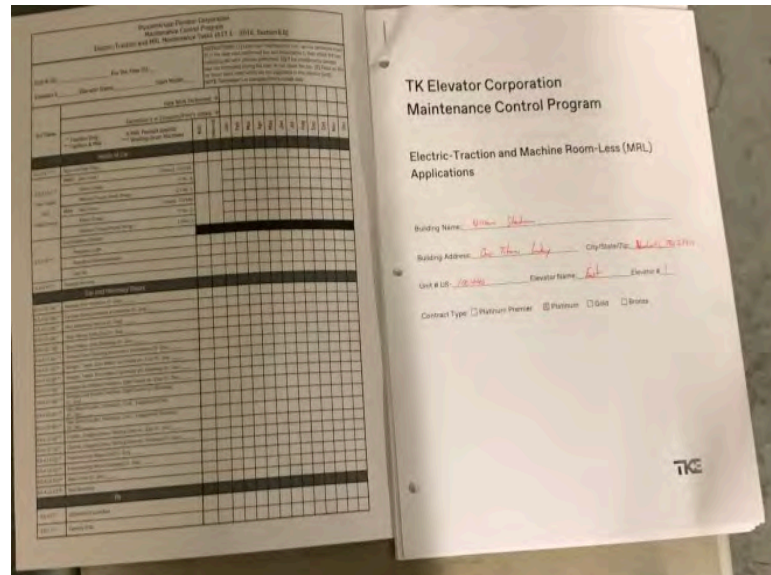
The simplex unit has a load capacity of 4,500 lbs. with a rated speed of 350 fpm. The unit uses a KONE Miprom A-1 microprocessor car controls with SCR DC motor drive. The geared hoist machines are Hollister Whitney 63-OH with a 40HP DC motor. The landing doors are two-speed side slide 48" W x 84" H and are operated by MAC PMSSC model car door operators. The unit serves six front landings designated as 1, 2, 3, 4, 5, and 6.

**Machine Room - Rating 2**

The machine room is shared with elevators #7 and #8 and has the same general findings. The required 5-year full load Category 5 tests were performed on 2/1/2020 and the Annual Category 1 test were performed on 6/1/2022. The Tennessee State inspection was completed in May of 2022. All tags were



posted on the controller door. The written maintenance control program (MCP) documents were not up to date on any elevator on site.



Written maintenance control plans (MCP) were not current on any elevator on site

The equipment is 24 years old and has reached its expected life cycle of 20-25 years. However, due to the limited use of these units during nonevent periods and with enhanced maintenance practices, the useful life may extend past the estimated years of reliable service.

The original KONE Miprom A-1 microprocessor car controls with a SCR DC motor drive have been reported obsolete by the OEM/KONE and is no longer supported, but replacement drives are available. Service provider ThyssenKrupp should have access to replacement parts.

The DC drive hoist motor commutators need to have the carbon dust removed to extend equipment life. The gear oil levels were adequate at the time of our review. The hoist ropes show signs of crown wear but with recommended preventative maintenance and proper tensioning of the ropes should provide several years of use. If the maintenance is performed to industry standards, the elevators should give three to five years of reliable service

except for the availability of Montgomery/KONE controller parts, and the SCR drive.



Geared machine carrying oil on to ring gear

**Hoistway Equipment - Rating 2**

The cartop was dusty and does not appear to have had preventative maintenance performed recently. The cartop surface is showing signs of weather-related deterioration and it is recommended that the car top equipment be painted to help prevent rust and extend equipment life. There is an extension cord laying on the cartop that is not code compliant. The cord appears to be supplying power to the added monitor inside the cab. The MAC door operator appears to be in fair overall condition. All door operator belts appeared to be in good condition and operate smoothly. The hoistway door track has surface rust due to the high moisture condition in the hoistway. The door equipment requires preventative maintenance, and the surface rust should be removed, and inhibitor applied to exposed metal surfaces.



Light bulb guard missing from inspection station

**Fixtures – Rating 2**

All push button fixtures appear to be original and 24 years old. It is recommended that they be replaced with vandal resistant fixtures. The push button lighting levels do not match on several floors which is an aesthetic issue, and should all be replaced when the next one burns out so they match.





Typical car operating panel for elevators #1-#8

### Pits - Rating 2

The pit area is in fair condition with some debris on the pit floor and water present on the day of inspection. The metal pit equipment is showing signs of rust and needs to be cleaned and should be painted after the water has been removed.



Elevator #6 pit has standing water and the equipment is rusting

### Elevators East #7 & #8

#### Overall - Rating 2

These units are automatic duplex operation with a load capacity of 4,500 lbs. and have a rated speed of 350 fpm. They serve seven front landings and serve floors 1, 2, 3, 4, 5, 6, and 7. They are equipped with KONE Miprom A-1 microprocessor car controls with Allen Bradley SCR DC motor drives. The geared hoist machines are Hollister Whitney 63-OH with a 40HP DC motor. The landing doors are two-speed side slide 48" W x 84" H and are operated by MAC PMSSC model car door operators.



Elevators #7 & #8 top floor entrance is numbered as East #2 & #3 and the entrance is open to the outdoors

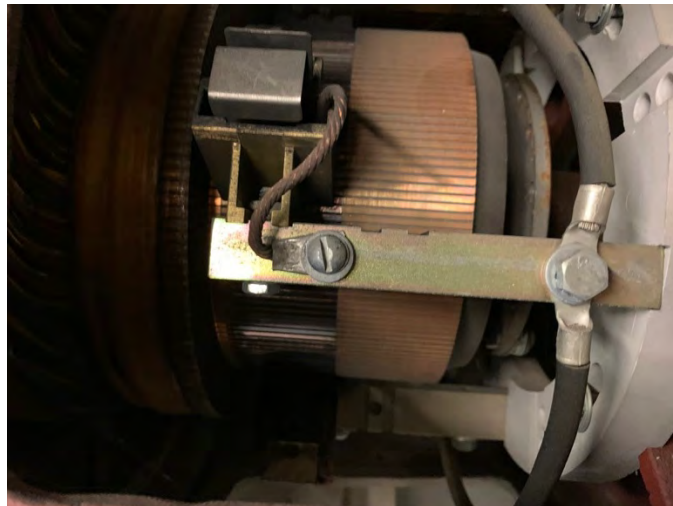
### Machine Room - Rating 2

The machine room was relatively clean but there were oil buckets stored in the room. Both elevators are up to date with required state inspections, and the required 5-year full load Category 5 tests were performed on 2/1/2020 and the Annual Category 1 Test were performed on 5/1/2022. The Tennessee State inspection was completed in May of 2022. All tags were posted on the controller door. The written maintenance control program (MCP) documents were not up to date on any elevator on site.

The equipment is 24 years old and has reached its expected end of its life cycle of 20-25 years. However, due to the limited use of these units during nonevent periods and with continued maintenance, the useful life may extend past the estimated years of reliable service.

The original KONE Miprom A-1 microprocessor car controls with SCR DC motor drives have been reported obsolete by the OEM/KONE and is no longer supported, but replacement drives are available. The service provider, ThyssenKrupp, should have access to replacement parts.

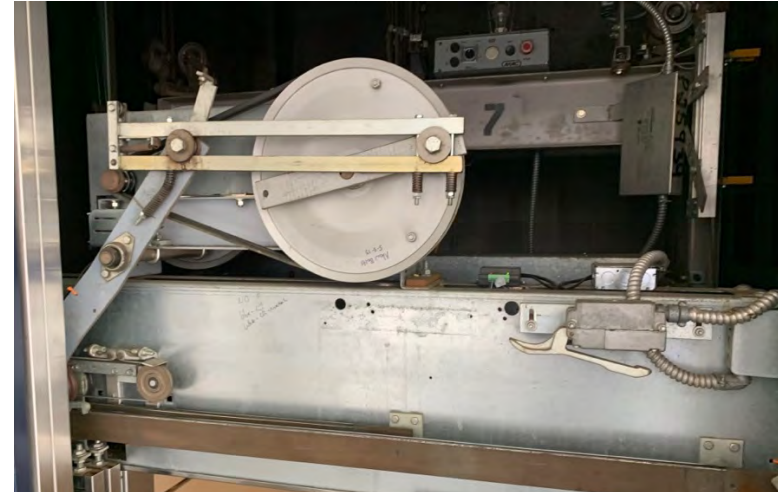
The DC drive hoist motor commutators need to have the carbon dust removed to extend equipment life. The gear oil levels were adequate on the time of our review. The hoist ropes show signs of crown wear but with recommended preventative maintenance and proper tensioning of the ropes should provide several years of use. If the maintenance continues up to industry standards the elevators should give three to five years of reliable service except for the availability of Montgomery/KONE controller parts, and the SCR drive.



DC motor has carbon dust buildup on commutator segments which could result in a short circuiting

#### Hoistway Equipment - Rating 2

The car top show signs of water residue and needs cleaning. It is recommended that all car top equipment be painted to help prevent rust and extend equipment life. All door operator belts appeared to be in good condition and operate smoothly. The original MAC door equipment was observed to be in fair condition.



Typical MAC operator for elevators #1-#8

#### Fixtures – Rating 2

All push button fixtures appear to be original and 24 years old. The standard plastic style buttons and it is recommended that they be replaced with vandal resistant fixtures.

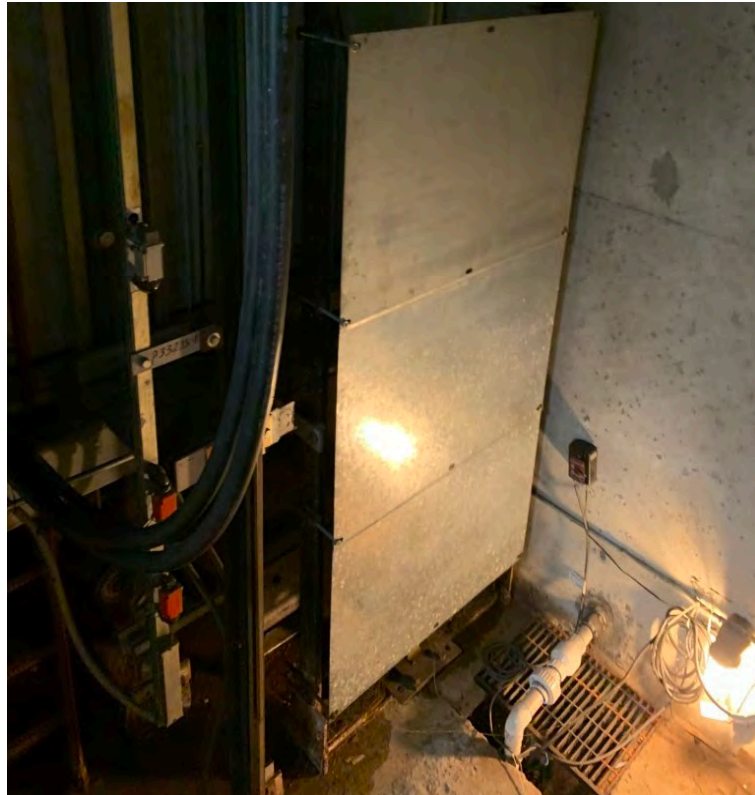


Typical car operating panel for elevators #1-#8

#### Pits - Rating 2

The pits had standing water during the inspection. This is a reoccurring problem and is causing the pit equipment to rust. A sump pump was present in the #8 pit; however, the grating has been removed and is causing a tripping hazard.





Elevator #8 has water entering the pit

#### **Freight Elevator #4**

#### **Overall - Rating 2**

The automatic simplex freight elevator is located on the westside of the stadium. It has a 12,000 lbs. capacity and operates at 100 fpm with seven stops, two front openings floor designation, 1 & 2 and five rear openings designated floors 3 through 7. The elevator was modernized in 2017 with a new Smartrise controller and new AC drive, updated Courion controller, cartop motor control system, proximity gate detectors and Courion Model G power freight doors. The original 1998 Hollister Whitney 63-OH geared traction machine was retained and a new AC, 40 HP motor was installed.



Freight elevator #4 cab enclosure

#### **Machine Room - Rating 3**

The machine room was fairly clean, however, there are signs that indicate the area has not been serviced recently. The required 5-year full load Category 5 test date was not posted on the controller. The governor test tag had a posted date of April 2017 and is overdue. The Annual Category 1 Test date tag was missing from the controller door, so verification of the last test date needs to be confirmed. If overdue, perform the required testing and post tag on the controller door. The state inspection was performed in May of 2022. With the completion of the modernization of the major components in 2017 the elevator should remain generally dependable for the next fifteen plus years with proper maintenance. The gear oil was at an acceptable level, although the machine has a slight leak and needs to be wiped down. The machine room temperature was acceptable. The hoist ropes are showing signs of slight crown wear and needs tensioning, cleaning, and lubrication.



CAT 5 test was performed April 2017 and in overdue for testing

#### **Hoistway Equipment - Rating 2**

The car top was dirty and needs significant cleaning along with the removal of stored materials and lubricants. The front side Courion box cover has been removed, is laying on the cartop and needs to be reinstalled. The car gate chains need to be lubricated. The hoist ropes show signs of slight crown wear and needs tensioning and lubrication. The Courion hall door equipment needs cleaning and preventative maintenance performed. A top of the car handrail is recommended to eliminate the fall hazards on the side of the car top. The front side gate reversing edge is not operational and needs to be repaired. It should be noted that the car gate infrared detector edges were added to the front and rear gates during the modernization.





Freight elevator #4 bottom landing door is rusted, and the metal is separating

**Fixtures – Rating 2**

All push button fixtures were standard plastic style buttons that are susceptible to vandalism and discoloration. The top floor hall door station close button is difficult to read and is almost illegible. The door open and close buttons need to be replaced.



The top floor hall door station plastic button covers are discolored making it hard to read the door open and close buttons

**Pits - Rating 2**

The pits were dirty and need to be cleaned. A sump pump is installed, and no water was present during our review.



Elevator #4 pit area has signs of water related issues and equipment is rusting

**Freight Elevator East #5**

**Overall - Rating 2**

The automatic simplex freight elevator is located on the westside of the stadium. It has a 12,000 lb. capacity and operates at 100 fpm with six stops front openings floor designations 1, 3, 4, 5, 6 and 7 and one rear opening designated floor 2. The elevator was modernized in 2017 with a new Smartrise controller and new AC drive, updated Courion controller, cartop motor control system, proximity gate detectors and Courion Model G power freight doors. The original 1998 Hollister Whitney 63-OH geared traction machine was retained and a new AC, 40 HP motor was installed.

**Machine Room – Rating 3**

The machine room was fairly clean, however, there are signs that indicate the area has not been serviced recently. There is a spare parts shelf with parts and materials but needs cleaning and organizing. The required state inspections, and the required 5 Year full load Category 5 test was performed in April of 2017 and is currently overdue; the Annual Category 1 test



requirement was completed in January of 2020. The governor tags indicate the month when the full load tests were performed, but not on the controller door. The hoist ropes are showing signs of slight crown wear and need tensioning, cleaning, and lubrication.

### Hoistway Equipment - Rating 2

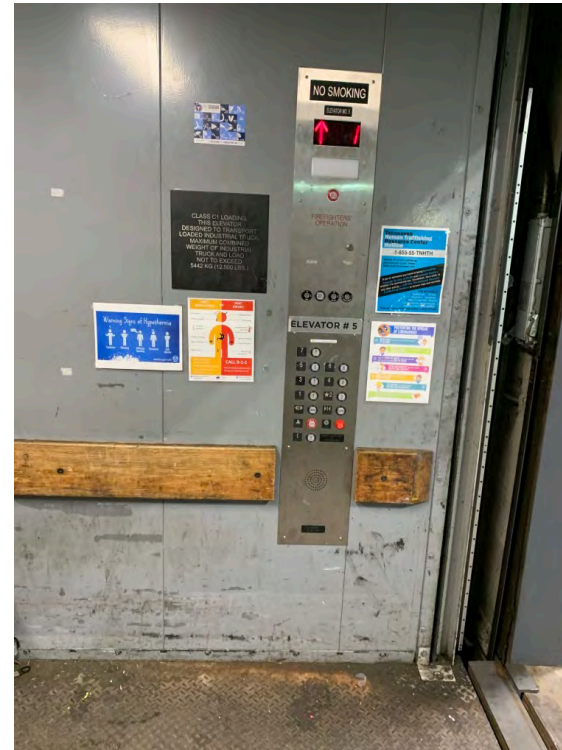
The car top was dirty and needs significant cleaning along with the removal of stored materials on the crosshead. There is a handy box with a missing cover that is exposing wire and needs to be reinstalled. The gate chains are dry and need cleaning and lubrication.



Freight elevator #5 cartop has material and parts stored on top

### Fixtures – Rating 3

The fixtures were upgraded during the modernization. All push button fixtures are standard plastic style buttons that are susceptible to vandalism and discoloration.



Freight elevator #5 modernized car operating panel and fixtures

### Pits - Rating 3

The pit had debris on the floor and needs to be cleaned. There was no water in the pit at the time of the inspection.



Elevator pit had some debris on the floor and was dry

### Passenger Elevators (Express) #9, #10 and #11

#### Overall - Rating 3

Passenger elevators (express) #9 - 20 are similar in age and design. Elevators #9, #10 and #11 are a Triplex Automatic operation where the bank of elevators sit in the same tower back-to-back with elevators #12 through #14. They have a capacity of 4,000 lbs. and operate at 500 fpm. They serve two landings, front opening floor designation 2 and 7. They are equipped with ThyssenKrupp/Nashville Machine TAC-50 controllers with Synergy Performance Series MRL Overhead permanent magnet gearless machines and variable volt frequency A/C drives. Doors are single speed center opening operated by ThyssenKrupp 08-LD Linear car door operators.





Typical main entrance for the bank of express elevators

### Machine Room - Rating 3

The machine room was clean and did have a parts shelf available. There are lubrication containers sitting on the floor that will need to be stored in a code compliant cabinet. The elevators require 5-year full load Category 5 test tags; they are missing from the controller doors so it is assumed that the tests are overdue and will need to be completed soon. The CAT5 test tags should be posted on the controller doors with the last date of completion. The Annual Category 1 test requirements were performed in June of 2022 and are current, and the state inspection was last completed 5/25/2022. The machine room temperature was acceptable upon our evaluation. It is recommended that the machine room HVAC be designed to keep the room between 60 and 85 degrees to help extend the life of the equipment and improve reliability. All machines and overhead equipment need to be cleaned and should be painted, due to signs of rust. Periodic testing of the hoistway louvers for proper operation is recommended.



Machine room lubrication containers are not properly stored

### Hoistway Equipment - Rating 3

All unit car tops were dusty and need cleaning, The hoist ropes need to be tensioned and lubricated. It is recommended that all car top equipment be painted to help prevent rust and extend equipment life. All door operator belts appeared to be in good condition and operate smoothly. All elevator equipment in the overhead should to be painted with rust inhibiting paint.



Typical rust on equipment in overhead on express cars



Car tops are dirty and in need of cleaning and rusted surfaces should be painted

### Fixtures – Rating 3

All push button fixtures were standard ThyssenKrupp metal style buttons. Due to the exposure to the outdoor elements, it will be necessary to replace buttons as they become damaged and/or



inoperable. The cab interiors were in good condition, but the stainless-steel door panels need cleaning.



Access key switches are showing signs of rusting

### Pits - Rating 2

Equipment is good quality and in fair condition. The pits have trash and debris on the floor and need cleaning. The area has a sump pump, smoke and heat detectors installed. The pits are missing identification numbers and need to be installed to meet code. The equipment is showing signs of rusting and needs cleaning and should be painted.



Pits have trash and debris and need additional cleaning

### Passenger Elevators (Express) #12, #13 and #14

#### Overall - Rating 3

Elevators #12, #13 and #14 are a Triplex Automatic operation where the bank of elevators sit in the same tower back-to-back with elevators #9 through #11. They have a capacity of 4,000 lbs. and operate at 500 fpm. They serve two landings, front opening floor designation 2 and 7. They are equipped with ThyssenKrupp/Nashville Machine TAC-50 controllers with Synergy Performance Series MRL Overhead permanent magnet gearless machines and variable volt variable frequency A/C drives. Doors are single speed center opening operated by ThyssenKrupp 08- LD Linear door operators.

#### Machine Room - Rating 3

The machine room was clean and did have a parts shelf available. There are lubrication containers sitting on the floor that will need to be stored in a code compliant cabinet. The elevators require 5-year full load Category 5 test tags. They are missing from the controller doors so it is assumed that the tests are overdue and will need to be completed ASAP. The Category 5 test tags should be posted on the controller doors with the last

date of completion. The Annual Category 1 Test requirements were performed in June of 2022 and are current, and the state inspection was last completed 5/25/2022. The machine room temperature was acceptable upon our evaluation. It is recommended that the machine room HVAC be designed to keep the room between 60 and 85 degrees to help extend the life of the equipment and improve reliability. All machines and overhead equipment need to be cleaned down and should be painted, due to signs of rust. Periodic testing of the hoistway louvers for proper operation is recommended.



Typical controller layout in the controller rooms



**Hoistway Equipment - Rating 3**

All car tops were dirty and need cleaning. The crossheads are not numbered as per code requirements. The hoist ropes need to be tensioned and lubricated. It is recommended that all car top and overhead equipment be painted to help prevent rust and extend equipment life. All door operator belts appeared to be in good condition and operate smoothly.



Typical car door operator and inspection station for group

**Fixtures – Rating 3**

All push button fixtures were standard ThyssenKrupp metal style buttons. Due to the exposure to the outdoor elements, it will be necessary to replace buttons as they become damaged and or inoperable. The cab interiors were in good condition, but the stainless-steel door panels need cleaning.



Typical car operating panel and fixtures for these elevators

**Pits - Rating 2**

Equipment is good quality and in fair condition. The pits have trash and debris on the floor and need cleaning. The area has a sump pump, smoke and heat detectors installed. The pits are missing identification numbers and need to be installed to meet code. The equipment is showing signs of rusting and need to be cleaned and should be painted.



Express elevator pits are missing identification numbers

**Passenger Elevators (Express) #15, #16 and #17**

**Overall Rating 3**

Elevators #15, #16 and #17 are a Triplex Automatic operation where the bank of elevators sit in the same tower back-to-back with elevators #18, #19, #20. They have a capacity of 4,000 lbs. and operate at 500 fpm. They serve two landings, front opening floor designation floors 2 and 7. They are equipped with ThyssenKrupp/Nashville Machine TAC-50 controllers with Synergy Performance Series MRL Overhead permanent magnet gearless machines and variable volt variable frequency A/C drives. Doors are single speed center opening operated by ThyssenKrupp 08- LD Linear car door operators.



**Machine Room - Rating 4**

The machine room was clean. There are lubrication containers sitting on the floor that will need to be stored in a code compliant cabinet. The elevators require 5-year full load Category 5 test tags. They are missing from the controller doors so it is assumed that the tests are overdue and will need to be completed soon. The Category 5 test tags should be posted on the controller doors with the last date of completion. The Annual Category 1 test requirements were performed in June of 2022 and are current, and the state inspection was last completed 5/25/2022. The machine room temperature was acceptable upon our evaluation. It is recommended that the machine room HVAC be designed to keep the room between 60 and 85 degrees to help extend the life of the equipment and improve reliability. All machines and overhead equipment need to be cleaned down and should be painted, due to signs of rust. Periodic testing of the hoistway louvers for proper operation is recommended.



TKE TAC50 Microprocessor controllers

**Hoistway Equipment - Rating 2**

All car tops were dirty and need cleaning. The crossheads are not numbered as per code requirements. The hoist ropes need to be tensioned and lubricated. It is recommended that all car top and overhead equipment be painted to help prevent rust and extend equipment life. All door operator belts appeared to be in good condition and operate smoothly.



Hoist ropes have slight crown wear and tensioning, and lubrication is needed

**Fixtures – Rating 3**

All push button fixtures were standard ThyssenKrupp metal style buttons. Due to the exposure to the outdoor elements, it will be necessary to replace buttons as they become damaged and or inoperable. The cab interiors were in good condition, but the stainless-steel door panels need cleaning.



Express elevators at outdoor top landing 7<sup>th</sup> floor entrance

**Pits - Rating 3**

Equipment is good quality and in fair condition. The pits have trash and debris on the floor and need cleaning. The area has a sump pump, smoke and heat detectors installed. The pits are missing identification numbers and need to be installed to meet code. The equipment is showing signs of rusting and should be cleaned and painted.

**Passenger Elevators (Express) #18, #19 and #20**

**Overall Rating 3**

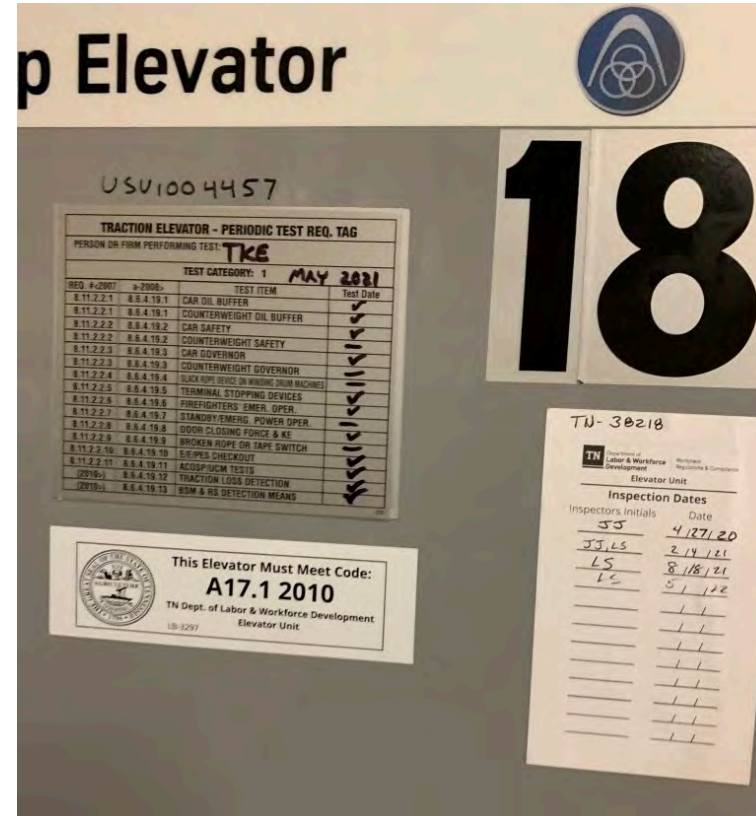
Elevators #18, #19 and #20 are a Triplex Automatic operation where the bank of elevators sit in the same tower back-to-back with elevators #15 through #17. They have a capacity of 4,000 lbs. and operate at 500 fpm. They serve two landings, front opening floor designation 2 and 7. They are equipped with ThyssenKrupp/Nashville Machine TAC-50 controllers with Synergy Performance Series MRL Overhead permanent magnet



gearless machines and variable volt variable frequency A/C drives. Doors are single speed center opening operated by ThyssenKrupp 08- LD Linear car door operators.

**Machine Room - Rating 4**

The machine room was clean but there are lubrication containers sitting on the floor that need to be stored in a code compliant cabinet. The elevators require 5-year full load Category 5 test tags. They are missing from the controller doors so it is assumed that the tests are overdue and will need to be completed soon. The Category 5 test tags should be posted on the controller doors with the last date of completion. The Annual Category 1 Test requirements were performed in June of 2022 and are current, and the state inspection was last completed 5/25/2022. The machine room temperature was acceptable upon our evaluation. It is recommended that the machine room HVAC be designed to keep the room between 60 and 85 degrees to help extend the life of the equipment and improve reliability. All machines and overhead equipment need to be cleaned down and should be painted, due to signs of rust. Periodic testing of the hoistway louvers for proper operation is recommended.



CAT5 test tag missing from group, CAT1 tests are overdue

**Hoistway Equipment - Rating 3**

All car tops were dirty and need cleaning. The crossheads are not numbered as per code requirements. The hoist ropes need to be tensioned and lubricated. It is recommended that all car top and overhead equipment be painted to help prevent rust and extend equipment life. All door operator belts appeared to be in good condition and operate smoothly.



Car tops are equipped with handrails and roller guides roughly operating

**Fixtures – Rating 3**

All push button fixtures were standard ThyssenKrupp metal style buttons. Due to the exposure to the outdoor elements, it will be necessary to replace buttons as they become damaged and/or inoperable. The cab interiors were in good condition, but the stainless-steel door panels need wiping down.

**Pits - Rating 3**

Equipment is good quality and in fair condition. The pits have trash and debris on the floor and need cleaning. The area has a sump pump smoke and heat detectors installed. The pits are missing identification numbers and need to be installed to meet code. The equipment is showing signs of rusting and should be cleaned and painted.





Counterweights and equipment are rusting due to high moisture levels in the hoistway

**Escalator East Short Unit**

**Overall - Rating 2**

The East short escalator is located at the East side of the stadium is a means of entry/egress by patrons from the street level, 2<sup>nd</sup> landing to the 3<sup>rd</sup> landing.

The Montgomery/KONE E-5000–236 F model/smart controller was operating at the designed speed of 100-fpm. The escalator was originally installed in 1998. Handrails and steps were tracking at the same speed, and no damaged steps were visible on the day of our evaluation. The mechanic is applying lubricant manually and the chain is well lubricated. The units have not had a clean down and condition report recently, which is imperative to determining the remaining useful life.

The escalator is used on a limited basis and is in good overall condition with the maintenance rated as average. A detailed listing of all such items has been formulated and included further on in this report.



Escalator landings, balustrades, and steps are in good condition

**Upper Landing – Rating 2**

There is trash and debris that has accumulated in the upper well, and no brake torque data or annually testing information was available on site.

The written maintenance control program (MCP) checklists and documents were not available during our review. This is a Tennessee state code requirement as of July 17, 2021.



Comb plates on all units have faded and are non-contrasting in color

**Lower Landing – Rating 3**

Dust and debris have collected on the lower end areas and the microswitch were not operational on all units at the time of our assessment. TKE has since corrected the issue.





*Microswitches inoperable due to metal shim depressing the plungers*

**Escalator East Long Unit**

**Overall Rating 2**

The East long escalator is located at the East side of the stadium and is a means of entry/egress by patrons from the street level to landing 2 and 3.

The Montgomery/KONE E-5000–236 F model/smart controller and was operating at the designed speed of 100 fpm. The escalator was originally installed in 1998. Handrails and steps were tracking at the same speed, and no damaged steps were visible on the day of our evaluation. The mechanic is applying lubricant manually and the chain is well lubricated. The unit has not had a clean down and condition report recently, which is imperative to determining the remaining useful life.

The escalator is used on a limited basis and is in good overall condition with the maintenance rated as average. A detailed listing of all such items has been formulated and included later in this report.



*Escalator steps have residual oil leaking from step chain lubrication*

**Upper Landing – Rating 2**

There is trash and debris that has accumulated in the upper well, and no brake torque data or annually testing information was available on site.

The written maintenance control program (MCP) checklists and documents were not available during our review. This is a Tennessee state code requirement as of July 17, 2021.



*Upper landing comb plates gap to steps in excess of 5mm and plates have faded color and are non-contrasting which is required by code*

**Lower Landing – Rating 2**

Dust and debris have collected on the lower end areas and the microswitch were not operational on all units at the time of our review, but TKE has since corrected the issue. The lower end controller cover is missing

**Escalator West Short Unit**

**Overall Rating 2**

The West short escalator is located at the West side of the stadium and is a means of entry/egress by patrons from the street level to landing 2 and 3.

The Montgomery/KONE E-5000–236 F model/smart controller and was operating at the designed speed of 100 fpm. The escalator was originally installed in 1998. Handrails and steps were tracking at the same speed, and no damaged steps were visible on the day of our evaluation. The mechanic is applying lubricant manually and the chain is well lubricated. The unit has



not had a clean down and condition report recently, which is imperative to determining the remaining useful life.

The escalator is used on a limited basis and is in good overall condition with the maintenance rated as average. A detailed listing of all such items has been formulated and included later in this report.



Escalator view from the 2<sup>nd</sup> landing looking up to long unit above



Right side handrail is damaged from rubbing on drive wheel

#### Upper Landing – Rating 2

There is trash and debris that has accumulated in the upper well, and no brake torque data or annually testing information was available on site.

The written maintenance control program (MCP) checklists and documents were not available during our review. This is a Tennessee state code requirement as of July 17, 2021.



Step chains appear to be well lubricated, and no damaged rollers or step axles were found during the visual inspection

#### Lower Landing – Rating 2

Dust and debris have collected on the lower end areas and the microswitch were not operational on all units which TKE has since been corrected. The lower end controller cover is missing.

#### Escalator West Long Unit

#### Overall Rating 2

The West long escalator is located at the West side of the stadium and is a means of entry/egress by patrons to transport people from the street level to landing 2 and 3.

The Montgomery/KONE E-5000–236 F model/smart controller and was operating at the designed speed of 100 fpm. The escalator 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 day of our evaluation. The mechanic is applying lubricant manually and the chain is well lubricated. The unit has not had a clean down and condition report recently, which is imperative to determining the remaining useful life.



The escalator is used on a limited basis and is in good overall condition with the maintenance rated as average. A detailed listing of all such items has been formulated and included later in this report.

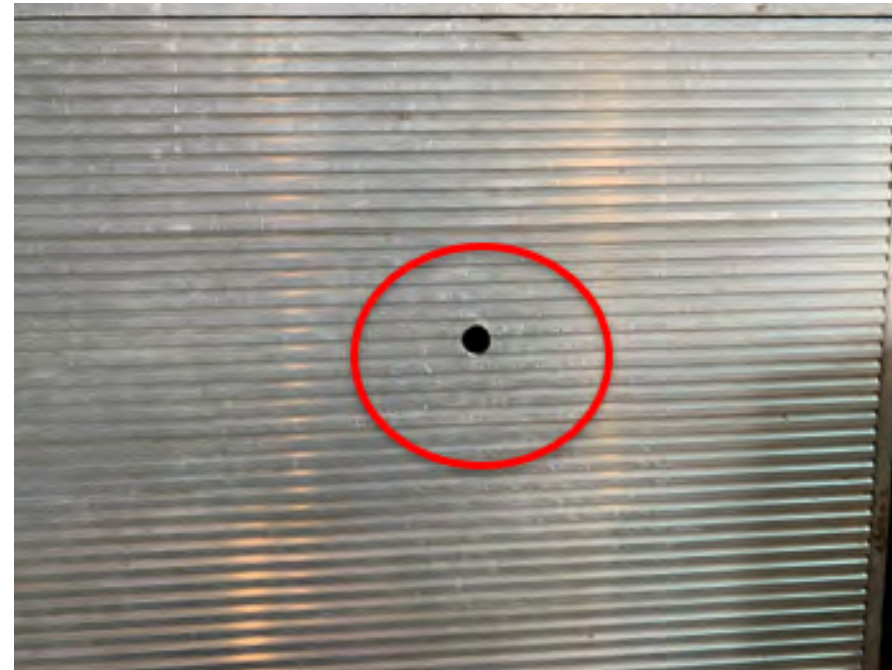


*West long escalator transports patrons to the Wesley Mortgage Club Level*

**Upper Landing – Rating 2**

There is trash and debris that has accumulated in the upper well, and no brake torque data or annually testing information was available on site.

The written maintenance control program (MCP) checklists and documents were not available during our review. This is a Tennessee state code requirement as of July 17, 2021.



*Upper landing floor plate was not secured with a hole in the plate which TKE has since repaired*



*Upper landing plastic skirting cover on the right side is missing and damaged on the left side*

**Lower Landing – Rating 2**

Wiring was observed pulled loose from junction box lower end. Dust and debris have collected on the lower end areas and the microswitch was not operational on all units at the time of our assessment, but TKE has since corrected the issue.



*Wiring pulled loose from junction box at the lower end pit*

**Conclusion**

Overall, the equipment is being maintained at an average level and could be improved. Scheduled preventative maintenance procedures being recorded and tracked in the written maintenance control program (MCP) will need to be provided and updated regularly by TKE. This is an essential part of providing reliable service for the next four to five years. Maintenance and repairs, especially to the freight elevators and the escalators is imperative if the equipment is to perform at the industry standard for this type of equipment. The freight elevators are obviously critical to the day-to-day operations, year around, so the necessary maintenance and repairs need to be completed in a timely manner. The four escalators serve a vital



role on event days and must operate at a safe and reliable level. Currently, a handrail for the West short escalator needs to be scheduled for replacement.

Estimated life expectancy for the original passenger elevators designated as West, #1 through #3 and East, #6 through #8 is 20-25 years under normal conditions. The equipment is 24 years old and is approaching the end of its useful life. With proper maintenance, these elevators should operate reliably for another three to five years. However, as previously outlined in this report, the drives should be addressed, and the controller parts availability will likely become an issue before the units reach the end of their life cycle. It has been determined by the OEM KONE and the service provider TKE that the DB-312 drives are obsolete and no longer available. It should be noted replacement drives are available but are expensive and time consuming to install in addition to potential long lead times. While the current drives are operational, a failure could occur at any given time. In lieu of full modernization, the stadium operator should work with TKE in acquiring spare drives and controllers in anticipation that failure of these components will occur regularly in the next three to five years.

Estimated life expectancy for escalators is also 20-25 years. The escalators are 24 years old and are approaching the end of their life cycle. However, due to the lighter use during non-event periods the equipment appears to be in good condition mechanically and could exceed the expected life cycle. If the clean downs and condition reports (regular maintenance) are completed on a regular basis the units should perform at an acceptable level for the next three to five years.

If replacement or upgrades to the elevator fixtures is determined to be needed, there are multiple manufacturers that can provide a variety of vandal proof/weather resistant pushbutton assemblies and fixtures.

The 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. The

condition of the cabs, fixtures, entrances and hoistway equipment indicates that the actual life expectancy of this equipment will be closer to 10-15 years rather than the typical 20-25 years experienced with traditional elevators. Maintenance and protection of the existing stainless-steel entrances should be considered immediately to help extend its useful life. Because of the environment that these units are exposed to, along with their application, enhanced maintenance practices are needed. Cleaning and painting will be necessary to maximize the life cycle.

### **Recommendations – Maintenance of Units** **Common Deficiency Items**

1. Provide and/or install up to date maintenance control program (MCP) documents as required by code.

### **Common Items Passenger Elevators #1, #2, #3**

1. Clean carbon dust buildup from DC motor commutators and blow out motors.
2. Car operating panels are all open with an extension cord plugged in to the outlet.
3. Fan mounted in cabs due to heat load during events do not meet code requirements.
4. Pits are not identified with code compliant ID numbers.
5. Counterweight run by data tag is missing from pit counterweight area and needs to be updated.
6. Check door restrictors on all elevators and ensure they function properly.
7. Extension cords supplying electronics are running across cartops. Re-route permanent wiring in conduit.
8. Hall button bulb color does not match on all floors and should be replaced with LED or bulbs that match color.
9. Machine room has lubricant and parts not stored properly.
10. Brake preventative maintenance procedures need to be completed.
11. Elevator hoist ropes are showing signs of crown wear. Complete rope preventative maintenance procedures.
12. Pit equipment has surface rust. Clean pits, remove rust, and paint.

13. Hoistway doors and equipment are dirty, trash and debris on sills and headers. Clean down hoistways, and complete door equipment PM's.

### **Passenger Elevator #1 and #2**

1. Geared machines are dusty and need to be cleaned.
2. Geared machines have a slight oil leak.
3. Clean and paint the car tops.
4. Elevator #1 has a dust cover stored on cartop and needs to be reinstalled.
5. Elevator #1 controller has a piece of plastic cover hanging down.
6. Elevator #2 car top has a piece of greenfield pulled out of the duct fitting.
7. Rope lubricators are mounted on the inside of the ropes near the machine sheave. Remount on outside of ropes.
8. Both elevators door torque is higher than 30lbs and should be reduced.

### **Passenger Elevator #3**

1. Wipe down the machine.
2. Elevator is running slower than contract speed.

### **Freight Elevator #4**

1. Lubricate car and hall door operator chains as directed by the manufacturer.
2. Complete preventative maintenance on hoistway door interlocks.
3. Replace 7<sup>th</sup> floor buttons as "open" and "close" buttons are discolored and illegible.
4. Replace braille missing on 5<sup>th</sup> floor right side.
5. Remove lubricants and materials stored on cartop.
6. Car top needs additional cleaning.
7. Front side door operator cover has been removed.
8. Front gate reversing device is inoperable.
9. Bottom floor lower bi-parting freight door panel is rusting.

**Freight Elevator #5**

1. Front car gate reversing device is not working.
2. Adjust front gate to achieve a level closing position.
3. Clean pit.
4. Handy box cover laying on cartop.
5. Lubricate car and hall door operator chains.
6. Complete preventative maintenance on hoistway door interlocks.
7. Lubricants and materials stored on cartop. Car top needs additional cleaning.

**Common Items Passenger Elevator #6, #7, #8**

1. Counterweight run by data tag is missing in pit.
2. Cartops are dirty. Clean and paint cartops.
3. Complete cartop equipment and door operator preventative maintenance.
4. Car operating panels are all open with an extension cord plugged in to the outlet.
5. Pits are not identified with code compliant ID numbers.
6. Counterweight run by data tag is missing from pit counterweight area. Install data tag, measured distance.
7. Check door restrictors on all elevators.
8. Extension cords are running across cartops. Re-route permanent wiring in conduit.
9. Hall button bulb color does not match on all floors. Replace LED or bulbs to match color.
10. Machine room is unorganized. Clean machine room and organize parts. Lubricants should be stored in a cabinet.
11. Complete brake preventative maintenance procedures.
12. Pit equipment has surface rust. Clean pits, remove rust, and paint.
13. Hoistway doors and equipment have dirt, trash and debris on sills and headers. Clean down hoistways, and complete door equipment preventative maintenance procedures.

**Passenger Elevator #6**

1. The light bulb does not have a guard on the cartop.
2. Door detector shield is broken on strike jamb side.

3. Hoist motor commutators have a buildup of carbon brush dust that can result in a short circuit. Blow out motors and clean commutator grooves.
4. Clean and paint the cartop.
5. Investigate water in the elevator pit. Clean and paint all rusted pit equipment.
6. Complete hoist rope preventative maintenance procedures.

**Passenger Elevator #7 and #8**

1. Hoist motor commutators have a buildup of carbon brush dust that can result in a short circuit. Blow out motors and clean commutator grooves.
2. Geared machines are dusty and need to be cleaned.
3. Geared machines have a slight oil leak.
4. Clean and paint the cartops.
5. Both elevator hoist ropes are showing signs of crown wear. Complete rope preventative maintenance procedures.
6. Clean and paint cartop.
7. Install braille missing at 1<sup>st</sup> floor on elevator #7.
8. Install braille missing at 1<sup>st</sup> floor on elevator #8. (Right hand side)
9. Reinstall sump pump cover has been removed in elevator #8.
10. Reinstall duct cover removed on elevator.

**Common Findings Passengers Elevators #9 - #20**

1. CAT5 test tags have out of date tests. Confirm dates, if overdue complete and install tag on controller doors.
2. Pit equipment is showing signs of rust. Clean and paint.
3. Clean and paint all rusted overhead equipment.
4. Clean and maintain uncovered hoistway entrance frames and doors. They are starting to show signs of rust.
5. Rough ride inside elevators. Check roller guides for flat spots. Recommend running elevators regularly to keep rollers round and smooth.
6. Cartops are not identified with code compliant numbers.
7. Pits are not identified with code compliant numbers.
8. Access key switches at the 2<sup>nd</sup> and 7<sup>th</sup> floor are exposed to outdoor elements and are showing signs of rusts. Clean

switches and stainless-steel door frames. Change switches as needed.

**Passenger Elevators #9, 10 and 11 (Express)**

1. #9 elevator has a rough ride. Identify and correct.
2. #10 elevator is making a squeaking noise when running at contract speed. Identify and correct.
3. #11 is making a noise when running at contract speed. Identify and correct.
4. Pits have debris and trash on floor. Clean pits.

**Passenger Elevators #12, #13 and #14 (Express)**

1. CAT1 Annual tests are overdue. Complete and install tags on controller door.
2. Pit lights out in bank. Building electrician to assist with troubleshooting.
3. Pits have debris and trash on floor. Clean pits.

**Passenger Elevators #15, #16 and #17 (Express)**

1. Mainline disconnects are not numbered.
2. Car light disconnects are missing signage and numbers.
3. Pit lights are out in all three pits. Building electrician to assist with trouble shooting.

**Passenger Elevators #18, #19 and #20 (Express)**

1. Mainline disconnects are not numbered.
2. Car light disconnects are missing signage and numbers.
3. Clean and paint all overhead equipment due to rusting.
4. Provide smooth and quiet operation in ride quality on all units. #20 is very rough. Suspect that due to long idle time the roller guides are getting flat spots. Run elevators regularly to eliminate this effect.
5. Clean and maintain uncovered hoistway entrance frames and doors. They are beginning to show signs of rust.
6. Provide legible "In Case of Fire Use Exit Stairs" signs.
7. Elevator #20 has a knocking noise when running at contract speed. Identify and correct.



8. #18 emergency phone is not operational.
9. #19 elevator car doors are not closing fully.

#### **Escalators Common Findings**

1. Written maintenance control program (MCP) documents are not available. Install and/or complete written MCP documents on all escalators.
2. Brake torque information not found posted on unit.
3. Annual testing data tag missing. Provide test dates and post a test tag on unit.
4. Install contrasting comb plates at top and bottom.
5. Complete a clean down and condition report.
6. Oil residual on steps.
7. Clean upper and lower end pans that have debris.
8. Check handrail pullout on all units.

#### **Escalator West - Short Unit**

1. The gap between the comb plates and the steps is in excess of 5mm. Reduce gap to less than 5mm on upper and lower floor plates.
2. Handrails have more than 200lbs pullout. Check and adjust to meet code.
3. Right side handrail has groove markings. Check drive sheave. Replace handrail as needed.
4. Wiring pulled loose from junction box in the lower end.
5. Right side handrail is damaged. Item has been written up for replacement.

#### **Escalator West - Long Unit**

1. Handrail pull out is set too high on right side handrail. Adjust pullout to meet code requirements.
2. Plastic skirt molding is missing on the left side and broken on the right. Replace both.

#### **Escalator East - Short Unit**

1. Perform clean down and condition report.
2. Install contrasting comb plates at top and bottom.

3. Upper end comb plates are in excess of 5mm to steps. Adjust by closing gap to under 5mm.

#### **Escalators East - Long Unit**

1. Upper end comb plates are in excess of 5mm to steps. Adjust by closing gap to under 5mm.
2. Escalator handrails have in excess of 200lbs pullout. Reduce to meet code requirements.
3. Install controller cover lower end.

#### **Building Operations Related Items**

1. Elevators #6 – #8 machine rooms middle row of fluorescent lights are not working.
2. Elevator #6 – #8 pits have standing water. Pit equipment including buffer stands, guide rails, and related are rusting. Recommend addressing water issue, clean pits, remove surface rust and paint equipment with rust inhibitor paint.
3. Pit lights not working in elevators #9 – #11 & #15 – #17.
4. Elevators #1 – #3 & #6 – #8 are very warm and uncomfortable to ride during operation. There are temporary fans mounted in rear of cab near ceiling. The fans are plugged into the car operating panel inspection station outlet. Doors are open. (Not code compliant)
5. Elevators #1 – #3 & #6 – #8 have extension cords laying on the cartop. This is a code violation. Recommend running 110 VAC wiring in electrical raceway on cartop.
6. Elevators #9 – #11 signage on 7<sup>th</sup> landing is illegible.
7. #1 elevator pit ladder is not safe to use. Too far from entrance, ladder is not high enough above floor level, and does not have a top rung. Replace ladder with a code compliant ladder.
8. No GFCI outlet in #1 pit.
9. Elevators #1 – #3 pits have surface rust on pit equipment. Clean and add inhibitor paint.
10. Freight elevator #4 1<sup>st</sup> landing bi-parting freight door panel has rust damage. Identify water issues and resolve. Monitor door damage. Repair will need to be completed at some point in the future.

CAPITAL EXPENSE MATRIX

Nissan Stadium Four Year Capital Plan						10%	10%	5%	4%	
						110%	121%	127%	132%	
						2023	2024	2025	2026	
Grouping	Subcategory 1	Subcategory 2	Priority	Frequency of repairs & replacement in years	Estimated Cost per occurrence in FY 2022 Dollars	Year 1	Year 2	Year 3	Year 4	Total Cost
MEP & Fire Protection	Mechanical Chilled Water	Chilled Water Pumps w/ VFDs	High	20	248,400	273,240	-	-	-	273,240
MEP & Fire Protection	Mechanical Chilled Water	Chilled Water / Hydronic Piping - System Flush	Moderate	One Time	-	-	-	-	-	-
MEP & Fire Protection	Mechanical Chilled Water	Chilled Water Insulation	Low	30	44,850	-	54,269	-	-	54,269
MEP & Fire Protection	Air Handlers	Chilled Water Air Handling Units (Service)	Moderate	20-25	340,860	187,473	206,220	-	-	393,693
MEP & Fire Protection	Air Handlers	Chilled Water Air Handling Units (Press)	Moderate	20-25	919,146	-	1,112,167	-	-	1,112,167
MEP & Fire Protection	Air Handlers	Computer Room Air Handling Units (CHW)	Moderate	20-25	89,321	-	108,078	-	-	108,078
MEP & Fire Protection	Air Handlers	Computer Room Air Handling Units (DX)	High	20-25	6,210	6,831	-	-	-	6,831
MEP & Fire Protection	Air Handlers	DX Air Handling Units (Elevators)	Low	15-20	41,400	-	-	52,599	-	52,599
MEP & Fire Protection	Air Handlers	DX Rooftop Units (Fan Accommodations, Ticket)	High	15-20	49,680	54,648	-	-	-	54,648
MEP & Fire Protection	Air Handlers	CHW Fan Coil Units	Low	25	34,673	-	-	44,051	-	44,051
MEP & Fire Protection	Mechanical Electric Heating	Baseboard Radiant Heaters	Low	25	3,133	-	-	3,980	-	3,980
MEP & Fire Protection	Mechanical Electric Heating	Cabinet Unit Heaters	Low	25	24,633	-	-	31,296	-	31,296
MEP & Fire Protection	Mechanical Electric Heating	Ceiling / Wall Unit Heaters	Low	25	17,250	-	-	21,916	-	21,916
MEP & Fire Protection	Mechanical Electric Heating	Fly Fan / Air Curtains	Low	25	10,178	-	-	12,931	-	12,931
MEP & Fire Protection	Misc. Ainside	Smoke Exhaust / Stair Pressurization Fans	High	25	165,600	91,080	100,188	-	-	191,268
MEP & Fire Protection	Misc. Ainside	Grease/Kitchen Exhaust Fans	High	25	26,013	14,307	15,738	-	-	30,045
MEP & Fire Protection	Misc. Ainside	General Exhaust Fans	Low	25	16,629	-	-	21,127	-	21,127
MEP & Fire Protection	Misc. Ainside	Vehicle Exhaust Fans	Low	25	6,900	-	-	8,766	-	8,766
MEP & Fire Protection	Misc. Ainside	CAV / VAV Boxes	Low	15-20	12,075	-	-	15,341	-	15,341
MEP & Fire Protection	Electrical	Upgrade Main Switchboards to Accept new Main, Tie & Branch Breakers	Very High	30+	2,691,000	1,480,050	1,628,055	-	-	3,108,105
MEP & Fire Protection	Fire Alarm	Replace Wall Mounted HND Fixtures on the Service Level w/ Quartz Resitika	High	15-20	113,850	11,385	-	-	-	11,385
MEP & Fire Protection	Fire Alarm	Replace Fire Alarm Cabling	High	One Time	345,000	379,500	-	-	-	379,500
MEP & Fire Protection	Fire Alarm	Replace Original Fire Alarm Sub-Panels & Recertification of System	High	15-20	48,300	53,130	-	-	-	53,130
MEP & Fire Protection	Fire Alarm	Address Horn/Strobe Synchronization Issues	High	One Time	51,750	56,925	-	-	-	56,925
MEP & Fire Protection	Lighting	Replace Wall Sconce Fixtures in Suite Area Corridors - Press Level	Medium	15-20	19,734	-	23,878	-	-	23,878
MEP & Fire Protection	Lighting	Replace Wall Sconce Fixtures in Suite Area Corridors - Lower Suite Level	Medium	15-20	75,348	-	91,171	-	-	91,171
MEP & Fire Protection	Lighting	Replace Wall Sconce Fixtures in Suite Area Corridors - Upper Suite Level	Medium	15-20	75,348	-	91,171	-	-	91,171
MEP & Fire Protection	Electrical Rooms	Replace PVC Jacketed Metal Clad Cables	Medium	20	310,500	-	375,705	-	-	375,705
MEP & Fire Protection	Plumbing	Replacing Domestic Water Galvanized Iron with Stainless Steel Piping	Very High	20-25	4,582,704	2,520,487	2,772,536	-	-	5,293,023
MEP & Fire Protection	Plumbing	Provide Backflow Preventer at Each Chemical Dispenser	High	20	60,375	66,413	-	-	-	66,413
MEP & Fire Protection	Plumbing	Dielectric / Transition Fittings Replacement for Domestic Water	High	20	224,250	246,675	-	-	-	246,675
MEP & Fire Protection	Plumbing	Provide Heat Trace on Exposed PVC	Medium	20	39,744	-	48,090	-	-	48,090
MEP & Fire Protection	Plumbing	Providing Shutoff Valves for Domestic Water Controllability	Medium	20-25	463,680	-	561,053	-	-	561,053
MEP & Fire Protection	Plumbing	Deterioration and Replacement of Flush Valves	Medium	10	120,750	-	146,108	-	-	146,108
MEP & Fire Protection	Plumbing	Auxiliary Condensate from Mechanical Units	Medium	15	274,482	-	332,123	-	-	332,123
MEP & Fire Protection	Plumbing	Sewage Ejector Updates	Medium	15	22,080	-	26,717	-	-	26,717
MEP & Fire Protection	Plumbing	Shutdown Master Mixing Valve Assemblies	Low	15	34,500	-	-	43,832	-	43,832
MEP & Fire Protection	Plumbing	Replace Grease Interceptor Manhole Covers	Low	20-25	6,900	-	-	8,766	-	8,766
MEP & Fire Protection	Plumbing	Fire Proofing for Plumbing Penetrations	Low	One Time	3,450	-	-	4,383	-	4,383
MEP & Fire Protection						-	-	-	-	-
<b>MEP &amp; Fire Protection - Total</b>						<b>5,442,144</b>	<b>7,693,266</b>	<b>268,990</b>	<b>-</b>	<b>13,404,400</b>
Structure		Replacement of Cast-in Place Concrete Steps at Seating Bowl	High	As Required	483,000	531,300	584,430	613,652	638,198	2,367,579
Structure		Precast stadia / double tee spall repairs	High	As Required	96,600	106,260	116,886	122,730	127,640	473,516
Structure		Crack routing/sealing at stadia units	Medium	As Required	27,600	30,360	33,396	35,066	36,468	135,290
Structure		Loading Dock Overhead Slab Crack Investigation	Low	One time if conditions deteriorate	69,000	-	83,490	-	-	83,490
Structure		New Weep Holes Scoreboard/Signage Girt	Medium	One Time	8,280	-	-	10,520	-	10,520
Structure		Install spacer bolts at scoreboard double angle bracing	Medium	One Time	16,560	-	-	21,039	-	21,039
Structure		Access Ramp Metal Deck Removal and Replacement	Medium	One time if conditions deteriorate	220,800	-	-	280,526	-	280,526
Structure		Sealing Cracks in CMU Vomitory Walls	Medium	One Time	27,600	-	-	35,066	-	35,066
Structure						-	-	-	-	-
<b>Structure - Total</b>						<b>667,920</b>	<b>818,202</b>	<b>1,118,599</b>	<b>802,306</b>	<b>3,407,027</b>





# Facility Condition Assessment Nissan Stadium

Nissan Stadium Four Year Capital Plan						10%	10%	5%	4%	Total Cost	
						110%	121%	127%	132%		
Grouping	Subcategory 1	Subcategory 2	Priority	Frequency of repairs & replacement in years	Estimated Cost per occurrence in FY 2022 Dollars	2023	2024	2025	2026		
Technology	Bowl Audio System	Digital Signal Processing (DSP)	High	8-10	252,150	277,365	-	-	-	277,365	
Technology	Distributed TV System	Routine TV Replacement & RF Modulated Cable System Maintenance	Medium	7-10	123,000	135,300	148,830	156,272	162,522	602,924	
Technology	Club Systems	(4) LED Displays & Local Connectivity	Low	8-9	1,050,420	-	-	-	693,970	693,970	
Technology	Interview Room System	AV Technology Updates	Low	9-12	108,732	-	-	-	143,670	143,670	
Technology	Video Production	Router Core Controller	High	8-9	67,650	74,415	-	-	-	74,415	
Technology	LED Displays	Endzone Displays	Very High	8-9	8,917,500	9,809,250	-	-	-	9,809,250	
Technology	Data Infrastructure	Telecom Room UPS & Power Distribution	High	7-10	135,300	148,830	-	-	-	148,830	
Technology	Security	Video Surveillance Cameras	Medium	6-10	1,230,000	-	744,150	781,358	-	1,525,508	
Technology	Security	Video Network Equipment	High	5-6	49,200	54,120	-	-	-	54,120	
Technology	Security	Security Control Room Video Wall System	Medium	7-8	67,650	-	-	85,949	-	85,949	
Technology						-	-	-	-	-	
<b>Technology - Total</b>						<b>10,499,280</b>	<b>892,980</b>	<b>1,023,578</b>	<b>1,000,163</b>	<b>13,416,001</b>	
Vertical Transportation	Modernization	Passenger Elevator #1	High	20-25	448,500	49,335	-	569,819	-	619,154	
Vertical Transportation	Modernization	Passenger Elevator #2	High	20-25	448,500	49,335	-	569,819	-	619,154	
Vertical Transportation	Modernization	Passenger Elevator #3	High	20-25	448,500	49,335	-	569,819	-	619,154	
Vertical Transportation	Modernization	Freight Elevator #4	Medium	20-25	690,000	-	-	-	-	-	
Vertical Transportation	Modernization	Freight Elevator #5	Medium	20-25	690,000	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #6	High	20-25	448,500	49,335	-	569,819	-	619,154	
Vertical Transportation	Modernization	Passenger Elevator #7	High	20-25	448,500	49,335	-	569,819	-	619,154	
Vertical Transportation	Modernization	Passenger Elevator #8	High	20-25	448,500	49,335	-	569,819	-	619,154	
Vertical Transportation	Modernization	Passenger Elevator #9	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #10	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #11	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #12	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #13	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #14	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #15	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #16	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #17	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #18	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #19	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Passenger Elevator #20	Low	10-15	427,800	-	-	-	-	-	
Vertical Transportation	Modernization	Escalator ESC1 - West Short	High	20-25	552,000	3,000	-	701,316	-	704,316	
Vertical Transportation	Modernization	Escalator ESC2 - West Long	High	20-25	690,000	3,000	-	876,645	-	879,645	
Vertical Transportation	Modernization	Escalator ESC3 - East Short	High	20-25	552,000	3,000	-	701,316	-	704,316	
Vertical Transportation	Modernization	Escalator ESC4 - East Long	High	20-25	690,000	3,000	-	876,645	-	879,645	
Vertical Transportation						-	-	-	-	-	
<b>Vertical Transportation - Total</b>						<b>308,010</b>	<b>-</b>	<b>6,574,838</b>	<b>-</b>	<b>6,882,848</b>	
<b>TOTAL</b>						<b>Years 2023-2026</b>	<b>\$ 16,917,354</b>	<b>\$ 9,404,448</b>	<b>\$ 8,986,005</b>	<b>\$ 1,802,468</b>	<b>\$ 37,110,275</b>
						<b>MEP &amp; Fire Protection</b>	<b>\$ 5,442,144</b>	<b>\$ 7,693,266</b>	<b>\$ 268,990</b>	<b>\$ -</b>	<b>\$ 13,404,400</b>
						<b>Structure</b>	<b>\$ 667,920</b>	<b>\$ 818,202</b>	<b>\$ 1,118,599</b>	<b>\$ 802,306</b>	<b>\$ 3,407,027</b>
						<b>Technology</b>	<b>\$ 10,499,280</b>	<b>\$ 892,980</b>	<b>\$ 1,023,578</b>	<b>\$ 1,000,163</b>	<b>\$ 13,416,001</b>
						<b>Vertical Transportation</b>	<b>\$ 308,010</b>	<b>\$ -</b>	<b>\$ 6,574,838</b>	<b>\$ -</b>	<b>\$ 6,882,848</b>
						<b>\$ 16,917,354</b>	<b>\$ 9,404,448</b>	<b>\$ 8,986,005</b>	<b>\$ 1,802,468</b>	<b>\$ 37,110,275</b>	