



UNIVERSITY OF WISCONSIN - MADISON

**CAMP RANDALL SOUTH END ZONE RENOVATION
FEASIBILITY STUDY - EXTENDED**

OCTOBER 2019





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TEAM DIRECTORY

PREPARED FOR:

The Division of Intercollegiate Athletics at the University of Wisconsin-Madison
University of Wisconsin-Madison
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1440 Monroe Street
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UNIVERSITY OF WISCONSIN-MADISON

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SECTION / 01

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

GOALS AND OBJECTIVES

The south side of the seating bowl provides great opportunities to maximize synergies to the UW Field House and provide new choices for premium seating to provide memorable game-day experiences that entice patrons to arrive early and stay late. This becomes an economical alternative to major work on the west side of Camp Randall Stadium.

PREMIUM SEATING OPTIONS STUDIED INCLUDE:

- Field Level Loge Boxes
- Ledge Seating
- Covered Hospitality Area
- Covered Loge Boxes
- Club Seating
- Two-story Premium Club with Mezzanine
- Party Deck / Upper Terrace

EXISTING CONDITIONS



EXTENTS OF DEMOLITION



EXECUTIVE SUMMARY

2019 DESIGN ALTERNATIVE







SECTION / 02

SEATING AND PREMIUM SPACE



SEATING AND PREMIUM SPACE

PRODUCT MATRIX



Existing Sections Y3,YZ,Z3,Z2*



2019 Alternative Design

6559	1548	Total Seats with Club Access	Seating Statistics
0	1316	Total Seats without Club Access	
6559	2864	Total Seats	
	3695	Total Seat Loss from Existing	
0	4500	Indoor Field Club (net sq.ft.)	Field Level
-	1750	Outdoor Field Club (net sq.ft.)	
0	236	Club Seats (Ledge Seats)	
0	8	Loge Boxes	
0	32	Loge Seats	
-	68	Chairback Seats without Club Access	
0	268	Total Patrons with Club Access	
-	23	net sq.ft./patron	
-	4800	Open-Air Hospitality Club (net sq.ft.)	Concourse Level
0	400	Suggested Capacity	
-	12	net sq.ft./patron	
-	11000	Club (net sq.ft.)	Club Level
0	456	Club Seats (Chairback)	
0	642	Chairback Seats with option to access to Hospitality Club	
-	456	Total Patrons with Club Access	
-	24	net sq.ft./patron	
-	5000	Mezzanine Club (net sq.ft.)	Club Mezzanine Level
0	44	Loge Boxes	
0	182	Loge Seats	
-	182	Total Patrons with Club Access	
-	27	net sq.ft./patron	
0	1248	Chairback Seats without Club Access	Upper Terrace Level
-	8000	Outdoor Deck (net sq.ft.)	

* All existing seats are bench seats without chairback.



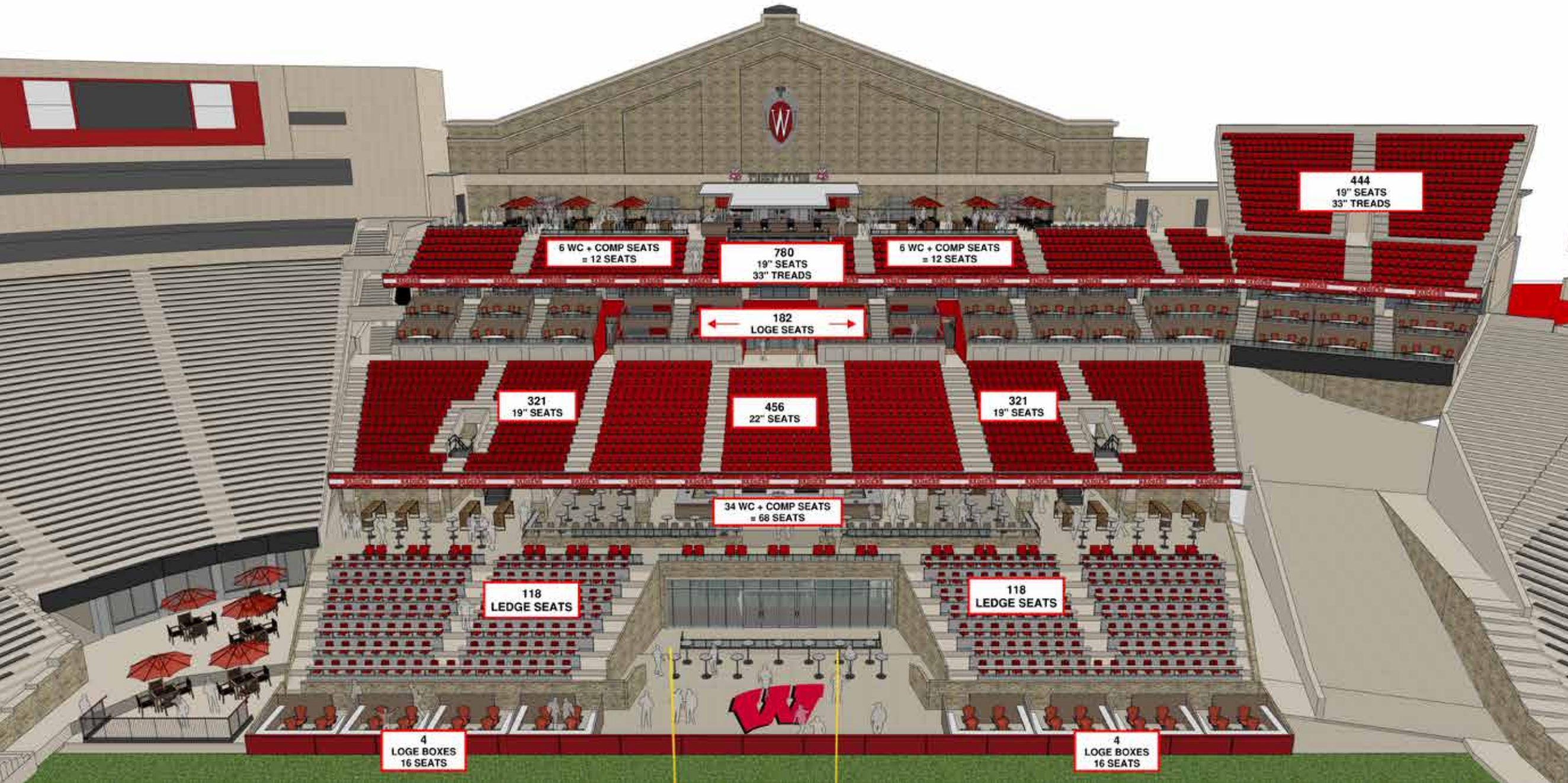


SECTION / 03

2019 DESIGN ALTERNATIVE

2019 DESIGN ALTERNATIVE

SEATING DIAGRAM



2019 DESIGN ALTERNATIVE

SECTION PERSPECTIVE



2019 DESIGN ALTERNATIVE

FIELD LEVEL PLAN



2019 DESIGN ALTERNATIVE

CONCOURSE LEVEL PLAN



2019 DESIGN ALTERNATIVE

CLUB LEVEL PLAN



2019 DESIGN ALTERNATIVE

CLUB MEZZANINE LEVEL PLAN



2019 DESIGN ALTERNATIVE

TERRACE LEVEL PLAN



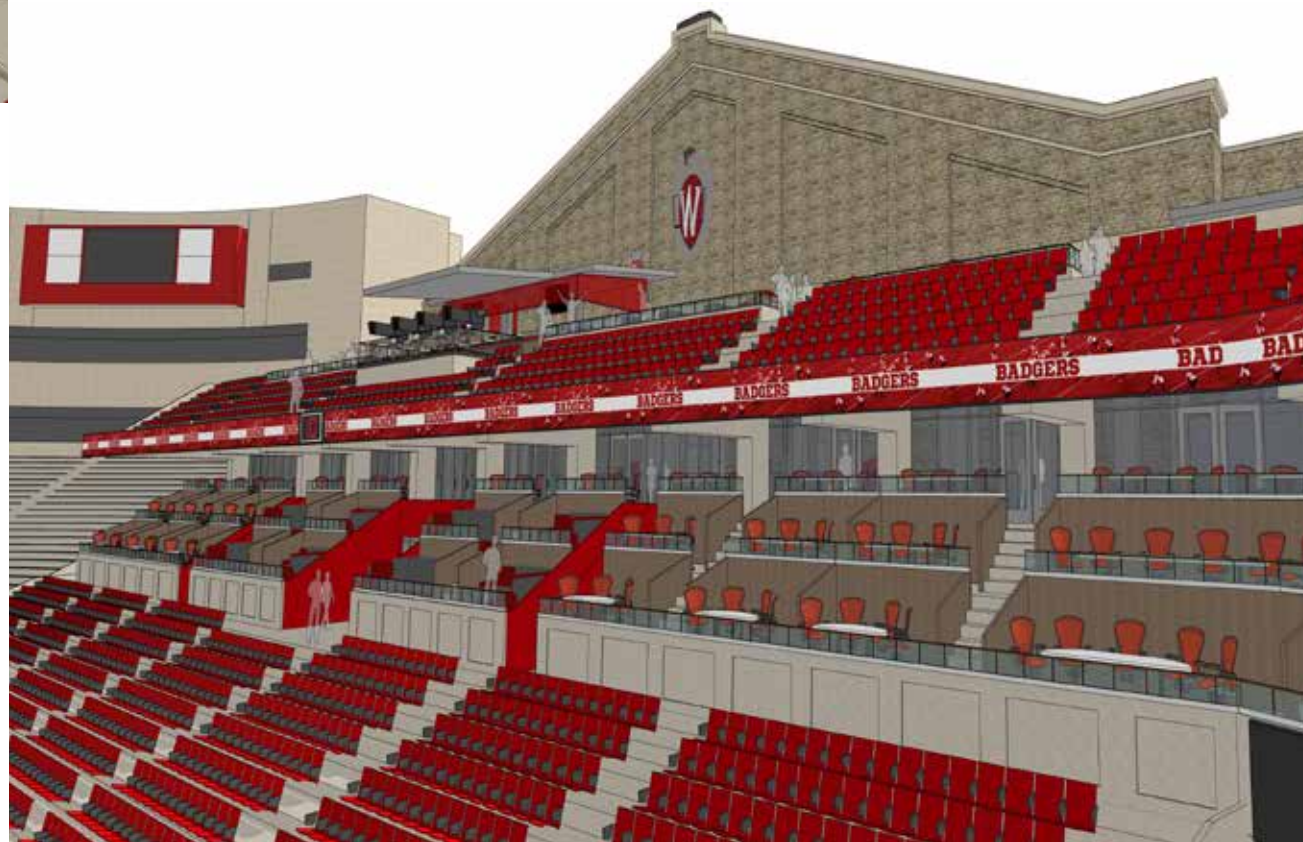
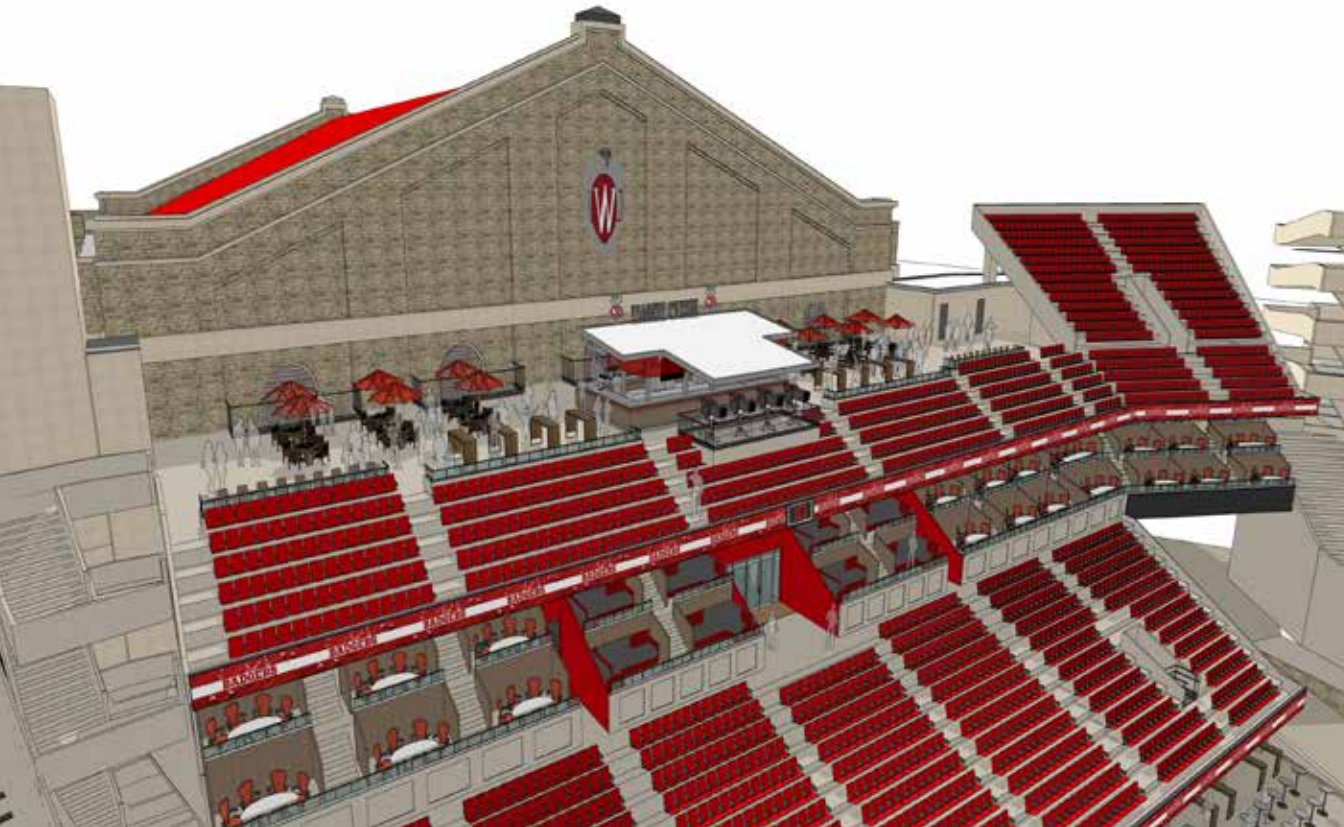
2019 DESIGN ALTERNATIVE

UPPER SEATING LEVEL PLAN



2019 DESIGN ALTERNATIVE

UPPER TERRACE LEVEL



2019 DESIGN ALTERNATIVE

FIELD LEVEL LOGE BOXES / LEDGE SEATING / FIELD LEVEL CLUB



2019 DESIGN ALTERNATIVE

CONCOURSE LEVEL / HOSPITALITY AREA ENTRY



2019 DESIGN ALTERNATIVE

OPEN-AIR HOSPITALITY AREA



2019 DESIGN ALTERNATIVE

AERIAL VIEW



2019 DESIGN ALTERNATIVE

UPPER TERRACE LEVEL







SECTION / 04

SYSTEM NARRATIVES

ELECTRICAL SYSTEMS NARRATIVE

OVERVIEW

This project consists of a renovation of the south end zone field, infrastructure, terrace and concourse area at Camp Randall Stadium. Power for the south end of the stadium is from the Kellner Hall substation located in the basement. Data for the stadium is from the MDF located in the basement of Kellner Hall. The existing power, signal and broadcast duct banks/ cabling will be relocated and replaced due to the construction of the field club on the field. The existing Video Booth and Score Clock systems will require relocation as well. New normal and emergency power panels will be needed. Lighting will use LED fixtures. New power outlets and mechanical connections will be provided. A new TR/IDF will be constructed on the west side of the new field club to support the new infrastructure. New voice and data outlets will be provided as requested by owner. The existing cable tray on the 3rd level concourse will be relocated into the fieldhouse.

The roof of the second-floor mechanical room will be removed and the area temporarily protected until the new roof structure is established. Existing conduits, fire alarm and lighting will need to be re-worked from the ceiling to the walls for demolition and to allow connections to the existing structural beams. Operation of the existing equipment should not be affected.

SUSTAINABLE INITIATIVES

The project will be designed to conform to the requirements of the IECC 2009 Energy Code. Energy efficient LED fixtures shall be specified to optimize the lumens per watt of the lighting system.

DEMOLITION

Existing light fixtures, ceiling/wall mounted electrical devices, data/voice outlets and systems located within the concourse/concession areas shall be removed and/or relocated as required to accommodate the renovation work of the project. The existing video, broadband and score clock equipment near and within the booth will require removal/revisions/relocations. Existing IPTV, WIFI devices and DAS transmitters/receivers will be removed and salvaged for reinstallation. Fire alarm devices will be removed in the areas of demolition. Existing mechanical equipment being removed will be electrically disconnected along with associated disconnects, starters and controls.

NEW WORK

The existing normal and emergency power distribution panels on the second level of the end zone are not adequate to support the new loads. Provide a new breaker in the Kellner Hall electrical vault and extend a circuit to a new 480V panel to be located in the second-floor mechanical room. For each of the new club spaces provide a new 200A panel with transformers to 120/208. For emergency power there appears to be available breakers in panels MDPX/HA (480V) and BC2X/LA (120V).

As far as we know there are no main feeders in conflict with the renovation/demolition. Underground duct-banks are located in the driveway and must be protected from heavy loads. 480V power will be extended for HVAC loads (air units and exhaust fans).

The expansion onto the field at the south end zone will disrupt the 480 V. power feeders, conduits and pull boxes going out to the 120/208 V. transformers on the field near the 20's. There is a 200-pair copper line from Section J onto the field, 50 pair at each 50-yard line (East and West) and 12 pairs to each 20-yard line (East and West). There are fiber cables from the A & O building onto the field, 12 to the east 50 and 24 to the West 50-yard line. There are MIC lines/conduits which may be disrupted. There is an existing manhole at the south end zone which has some of the fiber and copper cabling mentioned above which will be disrupted and reinstalled. All wiring will be pulled back to the AO building, box conduits re-established and feeds re-pulled back to the sources.

New fixtures specified within the project will be provided with energy-efficient LED sources to optimize the fixture lumens/watt. Dimming will be provided as required or requested and where feasible in all rooms to provide greater occupant controllability. Occupancy sensors will be provided as required for automatic shut-off of fixtures.

Emergency egress light fixtures and exit signs will be circuited to the Emergency Life Safety Branch Panel in the area as required by code.

Exterior building-mounted fixtures will be specified with full cutoff optics to minimize light pollution. The fixtures will be placed on the site as required to conform to campus standards for average illumination levels of the area. Fixtures will be controlled through photocell and timeclock functions to optimize the operation schedule.

The owner's standards for devices shall be maintained. General purpose, convenience duplex receptacles will be installed as required by code or requested by owner. All outlets will be identified per facility standards. Special outlet devices will be provided as required or requested. New electrical connections will be provided to all mechanical and plumbing equipment/loads and associated controls. New owner furnished equipment loads will be connected.

A new data/voice room(TR/IDF) will be provided with service entrance conduit sleeves, racks, patch panels, cabling and supports near the south west side of the stadium. Data/voice and TV outlets will be provided per owner's request. Some of the existing Data Room/IDF's will be utilized as well depending on circuit

ELECTRICAL SYSTEMS NARRATIVE

location. As mentioned in the demolition section, the Video booth and TV equipment above the booth will be relocated to the new terrace area. The conduit sleeves from the 3rd floor concourse tray up to the booth will need to be replaced. The Score Clock will be relocated and additional clocks will be required as to have two clocks at each of the north and south end zones.

The new cable trays installed recently at the first-floor concourse will be reinstalled. All circuits and devices will be reestablished. They serve IPTV's, WiFi and DAS. The third-floor concourse has two 24" wide cable trays which will be relocated into the fieldhouse. Protection and continuity of these cables is critical. There are splice plates in locations which will accommodate the required revisions.

The existing card access control and security camera systems will be expanded into the project areas as directed by owner. The existing fire alarm system will be expanded into the project areas per NFPA 72.

The concession stands at first floor concourse are served from Panel BD1/LB, located in the center main concession space. This panel, can be re-utilized to serve new concession loads. The four concession stands will be reestablished as-is. A new serving area will be provided for the new club area. Load will be provided for new kitchen equipment.

New turf and infrastructure will be provided on the football field. New ductbanks will be extend on the north to complete a ring around the field. Manholes will be provided and new electrical, data and broadcast panels added to the north and south ends of the field.

PRESS BOX

The 9th level will remain as-is. On the 8th level, power and data wiremold will be reworked for the 150 press seats. New lighting and general power outlets will be provided. Existing fire alarm, DAS, IPTV and WiFi will be reworked in the ceiling. The electrical panel in the corridor will be replaced and circuits re-established. On the 7th level, the cable tray in the corridor will need to be replaced and raised. Re-circuit existing devices. New lighting in all room and corridor. Fire alarm, DAS and WiFi will be reworked. New light fixtures will be placed on the site as required to conform to campus standards for average illumination levels of the area. Fixtures will be controlled through photocell and timeclock functions to optimize the operation schedule.

FIRE PROTECTION NARRATIVE

OVERVIEW

In general, the work will consist of a renovation of the south end zone field, infrastructure, terrace and concourse area at Camp Randall. There is a fire pump that serves the stadium, located in the east concourse on first level. There is an existing main that runs around the entire stadium on third/second level. The main has capacity for extension to new heads to serve the renovation. The roof of the second-floor mechanical room will be removed and the area temporarily protected until the new roof structure is established. Existing piping will need to be removed for the site 8 demo and then re-established to the new structure. Operation of the existing equipment should not be affected. Design and installation of the fire protection system shall be in compliance with NFPA 13, NFPA 14, and in addition to state and local codes.

DEMOLITION

Connections to the existing sprinkler system serving existing areas to remain may require shut-downs. The shut-downs may require alternative means of fire protection, and/or a fire watch to be provided at the affected areas during times when the sprinkler system is not operational. The existing site 7 and 8 areas effected by the structure demolition will need to be removed. The main loop will need to be capped at the south-west corner and at the second-floor mechanical room. The section of main in site 8 will need to be removed. The system will not operate as a looped system during this time. There is a dry valve sprinkler and standpipe system to be removed for the first and third level concourses.

NEW WORK

The existing area of building where the renovation is taking place is currently sprinkled. New connections to fire protection mains will be made, and new mains run throughout the project area. A new dry sprinkler system will be added to serve the Terrace, concourse and Loge seating areas. Provide new zone control assemblies with butterfly valve, flow and tamper switches as-required for the dry sprinkler and standpipe systems. Existing air compressors can remain. New hose valves and cabinets are needed every 250ft. New sprinkler heads will be installed, in coordination with other trades, in the center of ceiling tiles. Sprinkler heads will be quick response, concealed heads with painted white cover plates. Sprinkler heads in exposed areas to be upright heads. Piping to be black steel, type F, Grade A, ASTM A53, schedule 40 and galvanized in exterior areas. All products will be FM Global approved.

PRESS BOX

The 9th level will remain as-is. On the 8th level the existing piping and heads will be removed and replaced with new to fit the room layouts and ceilings. On the 7th level the existing piping and heads will be removed and replaced with new to fit the room layouts.

HVAC SYSTEMS NARRATIVE

OVERVIEW

In general, the work will consist of a renovation of the south end zone field, infrastructure, terrace and concourse area at Camp Randall. There are two main mechanical rooms that serve the stadium. The south end zone has steam, chilled water and hot water distributed from the basement of Kellner hall. The glycol hot water system is distributed from the north-east mechanical room. The air units that serve the field house and the south end zone are located in the second floor of the south end zone. Existing utilities are available for extension to new equipment to serve the renovation. The roof of the second-floor mechanical room will be removed and the area temporarily protected until the new roof structure is established. Existing piping and ductwork will need to be temporary supported from the floor and then reestablished to the new structure. Operation of the existing equipment should not be affected.

SUSTAINABLE INITIATIVES

Existing ductwork, piping and other systems to be remodeled will be removed from the site and recycled in accordance with local recycling practices in order to reduce the impact of the construction waste on the local environment. System service interruptions due to demolition activities will be pre-scheduled between the contractor and owner to coordinate the best timing. New HVAC systems being installed for the remodeling will be designed to minimize energy usage and meet or exceed the baseline energy performance requirements of the International Energy Code, DFD Standards and ASHRAE standard 90.1. Ventilation systems will be designed to meet or exceed the requirements set forth in ASHRAE standard 62.1, Ventilation for Acceptable Indoor Air Quality. Heat recovery systems will be employed where possible to minimize the energy penalty of increased ventilation. New air handling units will be selected as fully customizable units to match facility standards, and will utilize building steam for heating and humidification, chilled water for cooling, plenum fan walls, and high-level filtration systems (MERV 13).

Thermal comfort for each zone is evaluated against ASHRAE standard 55, Thermal Environmental Conditions for Human Occupancy. Individual zone temperature will be monitored and controlled by the occupant. Where it makes sense, rooms with similar climates will be grouped together onto a single zone.

The existing building automation system (BAS) will be extended to integrate the new equipment and controllers installed in the renovated spaces. The system will be electronic with DDC controls and will integrate any existing pneumatic equipment left after the remodeling into the new electronic system. All new equipment and zones will be integrated into the BAS for monitoring, alarm reporting and adjusting by facility staff. Proper ventilation is critical to a healthy environment. To aid in managing

and maintaining proper ventilation levels, outdoor air monitoring stations will be provided for new variable air volume systems and will be interlocked with the building automation system to adjust dampers as the system changes. During construction, an indoor air quality management plan will be specified to protect the HVAC system and adjacent occupied areas, maintaining a healthy environment for workers and building occupants as the remodeling takes place. At the end of construction all new air systems and modified systems will be balanced to ensure proper ventilation is provided in accordance with the design.

DEMOLITION

On first level south endzone the glycol piping along with the heating and ventilation in the four concession stands will be removed. On second floor there is minimal demo. Provide for protection of the existing ducts, piping and ventilation equipment. On third floor the air intakes for the three large and two small air units will need to be revised/raised/relocated for protection and may need to be extended due to construction fumes.

NEW WORK

The field club will need a new air unit to serve the new space. The unit will be a single zone VAV system with coils arranged for heating, cooling and (dehumidification)reheat inside the air unit. A mechanical room will be provided in the club space, preferably to the west. A return fan is not needed due to a single zone system. Glycol Hot Water and chilled water will be extended from the second-floor mechanical room. An exhaust fan provided for toilet rooms.

The new terrace/logge club will need a new air unit to serve the new space. A return fan is not needed if this is a single zone system. The unit will be a VAV system with coils arranged for heating and cooling inside the air unit. There is space on the east side of the second-floor mechanical room that could support a new AHU. Some ductwork reconfiguration is needed. Steam and chilled water are located in the second-floor mechanical room for use. VAV reheat boxes used for the spaces.

The kitchen and support space will have a supply duct extended from the new air unit serving the logge space and a new exhaust fan to support code required exhaust. It is expected that the kitchen will be a serving type space. VAV boxes with reheat coils will be used.

All spaces will have radiation to cover the unoccupied load so the air unit can be shut-off.

6in CWS/CWR should be extended from the main valves at the east side of the mechanical room through the room to the west, for connections to the two new air units and also for future cooling of the two large fieldhouse air units. Pipe capacities are adequate for the new loads. An 10in Low-Pressure Steam main exists in the mechanical room to support the new loads. Hot water will need to be extended from the 4in mains on the east side.

HVAC SYSTEMS NARRATIVE

(CONTINUED)

The 1.25in glycol heating pipes will be removed to the Kellner hall and new 2in pipes extended to serve the south end concession and clubs. The glycol piping serving Bucky's locker reheat coils will be changed to the hot water system (non-glycol).

The field house restoration will have air conditioning added to the two existing air units. Chilled water is existing. VFD's will be added to the three units to maintain humidity levels. There will be two small air units added to the south end for supplemental cooling. Chilled water will be extended from the mechanical room in the lower level of Kellner hall.

New turf and infrastructure will be provided on the football field. Gas piping will be extended to the sidelines from the south-west corner to each sideline for future use to replace the propane tanks.

The exterior/covered loge boxes will have gas-fired radiant heaters (below the new patio) as a client service amenity.

If an exterior/covered hospitality area is used then gas-fired radiant heaters will be used.

Controls will extend the existing JCI DDC system and utilize electronic devices for all HVAC equipment. The system will be upgraded to a BACnet controller.

With the addition of the new air units the fire command panel in the AO building needs to be replaced to a BACnet compatible panel.

The new IDF room will require a self-contained A/C unit for cooling.

PRESS BOX

The 9th level will remain as-is. On the 8th level the existing gas fired 100% OA air unit be replaced with a new exterior modular unit with heating and cooling coils. Existing glycol hot water and chilled water will be extended from adjacent risers. Blower coil units will be located in the ceiling to provide supplemental cooling of the area with ducted supply and return. Slot diffuser will be located at the windows. Chilled and hot water piping will be extended from existing risers to the north. The main supply duct will be replaced to fit into the new ceiling layouts. Exhaust fans will be replaced that serve the toilet and concession spaces. Radiation units will be provided for back of house spaces.

On the 7th level the press boxes will have new electric finned tube units. The exhaust will be replaced

to serve the toilet rooms. The corridor will have heating and ventilation for the new enclosed space. Hot water (glycol) will be extended from the existing risers.

INTERIOR DESIGN NARRATIVE

OVERVIEW

Interior materials and finishes will be selected based on the Camp Randall Stadium color and finish standards. If additional materials and finishes are required beyond the standards developed, suggestions will be made which are compatible with and extend the standards.

SUSTAINABLE INITIATIVES

Material evaluation will be made based on cost effectiveness, performance attributes, and environmental features. Priority will be given to materials that are locally sourced or supplied, that contain recycled content, and which take into account the ability of the material itself to be recycled into a quality product.

Selection of adhesives and sealants will be low-VOC to meet SCAQMD Rule 1168. Paints and coatings will be low-VOC content to meet Green Seal Standard GS-11 and SCAQMD Rule 1113. Wood and agri-fiber products will be specified to contain no added urea formaldehyde. Carpet selections will be made from those on the Green Label Plus program. Hard floors will be selected from those certified to meet the FloorScore standard or other environmental testing standard. Entry/Vestibules will be planned to incorporate a walk-off flooring system to control environmental contamination.

NEW WORK

The floor, wall and ceiling finishes will be smooth and easy to maintain. Casework will be plastic laminate with solid surface tops. Corner guards will be stainless steel. Red accent paint will be "Under Armor Red".

Interior End Zone Club Suites

Carpet tile with rubber base will be planned for the general flooring with luxury vinyl tile or porcelain floor tile at food and beverage serving areas. Walls will be planned to be painted gypsum board with wall graphic at large wall expanses. Ceilings will be finished with acoustical ceiling tile and painted gypsum board.

Toilet Rooms will be planned with porcelain tile at floors and fixture walls, and wainscot at the remainder of the walls with painted gypsum board above. Ceilings will be planned with acoustical ceiling tile. Stainless steel will be planned for toilet partitions.

PRESS BOX

7th Level: Booth Rooms will be planned with carpet tile, rubber base, painted gypsum board walls and acoustical ceiling tile. Circulation areas will be planned with rubber tile or broadcast quartz flooring,

rubber base, painted walls, and exposed structure ceilings.

Toilet Rooms will be planned with porcelain tile at floors and fixture walls, and painted gypsum board at the remainder of the walls. Ceilings will be planned with acoustical ceiling tile. Solid plastic will be planned for toilet partitions.

8th Level:

Carpet tile with rubber base will be planned for the general flooring with luxury vinyl tile or porcelain floor tile at food and beverage serving areas. Walls will be planned to be painted gypsum board with wall graphics planned at large wall expanses. Ceilings will be finished with acoustical ceiling tile and painted gypsum board.

Toilet Rooms will be planned with porcelain tile at floors and fixture walls, and painted gypsum board at the remainder of the walls. Ceilings will be planned with acoustical ceiling tile. Stainless steel will be planned for toilet partitions.

9th Level:

Window sill counter tops will be replaced with solid surface tops.

Basis of Finish Materials Selections

- Carpet Tile – Mohawk, Renegade Collection
- Carpet Tile Motion W accent – Mohawk Colorbeat, 996 Black Bean / 353 Tango
- Rubber Tile – Mondo, Zeus Tile with PU105 Adhesive
- Luxury Vinyl Tile – Armstrong, Natural Creations Mystic Collection
- Porcelain Tile – Flaviker, Urban Concrete, 12x24 floors, 12x24 & 6x24 walls
- Rubber Base – 4" Coved Rubber
- Solid Surface – Corian, Group "C"

PLUMBING SYSTEMS NARRATIVE

OVERVIEW

In general, the work will consist of a renovation of the south end zone field, infrastructure, terrace and concourse area at Camp Randall. The south end of the stadium and the fieldhouse has (steam) water heaters with recirculation pumps located on second level. City water distribution is from the basement of Kellner hall. The sanitary and storm piping flow from the south stadium area from west to east toward Kellner Hall. Existing utilities are available for extension to new equipment to serve the renovation. The roof of the second-floor mechanical room will be removed and the area temporarily protected until the new roof structure is established. Existing piping will need to be temporary supported from the floor and then reestablished to the new structure. Operation of the existing equipment should not be affected.

SUSTAINABLE INITIATIVES

New water closets shall utilize dual flush valves. New faucets shall incorporate low flow aerators. Water and storm piping will be insulated with glass fiber insulation.

DEMOLITION

Existing fixtures and piping serving the four concession stands will be removed. Sanitary and cold water is fed from the second floor mech room. Hot water is from electric heaters in each space.

Storm, subsoil drainage and water piping in the playing field will be revised. (16) storm inlets/runouts on the east and west will be removed and replaced. Piping is clay tile and is collapsing.

Sanitary, water, storm piping (catch basins, trench drains) in the south end zone Concourse levels to be rerouted as required for seat demolition, new footings/piling. Stadium to remain operational during construction. Provide temporary piping and additional isolation valves as required for piping shutdowns and to maintain the south end-zone locker rooms.

NEW WORK

All new toilet rooms shall incorporate ADA accessible fixtures as required per code. New toilets will be located for the field and loge club areas. New water closets shall be vitreous china with dual flush 1.6/1.1 gpf valves. Lavatories will be vitreous china with low flow faucet controls. Sinks to be stainless steel set in a solid surface countertop.

Extend water distribution including sanitary piping to the new serving kitchen. Equipment has yet to be identified. Provide winterization of utilities as necessary.

Fixtures and equipment in the four concession stands will need to be removed and replaced as-is. Extend hot, cold and recirculation from second floor to new concessions (do not use elect heaters). Provide winterization of utilities. The CO2 piping for the soda machines will need to be removed and replaced. This work may be done by the beverage vendor.

Provide non-freeze sill faucet(s) at several locations, including Toilet rooms and the Terrace for cleaning.

Provide water, drain connections for Owners' equipment. Backflow prevention to be included for beverage dispensers, ice machines and HVAC equipment.

Existing roof conductors and storm piping will be re-routed as required to coordinate with the new plan. Provide new storm water drainage for the Terrace area. Provide new sanitary/vent and water piping for new Toilet rooms.

New lines will be connected to existing campus mains. Water distribution is from the second-floor mechanical room. Existing plumbing equipment appears adequate to support the proposed remodeling.

Water piping lines shall be type "L" copper piping. Sanitary, vent and storm piping shall be hub-less cast iron with no-hub couplings. Water and storm piping shall be insulated with glass fiber insulation.

All plumbing work to comply with Wisconsin plumbing Code, International Plumbing Code and state or local codes.

(16) new storm manholes and inlets will be needed for the east and west field. Existing mains are adequate to support the new run-outs. An additional water line will be located on the field. Existing backflow valves will be relocated.

PRESS BOX

The 9th level will remain as-is. On the 8th level the toilet rooms and concession areas will have new fixtures. Reuse existing mains. On the 7th level the toilet rooms and concession areas will have new fixtures. Reuse existing mains.

STRUCTURAL SYSTEMS NARRATIVE

CODES AND STANDARDS

This section of the Basis of Design details the codes and standards that were followed when designing the various building systems. The year that the applicable code or standard was published is included, as the code will likely be updated during the lifespan of the building. In some cases, systems will be designed to “Best Practice”, which often exceeds requirements of certain codes/standards.

Codes and Standards Used

Type	Name & Year of Code/Standard	Reason For Use
ACI		
ACI 318-14	Building Code Requirements for Structural Concrete	Cast-in-place Concrete Design and Construction
ACI 530-11	Building Code Requirements for Masonry Structures	Design of Masonry
AISC		
AISC 360-10	Specification for Structural Steel Buildings	Steel Design and Construction
AISC	Manual of Steel Construction 14th Edition	Steel Design and Construction
SDI		
SDI DDM04	Steel Deck Institute- Diaphragm Design Manual	Design and construction of Steel deck diaphragm
ASCE		
ASCE7-10	Minimum Design Loads for Building and other Structures	Loading Criteria
Codes		
State	IBC 2015	Most recent national code
	NFPA 220	Structural framing hourly rating requirements

DESIGN VALUES AND ASSUMPTIONS

This section of the Basis of Design documents specific numbers used in the design of the building. These values and assumptions are an essential part of making the transition from the Project Intent to installed systems. The table below lists the values and assumptions applicable to this project.

Design Values and Assumptions

Item	Description of Value or Assumption	Value (units)
1	Risk Category	III
2	Wind criteria	Wind speed – 120 mph
		Exposure- B
		Enclosure Classification- Enclosed
3	Seismic criteria	Site Lat/Long – 43.069932°N, 89.412630°W
		Soil Classification – C (verified)
		Ss= 0.084g, S1= 0.046g
		SDs= 0.068g, SD1= 0.052g
		Seismic design category – A (minimum)
4	Snow Loads	Ground Snow Load – 30 psf
		Thermal Factor – 1 (Heated Areas)
		Thermal Factor – 1.2 (Seating Areas)
		Uniform Flat Roof Snow Load (Heated Areas) – 23.1 psf
		Uniform Flat Roof Snow Load (Seating Areas) – 27.7 psf
		Snow Density – 17.9 pcf
5	Minimum design live loads:	Common Areas – 100 psf
		MEP – 150 psf
		IT/Storage – 125 psf

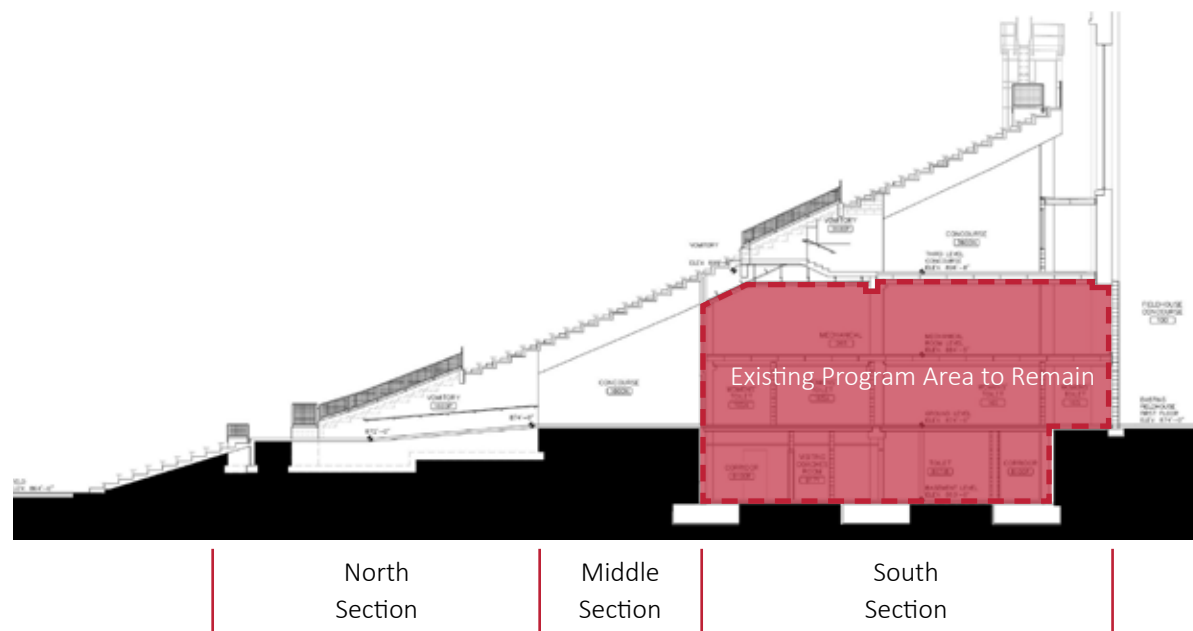
STRUCTURAL SYSTEMS NARRATIVE

DESIGN

There are multiple design options associated with reconfiguring the south endzone seating area of Camp Randall. Each that could be completed as a standalone project or in some combination with another option. Square footages, seat count and other parameters associated with each option are defined elsewhere. This narrative is a composite narrative intended to address each and all of the options but not apply to each and every option.

EXISTING BUILDING

The South Endzone areas original building's strip and spread footing foundation system was founded on a native sand strata having an allowable bearing capacity of 7,500 pounds per square foot (psf). Simplistically the existing south endzone area can be looked at as comprised of a north, middle and south section. The north section currently is a sloping slab-on-grade tread/rise system with a frost wall along the north edge and a retaining wall along the south edge where it transitions to the middle section. At the middle section at the base of the retaining wall there is a horizontal slab-on-grade for the concourse/concessions area with precast concrete raker beams overhead supporting a precast concrete tread/riser system that is an extension of the slab-on-grade tread/riser of the north section. To the south of the middle section is the south section that is a multi-level building with the lowest level being 1-story lower than the concourse/concession slab-on-grade of the middle section. Along the common line between the middle and south section there is a 1-story concrete foundation wall at the lowest level with a vertical precast column/wall line above basically separating these 2 sections much like the retaining wall separated the north and middle sections.



The south section has elevated horizontal levels at the ground level (that aligns with the middle section slab-on-grade), mechanical level and third level concourse areas each framed using horizontal precast plank some with topping slab and some without. Over the third level concourse the precast rakers and tread/riser systems continue their upward slope to the southernmost limits of the area. The lowest level of the south section is also a conventional slab-on-grade but is interior and horizontal.

In the southwest corner of the stadium immediately adjacent to the South Endzone areas there is just a raised precast concrete tread/riser on raker beam system that is elevated over the main vehicle accessible drive unto the stadium field that completes the stadium bowl (Site 8). This area is supported by precast columns on a shallow footing foundation and cast-in-place walls forming an at-grade storage room.

2019 DESIGN ALTERNATIVE

DEMOLITION

To facilitate the proposed, demolition of the existing construction will be required; Site 8 precast (the area over the storage room may be able to remain in place but still needs to be determined based on final program and bowl accessibility requirements

South Endzone Area

- North section
- Middle section
- South section above the Upper Concourse area over the existing Mechanical room that is to remain). This will require saw-cutting existing precast columns just above Upper Concourse Level.

NEW CONSTRUCTION

Since the original South Endzone south section is supporting one additional level over what the existing design was based upon, loads to foundations and vertical load bearing columns and walls to remain is something that will need to be evaluated. If the existing conditions can support the additional load without remedial efforts that would be ideal. However, if it is determined that new loads exceed allowable footing capacities, enhancement of the existing foundation system using micropiles or a similar foundation system will likely need to be incorporated into the design. If columns are determined to be deficient in load capacity they can be jacketed with additional concrete as required by design. To help mitigate higher loads to the existing columns and foundations, design alternatives that could be explored and implemented include using steel beams (including raker beams) and tread/riser sections stepped seating areas looking at alternative materials including aluminum and composite based products.

STRUCTURAL SYSTEMS NARRATIVE

New field level seating will be a stepped slab-on-ground system a slab-on-ground would also be used at the main concourse level between the Field Club and existing Lockers/Support space. Selection of the structural framing in elevated slab areas will need to consider the following;

- Water infiltration potential and what the spaces below are
- Potential self-weight of the system (in the case of existing foundations)
- Any fireproofing requirements
- Vibrational considerations

For the Club Seating area it is anticipated that the framing system would be similar to existing conditions consisting of precast tread/riser sections but potentially supported by steel raker beams in lieu of new precast concrete raker beams. The concourse floor area below the Club Seating and over the Field Club space could consist of a topping slab over membrane over either a precast concrete plank or concrete on metal deck system. A surface applied membrane over a topping slab directly on top of the precast plank or a form and poured cast-in-place concrete slab are also possible options. However we would advise against providing a surface membrane on any concrete on metal deck option in areas to see moisture due to the potential for the metal deck corroding away over time. Concrete on metal deck, a precast plank or a form and poured slab could all be supported by a steel beam system if the Club Seating area has steel raker beams but if precast concrete raker beams were to be used, a precast concrete beam and column system would also be used over the Field Club.

Extension of the existing concourse slab in the Club area, the Loge Seating/Club Mezzanine as well as the Upper Terrace levels will consist of a steel framed beam and column support system. Floor options are the same as described above with two exceptions:

- May look at an alternative material for tread/risers for Loge Seating for load purposes
- Since the Club Mezzanine is intended on being an enclosed space, a concrete on metal deck flooring system could be used.

Regarding the Upper Terrace, to mitigate vibrational/serviceability issues associated with the cantilevering nature of this space and what is anticipated to be a lively occupancy on this deck, preliminary design efforts have established that a 6" thick formed and poured concrete slab supported by a series of sub steel beams tying into major steel girders spanning north south tapered at the cantilever would suffice. Vibrationally a sporting event as well as a dance and dine event were investigated for the Upper Terrace. For both sporting and dance and dine reviews we used what they call the $f_{step} = 2.7\text{Hz}$ which is a comfortable but not overly conservative value and for both events we looked at the first two harmonics as recommended by industry standards. Under the sporting event the peak accelerations were determined to be 5% Gravity which is acceptable for such an event. Under what is

called Dance & Dine event, vibrations were determined to be 3.4% Gravity. This is higher than the 2.5% Gravity goal that we set meaning some patrons under a dance and design event may feel uncomfortable. Final configuration, length of cantilevers may bring the peak acceleration below this limit and is something that will need to be evaluated during actual design and if a dance and design event should even be a design requirement.

Site 8 rebuild will follow the form of what is done in the new South Endzone design in order to avoid mixing of trades and obtaining the best value. While the stepped tread/riser sections will likely be new precast concrete (since will be on new foundations), the main structural system could either be a precast system like it was done originally or a steel framed system. The kitchen floor in this site area would be done similarly to what is described for over the Field Club area.

Lateral resistance to the upper decks over the original South Endzone south section will be accomplished utilizing frame action between the new steel beams and girders and the steel columns that they bear on as an extension of the existing precast columns below. The natural truss profile that the raker configuration causes is a natural to address other lateral loading requirements as long as anchored to properly design foundations. As the design develops, lateral resisting elements in the form of walls, frame action or braced frames in the direction of the perimeter of the seating bowl will need to be incorporated.

